Navigating Post Covid-19 education: An investigative study on students' attitude and perception of their new normal learning environment (#86602)

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Navigating Post Covid-19 education: An investigative study on students' attitude and perception of their new normal learning environment

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Background: The incidence and aftermath of the COVID-19 pandemic brought about a drastic change in medical education around the world. Traditional classrooms made way for online classrooms in order to ensure that learning continued in a safe and secure environment. However, how well health professional students perceived and accepted these changes have not been fully gauged yet. Therefore, the aim of this study is to evaluate the perception of health professional students about their new educational climate. **Methods:** A modified and validated Dundee Ready Education Environment Measure (DREEM) questionnaire was used to collect data regarding student perception of their educational climate. **Results:** The mean DREEM scores for three time periods were in the accepted positive range of 101 to 150 indicating that most of the students perceived the changes positively. The results indicated that most students preferred blended learning over online learning or face-to-face learning alone. Areas of concern that need improvement were identified by poor item-wise scores. **Conclusion:** Strategic remedial measures for these concerns need to be developed to improve the quality of education received by the students. However, the results of our study indicated that most of the students were able to adapt positively to the new education environment due to the change in the circumstances during COVID.

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30 **Abstract:**

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45   quality of education received by the students. However, the results of our study indicated that

46   most of the students were able to adapt positively to the new education environment due to the

47   change in the circumstances during COVID.

48

49   **INTRODUCTION**

50   Medical education, over the years, has relied on traditional teaching methods and physical

51   classrooms to impart the necessary knowledge and skill sets to future health professional

52   students. Nevertheless, educational institutions all around the world were forced to use e-learning

53   platforms when COVID-19 was declared a pandemic in order to support students in continuing

54   their studies (Kaul et al. 2021). This inevitable and sudden transformative change tested the

55   flexibility and adaptability of teachers, students, and institutions alike. In a manner of speaking

56   the pandemic opened several opportunities for the improvement of how medical knowledge is

57   delivered to future health professional students. It served as a platform for the evolution of

58   medical education (Kaul et al. 2021).

59   A primary challenge brought about by this change in the field of medical education was the

60   transition from traditional classrooms to remote learning techniques such as live meetings and

61   pre-recorded lectures. While educators were expected to impart the same quality and quantity of

62   knowledge as before to students through electronic means, students were expected to understand,

63   conform, and exhibit the expected growth in their skill sets. This posed a variety of problems

64   (Chaudhary et al. 2022; Nimavat et al. 2021). E-learning required students to be more

65   independent, and self-reliant and exhibit a certain amount of self-discipline to keep pace with the

66 curriculum. Further, for medical and nursing students the absence of clinical experience during

67 the lockdown period was a major source of concern (Azlan et al. 2020) along with feelings of

68 loneliness and depression due to isolation (Tahir et al. 2022). With institutions suspending

69 regular classes, health profession students were at the risk of receiving less than an adequate

70 amount of exposure to all the necessary spheres of knowledge and skills. The opportunity for

71 students to learn directly from clinical experience and interaction with patients was largely

72 reduced due to safety concerns. This stood to weaken their performance both in exams and their

73 ability to become skilled health professional students (Ahmed et al. 2020).

74 The online learning had a number of distinct advantages too. It introduced flexibility into the

75 students' study routine, providing them with the opportunity to learn according to their

76 individual convenience. It made way for a student-oriented learning process which permitted

77 them to study at their own pace. Students also showed a preference for recorded lectures over

78 live classes, as they can be repeatedly listened by students (Kim et al. 2020). Safety during the

79 pandemic, cost and time conservation and convenience have all been cited to be advantages of

80 online education (Hussein et al. 2020). Several new challenges have also come to the forefront.

81 The interferences to normal life like changes in regimen added stress from COVID-19 lockdown,

82 isolation, and access to good internet connections have all made e-learning much more

83 challenging for a significant number of students (Hussein et al. 2020; Shahrvini et al. 2021).

84 Virtual classrooms limit teacher-student interaction which is an essential element in any given

85 environment. More importantly, students have been discouraged by the reduction in the practical

86 and clinical aspects of learning during the COVID period (Abbasi et al. 2020; Javed et al. 2021).

87 On the other hand, simulation-based learning has been recommended to counter the absence of

88 direct clinical experience during the pandemic (Abdulrahman et al. 2022).

89 The need for collecting feedback from both teachers and students is essential to understand the

90 type of changes and improvements needed for better delivering the curriculum via e-learning

91 (Nimavat et al. 2021). Moving forward, the future of medical education depends on how well the

92 students, educators, and institutions adapt to the changes. Medical education cannot be restricted

93 to traditional learning methods as online methods have been shown to be as effective as physical

94 classrooms (Kim et al. 2020). The pandemic has created an opportunity to create a flexible but

95 competent learning environment for students (Nimavat et al. 2021). Currently, the blended

96 learning technique is widely considered as it encompasses both synchronous and asynchronous

97 learning strategies. This will encourage students to be more involved in the process of their

98 education (Lapitan Jr et al. 2021). Therefore, the aim of this study was to identify the extent of

99 favorable and unfavorable aspects of remote learning. This knowledge will be valuable in

100 designing future learning practices for efficient curriculum design and knowledge delivery.

101

102 **MATERIAL & METHODS**

103 This descriptive cross-sectional study was conducted at Northern Border University (NBU),

104 Arar, Saudi Arabia among the health professional students from the colleges of

105 medicine, applied science, and nursing. The ethical approval for study was obtained from the

106 local committee of bioethics, Northern Border University (Ref: MED-2022-11-1371). The

107 students were selected using a random sampling method. Students who enrolled in courses in the

108 Universities after the start of the pandemic and students who passed out from their respective

109 universities before normal classes resumed after the pandemic were excluded from the study. A

110 modified version of the DREEM questionnaire was employed to collect the necessary data. The

111 perception of the students of their educational environment was analyse before, during and after

112 COVID-19. Dundee Ready Education Environment Measure (DREEM) analysis is a widely

113 validated method to analyse educational environments, particularly in Health professional

114 educational institutions (Al-Ahmari et al. 2022; Miles et al. 2012). DREEM analysis was chosen

115 for this study as it provides the possibility of identifying the strengths and weaknesses associated

116 with each institution or country independently and taking focused remedial measures as per

117 individual scores. A modified version of DREEM was used in this study which was verified by

118 an expert medical education team. DREEM inventory evaluates student perception under 5

119 domains constituting a total of 50 items. Items 4, 9, 13,17, 25, 35, 39, 48, and 50 are negative

120 statements and hence were reverse scored. The 50 items are scored on a 5-point Likert scale, as

121 follows: Strongly agree – 4.0, Agree – 3.0, Uncertain – 2.0, Disagree -1.0, and strongly disagree

122 - 0. For individual items, a mean score of $\geq$3.5 is considered a true positive. Items with a mean

123 score of $\leq$2 indicate problem areas and concerns. A mean score of 2–3 is an item that needs can

124 be bettered for maximum benefit to students. The responses to the questionnaire are used to

125 generate an overall score with a maximum value of 200. Completion of the inventory will be

126 undertaken on a voluntary basis, and data anonymity will be maintained. Items 6,8,13,37,41,47

127 and 50 were modified to reflect the aims of the present study. The five domains of student

128 perception and the maximum possible scores for each domain are,

129   1. Student Perception of Learning (SPL) – 12 items with a maximum score of 48

130   2. Student Perception of Teachers (SPT)- 11 items with a maximum score of 44

131   3. Student's Academic Self Perception (SASP) – 8 items with a maximum score of 32

132   4. Student's Perception of Atmosphere (SPA) – 12 items with a maximum score of 48

133   5. Student's Social Self Perception (SSSP) – 7 items with a maximum score of 28

134 **RESULTS**

135 The responses to the modified DREEM indicated that students perceived their educational

136 environment positively in all three timelines and all colleges (Figure 1). The initial study

137 conducted during the pre-covid period was extended after considering the impact of COVID on

138 medical education. A total of 300 valid responses were received and considered for each of the

139 three timelines. The respondents were 53.4% male and 46.6 % female. The results showed an

140 increase in the total DREEM scores during the pandemic and after when regular classes had

141 begun as compared to the pre-covid period. Medical students perceived the changes brought

142 about by the pandemic positively to a good extent.

143

144   The mean scores for individual items of the DREEM questionnaire for pre-COVID, COVID,

145 and post-COVID periods are listed in Table 1. Of the 5 domains SPT alone marked a decrease in

146 score during the COVID and post-COVID periods when compared to the pre-COVID period.

147 The highest positive score was recorded for item 47 (I prefer blended learning over face-to-face

148 learning) for COVID and post-COVID durations. The lowest negative score was given to item

149 19 (My social life is good) during the COVID timeline. Several problem-prone areas were

150 identified with scores lower than 2. Table 2 lists the country-wise distribution of domain scores

151 and Table 3 lists the overall mean scores for each domain.

152

153 **DISCUSSION**

154 Due to the COVID-19 pandemic, students' learning environments had to transition to an online

155 setting, and this had a significant impact on students' subjective happiness. DREEM has long

156 been used to gauge the environment associated with educating medical students. It has been used

157 as an effective tool to identify both strengths and weaknesses in a given institution (Al-Ahmari et

158   al. 2022; Miles et al. 2012). In our study too, we utilized DREEM to understand the full impact

159   of the COVID pandemic on health professional students studying in different colleges of

160   Northern Border University in Saudi Arabia. Data analysis revealed that health professional

161   students have adapted well to their new environment, irrespective of the intensity of the changes

162   around them. This is consistent with previous studies conducted in various universities in other

163   countries (Miles et al. 2012; Syed et al. 2021).

164   We observed an overall increase in the DREEM scores of the COVID and post-COVID timeline

165   in comparison to the pre-pandemic period (Figure 1). Though all three timelines reported

166   positive scoring, this observed increase in DREEM scores during and after the pandemic can be

167   attributed to the flexibility introduced into the otherwise tight schedule of health professional

168   students with the introduction of online learning (Lin et al. 2021). This increase was in line with

169   other similar studies in which health professional students aligned with the blended learning

170   principle. Effective time management, where students may choose their own learning pace, was

171   one of the reported advantages of online learning (Vishwanathan et al. 2021). Students felt

172   virtual classrooms to be more relaxed than physical classrooms. However, the overall positive

173   score does not fully reveal the true picture. Several items that received ratings of less than 2 were

174   reported as areas of concern. These areas need to be paid special attention for improvement.

175

176   SPL domain showed an increase in scores during and after a pandemic. In the pre-COVID

177   period, students reported being too tired to enjoy learning (Table 1). However, the score

178   improved during COVID when e-learning was introduced. Another area of concern in this

179   domain was the authoritarian nature of teachers. This has been reported in other studies as well

180   (Vishwanathan et al. 2021). Nimavat *et al* recommended adopting both the synchronous mode

181   (Live classroom, virtual lab, etc.) which will allow students to immediately interact with their

182   peers and the educator during live online sessions, and the asynchronous mode in which students

183   can think through issues later with their classmates via the internet (chat rooms and discussion

184   forums (Nimavat et al. 2021).

185   The only domain to report a reduction in scores during the pandemic and post-pandemic

186   timelines was Student Perception of Teachers (SPT). The data obtained highlighted faculty-

187   centered teaching, lack of effective communication skills of the faculty teaching, and the lack of

188   social life as areas of concern (Table 1). During the pandemic and in its aftermath, the social

189   lives of students were severely hindered. Students reported feeling lonely and depressed. Anxiety

190   and frustration due to isolation and lack of communication affected a significant population of

191   health professional students (Aristovnik et al. 2020; Shahrvini et al. 2021). In our current study

192   too, items 19 and 28 scored negatively indicating students' mental health was impacted by the

193   lockdown and ensuing isolation period.

194   The item scores in the SPA domain indicated the presence of a technological gap among both

195   students and teachers. Though this was amplified during the transition from physical to virtual

196   classrooms. Studies indicated the reluctance of teachers to accept and make themselves familiar

197   with the new technology platforms that were made available to aid virtual learning (Nimavat et

198   al. 2021). As a result, e-learning's effectiveness was somewhat diminished. Due to a lack of

199   technology, poor internet access, and resistance to change on the part of both students and

200   teachers, Abbasi et al.'s study in Pakistan concluded that learners prefer face-to-face instruction

201   (Abbasi et al. 2020). Just using online sessions that encompass only pre-recorded lectures and

202   occasional face-to-face sessions may not be enough to increase student participation. Azlan *et al*

203   recommended improving the efficiency and scope of online education by considering

204   collaborative educational tools and mediums (Azlan et al. 2020).

205   Abbasi *et al*, in their study, reported how e-teaching and learning experiences limited the number

206   of interactions between teachers and their students (Abbasi et al. 2020). In congruence with this,

207   the score of item 49 (I am able to ask questions whenever I want) dropped significantly during

208   the COVID timeline when e-learning was made exclusive for safety.

209   Students' responses provide some useful descriptive information regarding how they perceived

210   about distinct learning environments. The connections between the physical and psychosocial

211   learning environments that have been found are important because maintaining a suitable

212   learning environment becomes an ongoing challenge for educators as a poor learning

213   environment may prevent students from learning. It's possible that a learning environment's

214   inadequacies could also lead to a general unease that comes up on a psychosocial level, affecting

215   the standard of the learning environment. Overall, the study reveals that they had positive

216   perceptions of their learning environments, which were reflected by relatively high levels of task

217   orientation, cooperation, student cohesiveness, and satisfaction. This study has also served the

218   dual purpose of establishing the need for a blended learning environment for improving the

219   educational environment of health professional students while exposing the challenges and

220   concerns plaguing medical education. Emphasis needs to place on making the learning

221   atmosphere stress-free by encouraging students to interact and participate more both in physical

222   and virtual platforms. A healthy and efficient educational environment is essential for nurturing

223   both the professional and personal growth of future health professional students (Aga et al.

224   2021). The COVID-19 pandemic has significantly impacted medical schools around the world,

225   with the Middle East being no exception (Gordon et al. 2020). Our study also showed similar

226   results. The outbreak made it impossible for students to attend lectures or study in small groups,

227   and the whole curriculum shifted online (Rose 2020). To stop the spread of the infection,

228   clinical rotations had to be put on hold until the social distance was reduced (Chaudhary et al.

229   2021; Gaur et al. 2020; Kim et al. 2020). Medical students relatively accepted the online format

230   and were generally content with the online course (Gaur et al. 2020) despite the sudden transition

231   to online learning. Although most students had favourable opinions of the online format, many of

232   them also mentioned feeling lonely and missing their interpersonal relationships as a result of the

233   social distance policy. Happiness is referred to as subjective well-being and is described as "a

234   global evaluation of life satisfaction"(Zheng et al. 2021). Considered in context with its

235   relationship with academic performance and empathy, more recent studies have highlighted the

236   significance of emotional well-being in health profession students (Chaudhary et al. 2020; Khalil

237   et al. 2020). The improvement of the well-being of students as a fundamental human need and

238   the promotion of social connectivity are both potential responsibilities of healthcare institutions

239   (Dworkin et al. 2021). To further understand how health profession students' subjective

240   happiness changes over time, it is important to look into how they perceive their educational

241   environment (Yoo & Kim 2019). A few educators have just employed the DREEM to look into

242   the association between the learning environment and students' well-being. Positive evaluations

243   of the medical school's learning environment were found to greatly reduce students' stress in one

244   study (Gordon et al. 2020); in another, it was discovered that Student's Social Self-perceptions,

245   one of the DREEM subscales, significantly correlated with subjective happiness (Kim et al.

246   2020). The association between this and COVID-19 has, however, barely been explored in

247   investigations. Pre-pandemic data were not taken into consideration in the studies that already

248   exist on health profession students' satisfaction and stress following COVID-19 (Isaradisaikul et

249 al. 2021; Rose 2020; Stormon et al. 2022). Therefore, it can be difficult to figure out whether

250 students' perspectives have changed for better or for worse following COVID-19 (Meo et al.

251 2020). As far as we understand, only a few studies have looked into how students perceived the

252 learning environment and how happy they were both before and after the outbreak (Villanueva et

253 al. 2021). Our study was designed to evaluate pre-pandemic data to contrast with post-pandemic

254 data. As a result, we could look into how COVID-19 affected health students students' views of

255 the learning environment and their subjective happiness.

256 As a result of the pandemic, the learning environment go beyond traditional classroom education

257 and had a quick shift to online learning. Since its introduction, E-Learning has become a widely

258 used instructional strategy. Blended learning, or a combination of traditional classroom training

259 and online instruction, is likely to become an accepted method of education in the medical field.

260 The purpose of blended learning is to increase educational effectiveness by combining the

261 benefits of in-person and online learning. Blended learning in health professions education has

262 shown that more successful than traditional classroom instruction in terms of knowledge

263 acquisition. This form of teaching and learning has been used in higher education for many

264 years.

265 Our study results revealed that the student's preferences towards blended learning rather than

266 physical classes or e-learning alone need to be taken into consideration for building a beneficial

267 medical education system. One of the major areas of improvement needs to be SPT. Importance

268 needs to be given to both the educational and mental growth of students for the improvement of

269 this domain. It has been made evident that both students and faculty need to be in line with

270 technological advances to maximize the efficiency of blended learning.

271

272 **CONCLUSION**

273 Students perceived the changes brought about by the pandemic positively to a good extent,

274 however, there are emerging and evolving connections between the physical and psychosocial

275 learning environments related to the use of new information technologies. In particular,

276 psychosocial aspects may affect how satisfied learners are with learning in these settings. A

277 regular training session is recommended for teachers and students alike to remove the reluctance

278 exhibited by them towards new technologies. Further, medical universities should keep in mind

279 the mental and social health of students while designing curriculum and should establish a

280 support system for vulnerable students.

281

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Table 1(on next page)

Table 1. Mean score of individual items of DREEM

1   Table 1. Mean score of individual items of DREEM.

	DOMAINS AND ITEMS	Pre-COVID	COVID	Post-COVID
	SPL			
1	Encouraged to take part in classroom events	2.2	2.5	2.5
2	The educators provided thorough information regarding the course of study.	2.5	2.4	2.6
3	A good support system for stressed-out students	2.4	**1.9**	2.3
4	Exhausted and unable to enjoy the course	**1.8**	2.6	2.6
5	My approaches to learning were successful.	2.4	2.2	2.4
6	The course coordinators promoted a student-centered teaching approach.	2.2	2.6	2.6
7	A lesson is frequently motivating.	2.3	2.7	2.5
8	The instructors pushed active participation from the students.	2.4	2.2	2.3
9	The trainers are authoritarian.	**1.8**	2.2	**1.9**
10	I am confident that I will pass this year.	2.5	2.1	2.3
11	The environment remains tranquil while lecturing.	2.4	2.6	2.6
12	A well-planned course	2.1	2.3	2.2
	SPT			
13	There is faculty-centered teaching.	2.2	**1.9**	2
14	This course rarely makes me feel bored.	2.1	2.2	2.1
15	In this course of study, I have close friends.	2	**1.5**	**1.7**
16	My competency is being developed by what is being taught.	2.3	2.2	2.1
17	In this course, cheating is a concern.	2	**1.5**	2.1
18	Faculty members can effectively communicate with learners.	2	**1.8**	2
19	My social life is satisfying.	2.2	**1.4**	2.1
20	The content of the lesson seems extremely defined.	2.3	2.2	2.1
21	I believe I am being adequately prepared for my future as a professional.	2.2	2.3	2
22	The teaching helps to develop my confidence	2.4	2	2.2
23	During lectures, there is a comfortable environment.	2.1	2.7	**1.9**
	SASP			
24	The teaching time is effectively utilized.	2.3	3.1	2.9
25	The teaching above places a strong emphasis on factual learning.	2.9	3	2.8
26	The work from last year provided an effective foundation for this year's work.	2.4	2.9	2.6
27	I am able to remember any information that I need.	2.2	3.1	2.9
28	I don't often feel lonely.	2.2	**1.8**	2.4
29	Students receive quality feedback from the faculty members.	**1.7**	2.9	2.6
30	There are prospects for me to enhance my interpersonal abilities.	2.2	2.1	2.8
31	My work has taught me a lot about empathy.	2.4	2.9	2.8
	SPA			
32	Constructive criticism is provided by the faculty.	2.4	2.8	2.7
33	Socially, I feel relaxed during lectures.	2.6	**1.9**	2.6
34	During lectures, there is an informal atmosphere. / PBL	2.1	2.8	2.3
35	The course is disappointing to me,	2.2	2.4	2.5

36	I have good concentration abilities.	2.2	2.3	2.6
37	The tutor has access to the newest technology.	2.4	**1.6**	2.3
38	I am informed of the course's learning objectives.	2.5	2.4	2.5
39	The lecturers become agitated during classes.	2.1	2.3	2.2
40	The instructors for the course are well-prepared for their classes.	2	**1.9**	2.1
41	My knowledge of technology continues to develop here, which has made learning enjoyable.	2.4	2.2	2.2
42	The enjoyable aspect of the course exceeds its stress.	**1.8**	2.2	1.9
43	My learning is inspired by the environment.	2.3	2.4	2.3
	SSSP			
44	My ambition for continuous improvement is encouraged by the teacher's guidance.	2.6	2.3	2.6
45	I feel that a lot of what I must learn is related to my course.	2.9	2.8	2.9
46	My classroom provides an amazing environment to acquire knowledge.	2.5	2.6	3.1
47	I choose blended learning over classroom instruction.	2.2	3.4	3.5
48	The focus of the lesson is overly teacher-centered.	2.1	2.4	2.3
49	I'm convinced that I am able to ask whatever questions I want.	2.8	2.1	2.7
50	I support distance learning over face-to-face teaching.	**1.7**	2.1	**1.9**

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Table 2(on next page)

Table 2. Distribution of mean score college-wise.

1   Table 2. Distribution of mean score college-wise.

Domain	Pre-COVID	COVID	Post-COVID
College of Medicine (Male Campus)			
Students' Perception of Learning	29	31	31
Student's Perception of Teachers	22	20	22
Students' academic self-perception	18	21	22
Students' perception of the atmosphere	31	28	30
Students' social self-perception	17	20	21
TOTAL	**117**	**120**	**126**
College of Medicine (Female Campus)			
Students' Perception of Learning	30	31	33
Student's Perception of Teachers	24	23	24
Students' academic self-perception	16	19	18
Students' perception of the atmosphere	30	29	29
Students' social self-perception	18	19	19
TOTAL	**118**	**121**	**123**
College of Applied Science (Male Campus)			
Students' Perception of Learning	28	30	27
Student's Perception of Teachers	26	26	27
Students' academic self-perception	17	19	20
Students' perception of the atmosphere	29	24	30
Students' social self-perception	16	18	20
TOTAL	**116**	**117**	**124**
College of Applied Science (Female Campus)			
Students' Perception of Learning	23	24	23
Student's Perception of Teachers	22	18	18
Students' academic self-perception	19	23	24
Students' perception of the atmosphere	27	30	31
Students' social self-perception	16	15	18
TOTAL	**107**	**110**	**114**
College of Nursing (Female Campus)			
Students' Perception of Learning	27	28	30
Student's Perception of Teachers	22	20	20
Students' academic self-perception	15	24	23
Students' perception of the atmosphere	24	29	26
Students' social self-perception	17	18	19
TOTAL	**111**	**119**	**118**
College of Nursing (Male Campus)			
Students' Perception of Learning	25	26	29
Student's Perception of Teachers	27	23	23
Students' academic self-perception	19	25	24
Students' perception of the atmosphere	21	23	23
Students' social self-perception	17	16	17
TOTAL	**109**	**113**	**116**

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Table 3(on next page)

Table 3. Overall mean of DREEM analysis.

1

2   Table 3. Overall mean of DREEM analysis.

Domains	Pre-COVID	COVID	Post-COVID
SPL	27	28.3	28.83
SPT	23.83	21.67	22.33
SASP	18.33	21.83	21.83
SPA	27	27.17	28.17
SSSP	16.83	17.67	19
TOTAL	**112.99**	**116.64**	**120.16**

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Figure 1

Figure 1: Variation of Domain scores during the three timelines