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ORIGINAL RESEARCH

The Attitude of King Saud University Medical Students Toward Online Distance Learning During the COVID-19 Pandemic

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Objective: To explore the attitudes of medical students at King Saud University (KSU) toward online distance learning during the COVID-19 pandemic and to examine the effects of gender, academic year and level of computer skills on student attitudes toward distance learning.

Methods: A previously validated questionnaire was distributed to participants via WhatsApp using a stratified random sampling method. Data were analyzed using SPSS version 26.0 statistical software. Means and standard deviations were used to examine quantitative variables, while frequencies and percentages were used to examine qualitative variables.

Results: Our study included 533 students; 71.9% of participants were satisfied with online classes, while 59.6% struggled to receive explanations due to limitations to face-to-face interactions. Two-thirds of participants thought that online classes were more convenient because of their flexibility with respect to location. A similar proportion (65.3%) believed that in situations of distance learning, it was difficult to meet and work with friends. The majority (88.7%) of participants agreed that distance learning saved time and effort spent traveling to campus. Finally, most participants 355 (66.6%), favored blended learning, while only 111 (20.8%) of participants preferred in-class learning. Students in preclinical years had more negative attitudes regarding face-to-face interactions (66.5% vs 54.9%, P=0.027) and meeting with friends (69.3% vs 58.7%, P=0.026) than did students in clinical years. Gender and level of computer skills did not affect students' attitudes toward distance learning ($P > 0.05$).

Conclusion: The majority of student participants felt that online distance learning was an effective option during the pandemic, but they preferred to preserve face-to-face teaching as a concurrent option. Attitudes toward certain aspects of distance learning were more negative among students in preclinical years than among students in clinical years. We did not find any effects of gender or level of computer skills on student attitudes toward distance learning.

Keywords: distance learning, online classes, COVID-19, attitudes, medical students

Introduction

Since the emergence of the novel coronavirus disease (COVID-19) in December 2019, varying degrees of lockdown have been employed by governments in different countries worldwide to control the spread of the disease. The seriousness of the COVID-19 pandemic led to the suspension of almost all activities in the interests of safety. Academic institutions were also required to take drastic measures by suspending traditional teaching and implementing distance learning to ensure the safety of students and staff.[1]

Distance learning refers to the use of information communication technologies to transmit knowledge to students, facilitate student-teacher and student-student communication,[2,3] and help learners living in remote cities attend courses that are not available in their hometowns.[4,5] Internet-based learning, computer-based learning, virtual classrooms, and digital collaboration represent different types of e-learning.[2] In the context of medical education, online learning is rapidly expanding; however, online learning is considered to be a relatively new concept, and there are many barriers to

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its development and implementation. Additionally, this approach to learning requires a culture of striving to promote and support both students and staff to adopt online learning and teaching strategies.[6]

During the current COVID-19 pandemic, almost all institutes implemented distance learning, including medical schools. It is important to identify students' opinions and viewpoints regarding this virtual approach to teaching and learning,[7] as the attitude of medical students toward their mode of learning plays a tremendous role with respect to their productivity, understanding and achievement. Both before and during the pandemic, e-learning has been considered to be an effective method for teaching both graduate and undergraduate students in different fields, including medicine.[8–10] During the COVID-19 pandemic, several studies evaluated the satisfaction of medical students in preclinical years with distance learning, while other studies investigated the satisfaction of students in clinical years in the same context.[3,7,10,11] In addition, mixed results have been published, with both positive and negative attitudes toward distance learning among health care students. Moreover, systematic reviews about online learning showed conflicting results and data were insufficient to draw a clear conclusion.[12,13]

During the pandemic, medical college at king Saud university introduced for the first-time online distance learning to adapt to the lockdown, the effect of this new strategy of teaching on our students was not studied before. Therefore, the current study, aimed to evaluate the attitudes of medical students in both preclinical and clinical years toward online classes. Additionally, we intend to examine any differences in attitudes based on the gender, level of education and computer skills of participating students.

Methods

The present study is a cross-sectional study that was conducted at Medical College, King Saud University, Riyadh, Saudi Arabia, from October 2020 to January 2021 via an online questionnaire. We used a validated questionnaire after being granted permission by the first author of a recently published study.[14] After obtaining ethical approval from the Institutional Review Board (IRB) and receiving consent from participants, the questionnaire was distributed to King Saud University medical students via WhatsApp. The online questionnaire is composed of two sections. The first section contained simple demographic questions (concerning gender, age, academic year, number of family members, family income, and computer skills), and the second section included ten questions that asked participants to rate their responses on a five-point Likert scale including the response options of strongly agree (SA), agree (A), neutral (N), disagree (D) and strongly disagree (SD).

In accordance with a similar study,[15] the sample size was calculated by using the following formula: $n = z^2 [p(1-p)] / d^2$ where n = sample size, z = 1.96 at the 95% level of significance, p = prevalence of medical students' satisfaction with online classes, and d = degree of precision (0.05). The estimated required sample size was 384 students. However, we obtained a sample size of 533 students, and all students were included in the analysis. A stratified random sampling technique was employed. Each year (1st, 2nd, 3rd, 4th, and 5th) was divided into two groups (males and females), and students were chosen randomly from each group.

Statistical Analysis

Data were analyzed using SPSS version 26.0 statistical software. The mean and standard deviation were used to describe quantitative variables, while frequencies and percentages were used for qualitative variables. The chi-square test was used to evaluate the associations between the categorical and outcome variables. A p value of <0.05 was used as a measure of statistical significance.

From the questionnaire, we recorded a positive attitude if the answers were in favor of distance learning and a negative attitude if the answers were opposed to distance learning. For statements 1, 3, 4 and 7 we reported a positive attitude if students choose "agree" or "strongly agree" and a negative attitude if students choose "disagree" or "strongly disagree".

For statements 2, 5, 6 and 8, we reported a positive attitude if students chose "disagree" or "strongly disagree" and a negative attitude if students chose "agree" or "strongly agree".

For questions in Figures 1 and 2 if students answered "yes", we recorded a positive attitude, while answers of "no" were recorded as a negative attitude.

Results

Five hundred and thirty-three students participated in our survey, of whom 345 (64.7%) were male. The baseline characteristics of the sample are displayed in Table 1. The mean age was 21.36 with a standard deviation (SD) of

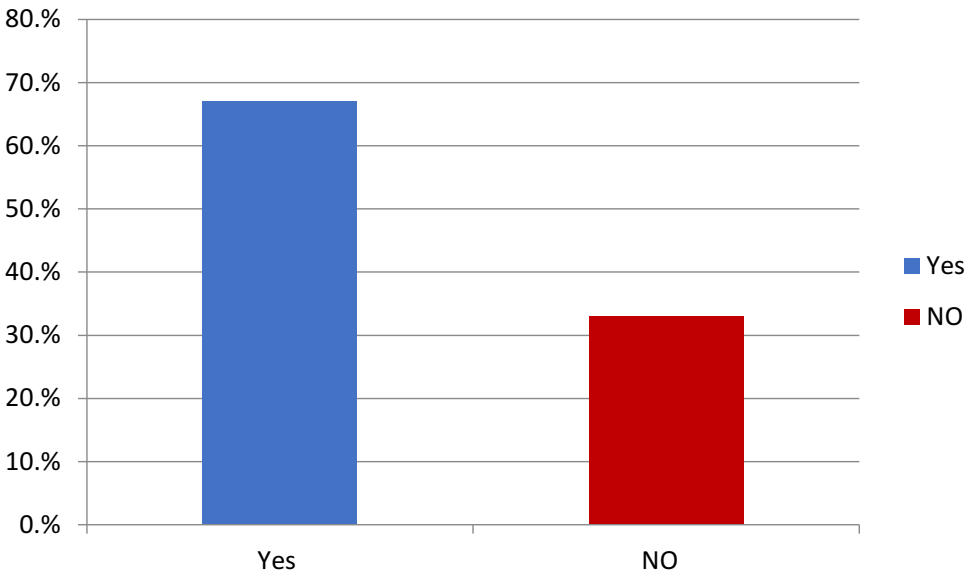

Figure 1 Overall, did you like distance learning?.

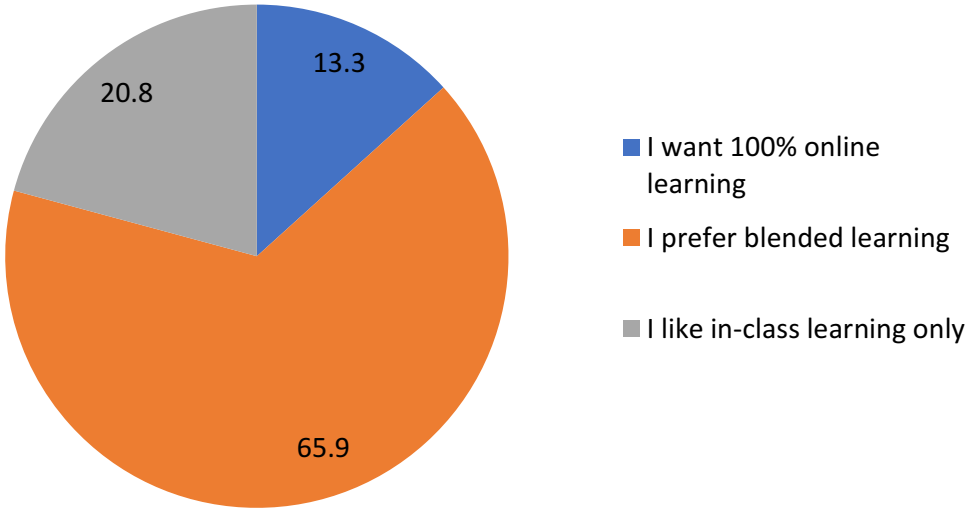

Figure 2 Would you like to continue distance learning in the future?.

1.77. Preclinical students (first and second year) constituted 41% of the sample, while other students were in their clinical years. Most students (66.2%) had a family income of more than 20,000 Saudi Riyals, and the majority (85.4%) thought that they had good or excellent skills using a computer or laptop.

Table 2 shows the responses of medical students to questions evaluating their attitudes toward distance learning during the COVID-19 pandemic. Most students agreed or strongly agreed that they were able to study effectively online (71.9%). More than half (59.6%) of students thought that distance learning occasionally made it difficult to receive explanations because of the limitation to face-to-face interaction. Sixty-five percent of students concluded that distance learning was very effective due to flexibility with respect to location. Approximately two-thirds (65.3%) of participants believed that distance learning made it difficult for them to meet and work with friends. The majority of students (88.7%) agreed that during the pandemic, distance learning saved time and effort spent traveling to campus. Overall, online classes were favored by 66.6% of participants, and only 20.8% disliked distance learning and preferred in-class learning only (Figure 1& 2).

There were no significant differences between males and females regarding their attitudes toward distance learning (Table 3). Students in preclinical years had more negative attitudes than did students in clinical years

Table 1 Distribution of Demographic Characteristics of Study Subjects (n=533)

Characteristics	N (%)
Gender	
Male	345 (64.7)
Female	188 (35.3)
Age	Mean: 21.36 SD: 1.775
Academic year	
First	104 (19.5)
Second	114 (21.4)
Third	104 (19.5)
Fourth	102 (19.1)
Fifth	109 (20.5)
Number of family members	Mean: 7.01 SD: 2.556
Family income	
<5000	11 (2.1)
5000 - <10,000	33 (6.2)
10,000 - <15,000	59 (11.1)
15,000–20,000	77 (14.4)
>20,000	353 (66.2)
Skills in using computers/laptops	
Excellent	274 (51.4)
Good	181 (34)
Average	78 (14.6)

Abbreviations: N, number of participants; SD, standard deviation.

Table 2 Distribution of Study Subject Responses to Items Regarding Online Classes

Survey Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	N (%)	N (%)	N (%)	N (%)	N (%)
1) I am able to study effectively online	145 (27.2)	238 (44.7)	85 (15.9)	56 (10.5)	9 (1.7)
2) Distance learning occasionally makes it difficult to receive explanations due to limitations to face-to-face interactions	142 (26.6)	176 (33)	109 (20.5)	79 (14.8)	27 (5.1)
3) I have internet access, and I am able to learn remotely using any device	303 (56.8)	207 (38.8)	20 (3.8)	3 (0.6)	0 (0)
4) Distance learning is very effective due to its flexibility with respect to location	178 (33.4)	170 (31.9)	129 (24.2)	43 (8.1)	13 (2.4)
5) I do not have technological resources for distance learning at home (PC/laptop/camera)	10 (1.9)	20 (3.7)	17 (3.2)	105 (19.7)	381 (71.5)
6) Due to distance learning, meeting/working with friends has become very limited	151 (28.3)	185 (34.7)	95 (17.8)	76 (14.3)	26 (4.9)
7) Distance learning saves time and effort spent traveling to campus	299 (56.1)	174 (32.6)	43 (8.1)	12 (2.3)	5 (0.9)
8) I do not have internet access	0 (0)	6 (1.2)	17 (3.2)	100 (18.8)	409 (76.8)

Note: Adapted with permission from Almuraqab NA. Shall universities at the UAE continue distance learning after the COVID-19 pandemic? Revealing students' perspective. Soc Sci Res Netw. 2020;2022:3620824.[14]
Abbreviation: N, number of participants.

Table 3 Associations Between Attitudes Toward Online Classes and Gender

Survey Statement	Gender		X^2	P value
	Male (n=345) N (%)	Female (n=188) N (%)		
1) I am able to study effectively online				
Positive:	249 (72.2)	134 (71.3)	1.423	0.491
Neutral:	51 (14.8)	34 (18.1)		
Negative:	45 (13)	20 (10.6)		
2) Distance learning occasionally makes it difficult to receive explanations due to limitations to face-to-face interactions				
Positive:	65 (18.8)	41 (21.8)	3.728	0.155
Neutral:	79 (22.9)	30 (16)		
Negative:	201 (58.3)	117 (62.2)		
3) I have internet access, and I am able to learn remotely using any device				
Positive:	327 (94.8)	183 (97.3)	*NA	*NA
Neutral:	17 (4.9)	3 (1.6)		
Negative:	1 (0.3)	2 (1.1)		
4) Distance learning is very effective due to its flexibility with respect to location				
Positive:	217 (62.9)	131 (69.7)	2.532	0.282
Neutral:	90 (26.1)	39 (20.7)		
Negative:	38 (11)	18 (9.6)		
5) I do not have technological resources for distance learning at home (PC/laptop/camera)				
Positive:	319 (92.5)	167 (88.8)	2.142	0.343
Neutral:	10 (2.9)	7 (3.7)		
Negative	16 (4.6)	14 (7.4)		
6) Due to distance learning, meeting/working with friends has become very limited				
Positive:	65 (18.8)	37 (19.7)	4.113	0.128
Neutral:	70 (20.3)	25 (13.3)		
Negative:	210 (60.9)	126 (67)		
7) Distance learning saves time and effort spent traveling to campus				
Positive:	301 (87.2)	172 (91.5)	3.038	0.219
Neutral:	30 (8.7)	13 (6.9)		
Negative:	14 (4.1)	3 (1.6)		
8) I do not have internet access				
Positive:	335 (97.1)	174 (92.6)	*NA	*NA
Neutral:	7 (2)	10 (5.3)		
Negative:	3 (0.9)	4 (2.1)		
9) Overall, did you like distance learning?				
Positive:	229 (66.4)	126 (67)	0.023	0.880
Negative:	116 (33.6)	62 (33)		
10) Would you like to continue distance learning in the future?				
Positive:	272 (78.8)	150 (79.8)	0.066	0.797
Negative:	73 (21.2)	38 (20.2)		

Note: Adapted with permission from Almuraqab NA. Shall universities at the UAE continue distance learning after the COVID-19 pandemic? Revealing students' perspective. Soc Sci Res Netw. 2020;2022:3620824.[14]

Abbreviations: N, number of participants; X^2, chi square.

(66.5% vs 54.9%, P=0.027) when prompted with the survey statement "Distance learning occasionally makes it difficult to receive explanations due to limitations to face-to-face interaction" (Table 4). Students in preclinical years exhibited more negative attitudes than did students in clinical years (69.3% vs 58.7%, P=0.026) regarding the survey question evaluating limitations to meeting or working with friends due to distance learning. There were no significant differences between the groups with respect to the remaining survey statements.

We found no significant differences in attitude toward online classes between students with excellent or good computer skills and those with average skills (Table 5).

Table 4 Associations Between Attitudes Toward Online Classes and Academic Year

Survey Statement	Pre-Clinical Years (n=218) N (%)	Clinical Years (n=315) N (%)	X^2	P value
1) I am able to study effectively online				
Positive:	162 (74.3)	221 (70.2)	4.214	0.122
Neutral:	37 (17)	48 (15.2)		
Negative:	19 (8.7)	46 (14.6)		
2) Distance learning occasionally makes it difficult to receive explanations due to limitations to face-to-face interactions				
Positive:	36 (16.5)	70 (22.2)	7.195	0.027
Neutral:	37 (17)	72 (22.9)		
Negative:	145 (66.5)	173 (54.9)		
3) I have internet access, and I am able to learn remotely using any device				
Positive:	207 (95)	303 (96.2)	*NA	*NA
Neutral:	10 (4.6)	10 (3.2)		
Negative:	1 (0.5)	2 (0.6)		
4) Distance learning is very effective due to location flexibility				
Positive:	134 (61.5)	214 (67.9)	3.623	0.163
Neutral:	62 (28.4)	67 (21.3)		
Negative:	22 (10.1)	34 (10.8)		
5) I do not have technological resources for distance learning at home (PC/laptop/camera)				
Positive:	201 (92.2)	285 (90.5)	0.753	0.686
Neutral:	7 (3.2)	10 (3.2)		
Negative:	10 (4.6)	20 (6.3)		
6) Due to distance learning, meeting/working with friends has become very limited				
Positive:	31 (14.2)	71 (22.5)	7.283	0.026
Neutral:	36 (16.5)	59 (18.7)		
Negative:	151 (69.3)	185 (58.7)		
7) Distance learning saves time and effort spent traveling to campus				
Positive:	193 (88.5)	280 (88.9)	0.019	0.991
Neutral:	18 (8.3)	25 (7.9)		
Negative:	7 (3.2)	10 (3.2)		
8) I do not have internet access				
Positive:	209 (95.9)	300 (95.2)	*NA	*NA
Neutral:	3 (1.4)	14 (4.4)		
Negative:	6 (2.8)	1 (0.3)		

(*Continued*)

Table 4 (Continued).

Survey Statement	Pre-Clinical Years (n=218) N (%)	Clinical Years (n=315) N (%)	X^2	P value
9) Overall, did you like distance learning?				
Positive:	152 (69.7)	203 (64.4)	1.615	0.204
Negative:	66 (30.3)	112 (35.6)		
10) Would you like to continue distance learning in the future?				
Positive:	169 (77.5)	253 (80.3)	0.610	0.435
Negative:	49 (22.5)	62 (19.7)		

Note: Adapted with permission from Almuraqab NA. Shall universities at the UAE continue distance learning after the COVID-19 pandemic? Revealing students' perspective. Soc Sci Res Netw. 2020;2022:3620824.[14]
Abbreviations: N, number of participants; X^2, chi square.

Table 5 Associations Between Attitudes Toward Online Classes and Computer Skills

Survey Statement	Excellent/Good (n=455) N (%)	Average (n=78) N (%)	X^2	P value
1) I am able to study effectively online				
Positive:	334 (73.4)	49 (62.8)	5.122	0.077
Neutral:	66 (14.5)	19 (24.4)		
Negative:	55 (12.1)	10 (12.8)		
2) Distance learning occasionally makes it difficult to receive explanations due to limitations to face-to-face interactions				
Positive:	90 (19.8)	16 (20.5)	0.810	0.667
Neutral:	96 (21.1)	13 (16.7)		
Negative:	269 (59.1)	49 (62.8)		
3) I have internet access, and I am able to learn remotely using any device				
Positive:	436 (95.8)	74 (94.9)	*NA	*NA
Neutral:	18 (4)	2 (2.6)		
Negative:	1 (0.2)	2 (2.6)		
4) Distance learning is very effective due to location flexibility				
Positive:	302 (66.4)	46 (59)	2.192	0.334
Neutral:	105 (23.1)	24 (30.8)		
Negative:	48 (10.5)	8 (10.3)		
5) I do not have technological resources for distance learning at home (PC/laptop/camera)				
Positive:	416 (91.4)	70 (89.7)	*NA	*NA
Neutral:	13 (2.9)	4 (5.1)		
Negative:	26 (5.7)	4 (5.1)		
6) Due to distance learning, meeting/working with friends has become very limited				
Positive:	92 (20.2)	10 (12.8)	5.070	0.079
Neutral:	75 (16.5)	20 (25.6)		
Negative:	288 (63.3)	48 (61.5)		

(*Continued*)

Table 5 (Continued).

Survey Statement	Excellent/Good (n=455) N (%)	Average (n=78) N (%)	X^2	P value
7) Distance learning saves time and effort spent traveling to campus				
Positive:	399 (87.7)	74 (94.9)	4.280	0.118
Neutral:	3 (8.6)	4 (5.1)		
Negative:	17 (3.7)	0 (0)		
8) I do not have internet access				
Positive:	435 (95.6)	74 (94.9)	*NA	*NA
Neutral:	14 (3.1)	3 (3.8)		
Negative:	6 (1.3)	1 (1.3)		
9) Overall, did you like distance learning?				
Positive:	302 (66.4)	53 (67.9)	0.074	0.785
Negative:	153 (33.6)	25 (32.1)		
10) Would you like to continue distance learning in the future?				
Positive:	360 (79.1)	62 (79.5)	0.005	0.941
Negative:	95 (20.9)	16 (20.5)		

Note: *Chi-square test was not applicable as >25% of the cells had expected cell counts <5. Adapted with permission from Almuraqab NA. Shall universities at the UAE continue distance learning after the COVID-19 pandemic? Revealing students' perspective. Soc Sci Res Netw. 2020;2022:3620824.[14]

Discussion

Our study showed that the majority of medical students in preclinical and clinical years have a positive attitude toward online classes. Recently, Al-Mazidi found that both medical students and faculty members gave positive feedback regarding online teaching with respect to theoretical and problem-based learning but not in the context of clinical sessions.[15] Similarly, a study conducted in AlQassim concluded that medical students reported positive attitudes and high levels of satisfaction with online learning when that approach was used to teach basic science and preclinical subjects.[10] Medical students in Nigeria expected that e-learning would be more suitable for them in the future than traditional learning; however, first-year medical students were excluded from this study, which might have impacted its results.[16] In contrast to our results, an Indian study including both medical and nursing students found that the majority of participants were dissatisfied with online classes, particularly junior students.[17] Another study reported that although medical students greatly appreciated the online program, nearly half of the participants in the study believed that physical classes were better than virtual classes.[18] The discrepancy between our results and those of previous studies could be attributed to differences in the types of questions used in the questionnaires. Although we used general questions regarding the advantages and disadvantages of online classes, other studies have focused on the quality of teaching and interactions between students and teaching staff.[17,18]

Interestingly, our study showed that medical students in preclinical years had lower satisfaction with online classes than students in clinical years. This difference may be attributable to the concern expressed by students in preclinical years regarding their ability to obtain explanations due to limitations to both face-to-face interaction and their capacity to meet with their friends. Moreover, final-year students might have more experience and be more confident with respect to e-learning than students in their early years. Our findings agree with the results of studies conducted at medical schools in Nigeria and India.[16,17] Another study conducted during the COVID-19 pandemic that involved only first-year medical students concluded that the majority of participants preferred traditional learning for both theoretical and practical classes but also that such students valued the support of online teaching material.[11] Singh and coworkers found that nearly half of participating medical students thought that physical attendance was better than online classes and that the satisfaction rate of junior students with online learning was comparatively lower than that of senior students.[19] Hanafy et al reported that students in preclinical years have negative attitudes toward online teaching because they believe that it hinders their communication, teamwork, brainstorming, critical thinking, ability to orient themselves and capacity to have support.[20]

On the other hand, a study from Jordan involving medical students in their clinical years showed that more than half of the students were dissatisfied with their overall experience with distance learning.[3] Similarly, another study conducted on a sample of undergraduate medical students in China found that the higher the learning phase was, the lower levels of satisfaction with online classes.[21] The challenges that medical students of various levels face in the context of distance learning are different; while students in preclinical years complain of difficulty interacting with faculty members and friends, students in clinical years find it very difficult to develop adequate clinical skills. Encouraging students to have group discussion and providing tutorial sessions after online classes might improve the quality of distance learning for students at preclinical years. For students at higher levels using simulations and virtual learning can support clinical education.

In our study, we found no gender differences in the attitudes of medical students toward online classes. In contrast, Venkatesh et al showed that in preclinical years, male medical students had significantly higher satisfaction with blended integrated e-learning than those expressed by their female counterparts. Those authors attributed this difference to higher levels of computer self-efficacy and lower anxiety levels among male students than among female students.[22] In our study, we found no effects of the level of computer skills on students' attitude toward online classes, which might indicate that participation in online classes did not require a high level of computer skills.

Although a high percentage of our students had positive attitudes toward online classes, most students preferred a blended form of learning. Consistent with our findings, senior medical students in Jordan believe that in the future, blended learning could be the most appropriate strategy for teaching medicine.[3] Almuraqab found that the majority of college students preferred blended learning, and they suggested that educational authorities should advise universities to continue providing blended learning as an option.[14] In addition, a recent study recommended combining online learning with classroom teaching since online learning cannot be a substitute for traditional education and should rather be used as a supplement, especially in the context of medicine, which requires physical attendance to develop clinical skills.[23] Moreover, medical students in Jeddah agreed that e-learning should be provided in a blended form.[24] Through blended learning, students can gain the benefits and overcome the limitations of both traditional and distance learning.

Limitations

The design of our study is a across sectional which does not follow up individuals over time. This study involved medical students at one university; thus, our findings cannot be generalized to all medical students in other institutions. Moreover, we were not able to access students' performance grades (GPAs), so the effectiveness of distance learning was not measured in this study.

Conclusions

The majority of participating students greatly valued distance learning; however, these students preferred a blended form of teaching, which indicates that distance learning alone may not be sufficient to allow students to develop adequate clinical medical skills. Technological improvement and improvement in faculty training with respect to the task of communicating learning materials in the most efficient way can help maximize the benefits of distance learning. We believe that the results of this study can help stakeholders in our institution and other universities consider blended learning as an option in the future in the context of teaching different classes in medical colleges.

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Disclosure

The authors declare that they have no competing interests.

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