

Impact of Distance Learning on Pharmacy and Pharm.D Undergraduates' during the COVID-19 Pandemic in Jordan

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ABSTRACT

Objective: The study aims to evaluate the impact of distance education on Pharmacy, Pharm.D and postgraduate students' satisfaction and its associated factors during COVID -19 pandemic.

Methods: A cross-sectional web-based survey was distributed online for Pharmacy, Pharm.D and postgraduate Diploma and Master Students across Jordanian universities. Expiratory factor analysis (EFA) and Cronbach's alpha were conducted to examine the validity and the internal consistency of the survey, respectively. .Analysis of Covariance (ANCOVA), Chi square test and t-test were conducted to evaluate the variables associated with students' satisfaction with distance learning.

Results: A total of 860 students completed the survey. The EFA generated a three-factor model including positive impact, negative impact and general impact. The mean scores of the factors were 2.84 (SD=1.03), 2.78 (SD=0.92) and 2.34 (SD=1.22) respectively. Several factors were associated with students' level of satisfaction with distant learning including gender, nationality, university type and field of study.

Conclusion: Distance education had negative impact on Pharmacy and Pharm.D. students' satisfaction, which opens the doors for the necessity to improve the distance education for university students. Variables including gender, nationality, university type and field of study were associated with students' level of satisfaction.

Keywords: The COVID-19, distance learning, satisfaction, impact; pharmacy and pharm. D students, Jordan.

INTRODUCTION

In December 2019, the world started investigating an outbreak of a novel virus named Coronavirus Disease of 2019 (COVID-19), which started from Wuhan, China.(1) The virus spread worldwide and millions of confirmed cases had been recorded and hundreds of thousands of lives had been claimed by the infection(2). The COVID-

19 pandemic requires a number of varied restriction strategies as preventative measures to stop or slow down its spread around the world. Therefore, many countries, including Jordan, imposed an overall lockdown that included travel restrictions, quarantines, and schools and universities closure.(3,4) These measures intended are to help in slowing the infection rate and providing time to researchers to come up with effective treatment against COVID-19.(5) This on the other hand obligated activation of distance education and web-based learning for schools and universities. Despite the advantages of e-Learning in

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saving the mental and physical health of school and college students, disadvantages have equally been identified, including the lack of interaction between both faculty academics and students, the negative effect on students' communication skills, and the less efficient technique of learning due to remoteness when compared to the face-to-face learning process (6, 7).

An earlier study showed that remote-campus students reported lower academic performance than main-campus ones.(8) On the other hand, other studies reported the opposite and showed that distance education was more effective and successful.(9-11)

Such controversial findings led to many questions about the impact of this time period on learning outcomes and university students' academic performance. Therefore, this study aims to describe students' experiences of distance education and to investigate the impact of distance education on Pharmacy students' satisfaction with the education process during the COVID-19 pandemic. The present study findings should provide insights on and opens doors for improving the web-based teaching environment and hence improving education outcomes.

Aim of study

The aim of this study is to evaluate the impact of distance education on Pharmacy, Pharm. D and postgraduate Diploma and Master students' satisfaction and its associated factors during the COVID -19 pandemic.

Methods

Study design and subjects

A cross-sectional web-based design survey was distributed among first to sixth-year Pharmacy and Pharm.D. in addition to postgraduate students including Diploma and Master students across all universities in Jordan. The study participants were registered in Jordanian universities that are accredited by the Accreditation Council of Higher Education in Jordan. The study received ethical approval (number: (36/132/2020) by the Institutional Review Board Committee at King Abdullah

University Hospital / Jordan University of Science and Technology in May 2020.

Study instrument

The survey used in this study was a custom-designed questionnaire that describes participants' demographics including age, gender, nationality, level of study, name of the University, and academic patch. The survey also evaluated students' satisfaction with distance education and its' impact on academic performance and usual daily activities. Ten questions were included in the questionnaire to evaluate the students' satisfaction level with distance learning. The validated questionnaire contained three factors; the first one was "Negative impact", which consists of five questions that discussed the quality of the applied distance education, the fairness of assessment, and the impact of distance education on clinical training. The second factor was the "Positive impact" which included three questions related to students' satisfaction level toward distance learning and whether they enjoyed it or not and the advantage provided by this system in terms of saving transportation time. The final factor was the "general impact" which evaluated how COVID-19 changed the students' study plans and daily activities routine. The score was reversed in questions that evaluated "Negative and General Impact", where a higher mean indicated lower satisfaction with distance education. The questionnaire was developed in English, the official study language at Colleges of Pharmacy in Jordan. The questionnaire was reviewed for face validity by expert academics in the field of pharmacy practice and Pharmacoepidemiology. The Google-formatted survey was piloted on purposely selected twenty Pharmacy and Pharm.D. k students and the results of the pilot study were excluded from the final analysis, and their feedback regarding the clarity and length of the survey was addressed appropriately. The questionnaire included ten 5 points Likert-type scale questions which evaluated the students' satisfaction with distance education. A score of 5 indicated complete satisfaction and the score of one represents complete dissatisfaction, with reverse scoring used for negative questions.

Sample size calculation

The sample size was calculated using the Kish formula for sample size estimation at a 95% significance level and 5% error margin. The estimated sample size was 384. To avoid dropout, 10% of the sample size was added and the target sample size, therefore, was 422. However, a total of 860 undergraduate and postgraduate students were recruited in the present study.

Statistical analysis

Data analysis was conducted using SPSS Version 20. Continuous variables were presented as means and standard deviations (SD), while categorical variables were presented as frequencies and percentages.

Exploratory factor analysis (EFA) was conducted to validate the questionnaire and determine the best model that represents the study data. Kaiser-Meyer-Olkin value (KMO), and Bartlett’s Test of Sphericity were conducted to evaluate the suitability of the data for EFA. Communalities were examined, and any item with a commonality that was less than 0.4 was removed from the data. Parallel analysis and scree plot were used to determine the most suitable

number of factors for the study data. EPA was conducted using principal-components analysis using varimax rotation; orthogonal rotation was used because the correlations of the produced factors were less than the 0.32 cut-off point. Any item that had a loading below 0.4 in all factors or had a loading of 0.4 or more in multiple factors was excluded. Discriminate validity was evaluated by examining the factor correlation matrix. Cronbach’s alpha and Cronbach’s alpha if item deleted were calculated to evaluate the internal consistency of each factor.

T-test, chi-square, and analysis of covariance (ANCOVA) were used to evaluate any significant association between participants' demographics and their satisfaction level with distance education.

Results

A total of 860 Pharmacy students completed the questionnaire. As shown in Table 1, the majority of the students were females (67.3%), Jordanians (81.5%), and undergraduate Pharmacy students (60%). No significant difference in the number of the participants in terms of private versus public university was observed in the current study.

Table 1. Demographics of the study participants

		Frequency (Percent)
Gender	Female	108 (37.8)
	Male	178 (62.2)
Degree of Study	BSc.	9 (3.1)
	PhD.	225(78.7)
	MSc.	52 (18.2)
Academic Position	Professor	40 (14)
	Associate Professor	83 (29)
	Assistant Professor	103 (36)
	Teaching Assistant	10 (3.5)
	Teacher	50 (17.5)
Employment Status	Part Time	12 (4.2)
	Full Time	274 (95.8)
Specialty	Medical	122 (42.7)
	Social Sciences	107 (37.4)
	Engineering, IT, Science	57 (19.9)
Field of Education	Scientific	226 (79)
	Non-Scientific	60 (21)

		Frequency (Percent)
Have you operated online teaching before the COVID-19 pandemic?	No	168 (58.7)
	Yes	118 (41.3)
Have you received training for online teaching?	No	143 (50)
	Yes	143 (50)
Have you attended any courses as a trainee through the internet?	No	123 (43)
	Yes	163 (57)
Age		44.30 (9.652)
Number of years of online teaching		3.49 (3.302)
Number of years of teaching experience		11.31 (8.037)

The KMO test result was 0.82 and Bartlett's Test of Sphericity was $\chi^2(45) = 3246.57$, $p < 0.01$ indicating that the study data are suitable for factor analysis. Scree plots (figure 1) and parallel analysis indicated that the three-factor model was the most suitable representation of the study data; the three factors are "Positive impact", "Negative impact" and "General impact". As Table 2 shows, factor loadings for all the ten items were higher than 0.04 and the item "I'm aware that online classes are the only way to continue the semester, but need better strategies", in the "Negative impact" factor had the lowest loading (0.69) and the lowest communality (0.57). All

three factors had a high Cronbach's alpha (above 0.8) indicating acceptable internal consistency; also, when applicable, deleting an item will not improve the reliability of the factor. The mean of the three factors "General impact", "Positive impact" and "Negative impact" was 2.34 (SD=1.22), 2.84, (SD=1.03) and 2.78, (SD=0.92) respectively, and the total mean of the three factors was 2.66 (SD=0.64). The item "the online education is the worst thing happened" had the higher mean =3.10, SD=1.20), whereas the item "the effect of COVID-19 on your daily routine" had the lowest mean 2.32, SD=1.35.

Table 2. The mean and standard deviation for each questionnaire item and for the total items

	Mean (Std)
1. The level of my interactions with students in the online course is higher than in a traditional face-to-face class.	2.25 (1.09)
2. The flexibility provided by the online environment is important to me.	3.44 (1.10)
3. My online students are actively involved in their learning.	2.66 (1.10)
4. I incorporate fewer resources when teaching an online course as compared to traditional teaching.	3.47 (1.17)
5. The technology I use for online teaching is reliable.	3.65 (0.94)
6. I have a higher workload when teaching an online course as compared to the traditional one.	1.81 (0.96)
7. I miss face-to-face contact with students when teaching online.	1.76 (0.90)
8. I do not have any problems controlling my students in the online environment.	2.95 (1.22)
9. I look forward to teaching my next online course.	2.66 (1.09)

	Mean (Std)
10. My students are very active in communicating with me regarding online course matters.	2.98 (1.11)
11. I appreciate that I can access my online course any time at my convenience.	3.48 (0.98)
12. My online students are more enthusiastic about their learning than their traditional counterparts.	2.14 (0.93)
13. I have to be more creative in terms of the resources used for the online course.	2.17 (0.91)
14. Online teaching is often frustrating because of technical problems.	2.48 (0.97)
15. It takes me longer to prepare for an online course on a weekly basis than for a face-to face course.	1.88 (0.91)
16. I am satisfied with the use of communication tools in the online environment (e.g., chat rooms, threaded discussions, etc.).	3.4 (0.94)
17. I am able to provide better feedback to my online students on their performance in the course.	2.71 (1.05)
18. I am more satisfied with teaching online as compared to other delivery methods.	2.38 (1.08)
19. My online students are somewhat passive when it comes to contacting the instructor regarding course related matters.	2.5 (0.96)
20. It is valuable to me that my students can access my online course from any place in the world.	3.96 (0.73)
21. The participation level of my students in the class discussions in the online setting is lower than in the traditional one.	2.15 (0.97)
22. My students use a wider range of resources in the online setting than in the traditional one.	2.81 (1.08)
23. Technical problems do not discourage me from teaching online.	3.16 (1.14)
24. I receive fair compensation for online teaching.	3.33 (1.08)
25. Not meeting my online students face-to-face prevents me from knowing them as well as my on-site students.	3.56 (1.57)
26. I am concerned about receiving lower course evaluations in the online course as compared to the traditional one.	2.6 (0.98)
27. Online teaching is gratifying because it provides me with an opportunity to reach students who otherwise would not be able to take courses.	2.88 (1.03)
28. It is more difficult for me to motivate my students in the online environment than in the traditional setting.	1.97 (0.89)
Total Items	2.76 (0.5)

As shown in Table 3, there was a significant association between different variables and the mean of each factor and the overall factors. For example, the total impact (the mean of the three factors) was significantly associated with the field of study, nationality, gender, and college year. These results

were also confirmed when ANCOVA was conducted, as the result of the analysis indicated that several factors were significantly associated with total impact including gender, nationality, university type, and field of study.

Table 3. Questionnaire Subgroup Satisfaction Scores

		Mean (SD)
Gender	Female	2.75 (0.50)
	Male	2.76 (0.50)
Degree of Study	BSc.	2.61 (0.38)
	PhD.	2.76 (0.51)
	MSc.	2.78 (0.50)
Academic Position	Professor	2.85 (0.43)
	Associate Professor	2.78 (0.48)
	Assistant Professor	2.70 (0.56)
	Teaching Assistant	2.71 (0.34)
	Teacher	2.77 (0.47)
Employment Status	Part Time	1.5 (0.37)
	Full Time	1.9 (0.38)
Specialty	Medical	1.49 (0.08)
	Social Sciences	1.97 (0.12)
	Engineering, IT, Science	2.47 (0.11)
Field of Education	Scientific	2.77 (0.50)
	Non-Scientific	2.70 (0.48)
Have you operated online teaching before the COVID-19 pandemic?	No	2.71 (0.49)
	Yes	2.82 (0.51)
Have you received training for online teaching? *	No	2.69 (0.49)
	Yes	2.82 (0.50)
Have you attended any courses as a trainee through the internet? *	No	2.62 (0.50)
	Yes	2.86 (0.47)

* P value <0.05

Discussion

The present study enlightens the impact of distance education on Pharmacy, Pharm. D and postgraduate Diploma and Master Students' satisfaction during COVID-19 pandemic. This study formulated and validated a questionnaire to evaluate students' level of satisfaction with distance education and analyzed the factors that may influence their satisfaction. Students' satisfaction towards distance learning methods may be influenced by several factors such as internet server capacity, internet connection speed, and examination security.(12) Such different variables might explain the contradicting findings with of students' level of satisfaction with distance learning.(13-

15) As shown in the results, the majority of participated students reported low satisfaction with the web-based learning, even though the students had the same content, the same form of evaluation, and the same level of information delivery in both distances and on-campus education. Many students in the present study described distance education as the worst thing that happened (mean of that question=3.10, SD=1.20), and many considered that the education quality during online education decreased (mean=2.73, SD= 1.18). The current study finding is consistent with previous research findings, which reported that Pharmacy students in the remote campus were less satisfied with the education process and

had significantly lower course scores when compared with students who had campus-based learning.(8) A meta-analysis study reported that high-education students were more satisfied with live campus-based courses when compared to distance education formats. This may be attributed to the insufficient quality of services provided by e-learning which require computer access, (16) in addition to the technical and internet access problems or the low students' technical skills.(17) Moreover, students' satisfaction level may be influenced by the lack of interactivity nature of the online learning material which is limited to videos and written e-mails.(18) On the other hand, many studies demonstrated more students' satisfaction with the e-learning process,(19-20) where they could check emails and the University website and were capable to have access to the Moodle platform at home to complete their assignments on daily basis. Furthermore, the e-learning process enhances students' active participation by verifying and mentoring students' access to completed the required assignments.(11)

The results of this study indicated that students were not satisfied with the clinical training received during the pandemic, and they thought that they were deprived of getting field-related knowledge and the information they need. The lack of direct interaction with other healthcare professionals, which could negatively impact the inter-professional learning experience for the clinical training of the students,(21) could justify this finding.

Consistent with a previous research finding,(22) advanced-stage students with prior and frequent online experiences during their academic educational journey such as master degree students, showed significantly higher satisfaction level and were more able to learn from different video styles, when compared with other earlier stage students. Results also showed that males were more satisfied with two of the three factors than females, but the reasons are not clear yet.

On the "General impact" questions, the students confirmed that the COVID-19 and distance learning made

significant changes in their daily routine and study plans. However, this finding was not surprising because this is the first time they applied distance learning in full-term with no prior preparation strategies.

The current study findings shed the light on improving the e-learning technique that provides distinctive academic services and ensuring that each component of the integrated educational system contributes to improving the student learning environment.(23) One of the strongest recommendations to improve distance learning is to create clear and unobstructed visual materials while the instructor is also simultaneously visible.(22)

Limitations

The sample is web-based thus there is a subject selection bias and generalizability is not warranted. Other factors such as student GPA, geographical location, number of family member vs. number of devices, grade obtained and others which could potentially impact student satisfaction were not evaluated in the present study. Finally, the measure of satisfaction might have improved by now or get more accepted, thus the study findings might not resilient over time.

Conclusion

The students' low satisfaction with distance education reported in the present study opens doors for distance education improvement and supports more learner-focused approaches to improve the web-based teaching environment and hence improving education outcomes. It is expected that the outcomes of this study will help decision-makers understand the challenges that affect students' motivation toward online learning in order to implement future interventions which match students' expectation in a step to improve the online learning outcomes.

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Authors' contribution

AJ, WA, TL and AA conceived and designed the study.

AJ, TL, DA and AA conducted research, provided research materials, and collected and organized data. AJ, WA and DA analyzed and interpreted the data. TL, AA and DA wrote the initial and final drafts of the article and provided logistic support. AJ and WA performed the critical revisions in the manuscript. All authors have critically reviewed and approved the final draft and are responsible

for the content and similarity index of the manuscript.

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تأثير التعلم عن بعد على طلاب الصيدلة والصيدلة السريرية الجامعيين خلال جائحة كوفيد-19 في الأردن

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ملخص

الهدف: تهدف الدراسة الحالية إلى تقييم تأثير التعليم عن بعد على رضا طلاب الصيدلة والصيدلة السريرية والعوامل المرتبطة به خلال جائحة كوفيد-19.

الطرق: تم توزيع مسح مقطعي على شبكة الإنترنت على طلاب الصيدلة والصيدلة السريرية في مختلف الجامعات الأردنية. تم إجراء تحليل عامل الاستكشاف و Cronbach's alpha لفحص الصلاحية والاتساق الداخلي للمسح على التوالي. تم إجراء تحليل التباين المشترك (ANCOVA) واختبار مربع كاي واختبار تي لتقييم المتغيرات المرتبطة برضا الطلاب عن التعلم عن بعد .

النتائج: أكمل الاستبيان 860 طالبًا. أنتج تحليل عامل الاستكشاف نموذجًا من ثلاثة عوامل يتضمن التأثير الإيجابي والأثر السلبي والأثر العام. كان متوسط درجات العوامل 2.84 (1.03)، 2.78 (0.92) و 2.34 (1.22) على التوالي. ارتبطت عدة عوامل بمستوى رضا الطلاب عن التعلم عن بعد بما في ذلك الجنس والجنسية ونوع الجامعة ومجال الدراسة.

الخلاصة: كان للتعليم عن بعد تأثير سلبي على رضا طلاب الصيدلة والصيدلة السريرية، مما يفتح الأبواب لضرورة تحسين التعليم عن بعد لطلاب الجامعة. ارتبطت المتغيرات بما في ذلك الجنس والجنسية ونوع الجامعة ومجال الدراسة بمستوى رضا الطلاب.

الكلمات الدالة: كوفيد-19، الدراسة عن بعد، رضا، تأثير، طلاب الصيدلة والصيدلة السريرية، الأردن.

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