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Exploring the Educational Experiences of a Saudi Undergraduate Medical Student Cohort Who Commenced Medical School During the COVID-19 Pandemic

Mubarak Alruwaili[1]*, Bandar Alotaibi[2], Raed Alruwaili[3], Basil Mohammed Alomair[1], Muhannad Faleh Alanazi[1], Marwa Ahmed El Naggar[4, 5], Ziad M. Alshaalan[1], Aseel Awad Alsaidan[4], Rehana Basri[1], Soha Ashry[4]

[1]Department of Internal Medicine, College of Medicine, Jouf University, Sakaka, Saudi Arabia

Email ID: Mubarak.alruwaili@hotmail.com, Alomairbasil@gmail.com, Mfalanazi@ju.edu.sa, dr.ziad@ju.edu.sa, drbasri@ju.edu.sa,

[2]Clinical skills and simulation center, King Saud Medical City, Saudi Arabia,

Email ID: Bandalbhi@gmail.com,

[3]Department of Internal Medicine, College of Medicine, Northern Border University, Arar Saudi Arabia.

Email ID: Raed-123@hotmail.com,

[4]Medical Education Unit, Community and Family Medicine Department, College of Medicine, Jouf University Sakaka, Saudi Arabia.

Email ID: managgar@ju.edu.sa, aaalsaidan@ju.edu.sa, sohashry@gmail.com,

[5]Medical education department, Faculty of medicine, Suez Canal University, Egypt.

Email ID: managgar@ju.edu.sa

***Correspondence Author:**

Mubarak Alruwaili,

[1]Department of Internal Medicine, College of Medicine, Jouf University, Sakaka, Saudi Arabia

Email ID: Mubarak.alruwaili@hotmail.com

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ABSTRACT

Objective: The COVID-19 pandemic prompted an abrupt shift from traditional in-person medical education to online learning, significantly affecting students' academic performance, engagement, and mental health. This study evaluates these impacts among first-year medical students at Jouf University College of Medicine, Saudi Arabia.

Methods: A cross-sectional study was conducted in two phases. Phase 1 analyzed institutional academic records to compare the performance of pre-pandemic (2019/2020) and COVID-19 (2020/2021) cohorts across six courses. Phase 2 utilized an online survey to assess students' perceptions of online learning, academic challenges, and mental health support.

Results: A significant decline in academic performance was observed in two courses. One course experienced an increase in failure rates from 11.8% to 46.4% ($p < 0.001$), while another showed a reduction in A and A+ grades ($p = 0.002$). Both courses required higher cognitive skills and hands-on training. Survey results revealed that 62.5% of students reported worsened exam performance, 56.3% experienced decreased engagement, and 50% felt unprepared for future assessments. Additionally, 41.7% reported increased psychological distress, and 39.6% expressed dissatisfaction with institutional mental health support.

Conclusion: The findings underscore the need for blended learning models that integrate online instruction with hands-on experiences, enhanced faculty engagement, and improved mental health resources to support students in medical education.

Keywords: *COVID-19, online medical education, student engagement, academic performance, mental health, blended learning*

1. INTRODUCTION

The COVID-19 pandemic significantly disrupted medical education worldwide, presenting unprecedented challenges for undergraduate medical students, particularly those who began their studies during this period. The rapid transition from traditional, in-person learning to online and virtual teaching methods led to substantial changes in how medical education was delivered, affecting not only academic learning but also clinical training and students' overall well-being [1-3].

1.1. Higher Education Disruptions During the COVID-19 Pandemic

The emergence of COVID-19 placed an enormous strain on educational systems, forcing institutions to adapt quickly to remote learning modalities [4]. The World Health Organization (WHO) declared COVID-19 a pandemic in 2019, and governments worldwide implemented public health measures such as social distancing, quarantine, and lockdowns to curb the spread of the virus. These measures had a profound impact on medical education, as medical schools shifted from face-to-face instruction to online learning platforms [5-6]. This transition represented a drastic shift in pedagogy, testing the adaptability of both educators and students [7-8]. The suspension of clinical rotations further disrupted traditional medical training, requiring institutions to explore alternative educational approaches such as simulation-based instruction, asynchronous and synchronous e-learning, and remote patient consultations [9-10]. However, despite the quick adaptation of medical education to digital formats, concerns arose regarding the effectiveness of online learning, particularly in developing clinical and practical skills [1-3]. In addition, the shift to virtual learning environments negatively affected medical students' communication skills and ability to develop empathy, as traditional patient interactions were replaced with remote consultations and simulated case discussions [11]. Many students expressed concerns about their preparedness for postgraduate training and clinical practice due to the limitations of online education [11-13].

1.2. The Shift to Digital Learning: Barriers and Adaptations in Higher Education

The rapid shift to online learning revealed several challenges, including technological barriers, disparities in digital literacy, and concerns regarding assessment methods. The transition to digital education was not only about technology but also required a pedagogical shift, with educators rethinking their approaches to ensure effective student engagement [14]. Educators had to quickly restructure their curriculum to accommodate remote learning, often with little preparation. Some institutions struggled to provide adequate digital resources, further exacerbating disparities in educational access [15]. In low-resource settings, many students faced difficulties in accessing reliable internet connections, while educators struggled to transition their teaching methodologies to virtual platforms [16-17]. Insufficient ICT infrastructure and a lack of technical skills among faculty and students further hindered the effectiveness of e-learning [18-19]. Moreover, online assessments posed significant challenges, as traditional examination methods were not always suitable for virtual formats. Concerns about academic integrity, the validity of assessments, and the effectiveness of online evaluations were widely discussed [20-22]. The United Nations also highlighted the pandemic's impact on public qualifications and entrance exams, further complicating student assessment processes [23].

1.3. Student Well-Being and Mental Health in the Digital Learning Era

Beyond academic and clinical disruptions, the pandemic had a profound psychological and emotional impact on medical students. Increased stress, anxiety, and burnout were commonly reported, largely due to social isolation, lack of hands-on learning opportunities, and uncertainty about the future [24-25]. The mental health challenges experienced by students during this period underscored the need for institutional support mechanisms, such as counseling services, peer support networks, and flexible learning policies [26-27]. Despite these challenges, some students found positive aspects in their pandemic-era medical education. Increased clinical responsibilities for some students correlated with a reduced perception of the negative impact on training, and the pandemic accelerated the adoption of innovative teaching technologies that may have lasting benefits for medical education [28-29].

1.4. Institutional and Policy Responses to Online Learning in Saudi Arabia

Saudi Arabia was no exception to the global shift in the educational process that occurred during the COVID-19 crisis. The transition to online education in medical schools, including Jouf University College of Medicine, was rapid and widespread, altering the learning experiences of students [30]. The Saudi government has been keeping pace with new educational technology and played a pivotal role in the development of e-learning in universities over the past three decades. Infrastructure was provided for all areas, and policies were prepared to ensure virtual learning success. Saudi universities across the country provided open e-learning platforms and applications for faculty and students. Faculty used Blackboard platforms to conduct remote teaching for some courses before the COVID-19 crisis, and due to previous online and blended learning experiences, it was easy to switch to online learning during the COVID-19 crisis [31]. In Jouf University College of Medicine, all remote learning activities were conducted on the Blackboard platform. These included virtual classes for lectures, problem-based learning (PBL), virtual labs, and seminars. Assessment was carried out through personal and group assignments and online exams. Discussion forums and online chatrooms were active at all times to deal with anticipated difficulties and answer students' inquiries. The current research is designed to explore the impacts of this transition on

medical students at Jouf University, focusing on their educational experiences during the pandemic.

2. SUBJECTS AND METHODS

2.1. Study Design, participants and setting

This study employed a quantitative, cross-sectional design to evaluate the impact of the COVID-19 pandemic on medical students' academic performance and learning experiences at Jouf University College of Medicine.

- •Participants: Medical students from two cohorts:
- Pre-pandemic Cohort (2019/2020): Experienced traditional in-person learning.
- COVID-19 Cohort (2020/2021): Studied online due to pandemic restrictions.

Inclusion Criteria

- Institutional Data (Phase 1): medical students in their preclinical years from both cohorts (pre-pandemic and COVID-19).
- Online Survey (Phase 2): medical students who studied during the COVID-19 pandemic (2020/2021).

Exclusion Criteria

- Non-Consent or Withdrawal: Students who initially agreed to participate but later withdrew.
- Incomplete Data: Students with missing academic records or incomplete survey responses.

The research was conducted in two phases:

1. Phase 1 – Institutional Data Analysis: Academic records were analyzed to compare the academic performance of students from the two cohorts (pre-pandemic vs. COVID-19 cohort).

2. Phase 2 – Online Survey: A structured survey was distributed to students from the COVID-19 cohort to assess their perceptions of online learning, engagement, and preparedness for clinical training.

2.2. Data Sources

The study utilized two primary data sources:

1. Institutional Data (Phase 1 – Objective Performance Data) Academic records were obtained from the university's official database for all 6 courses of year 1.

2. Online Survey (Phase 2 – Perceptions & Experiences) Based on findings from institutional data analysis, a structured survey was developed to assess the experiences of male students from the COVID-19 cohort only.The survey focused on online learning effectiveness, challenges, and psychological impact.

2.3. Sample size

Sample size was calculated for the online survey. By using Power Analysis and Sample Size Software (PASS 15) version 15.0.10 for sample size calculation, setting confidence level at 90%, margin of error ±0.05. A previous study (Mahyoob, 2021) reported that 54% of medical students believed in the effectiveness of online learning, which was used as a reference for sample size estimation. The survey was distributed to all 60 students in the COVID-19 cohort, and 48 students responded, yielding a response rate of 80%. PASS software determined that a minimum of 48 responses was required to achieve statistical reliability, confirming that the collected data was adequate for analysis. Although 12 students did not respond, the high response rate (80%) minimizes the risk of non-response bias.

2.3. Data Collection Tools

1. Institutional Data (Phase 1)

Jouf university college of medicine data base for students records

2. Online Survey (Phase 2) – COVID-19 Cohort Perceptions A structured self-administered questionnaire was created and it was adapted from previous studies and refined to cover the information needed to be gathered. The questionnaire was distributed to students from the COVID-19 cohort after institutional data analysis.The questionnaire contained closed-ended Likert-scale questions and was divided into four sections:

Section	Focus	Number of Questions
1. Academic Performance	Impact of online learning on students' grades and engagement.	9 MCQs

2. Perceptions and Experiences	Attitudes toward online learning and effectiveness of digital resources.	9 MCQs
3. Student Support, Adaptation & Mental Health	Institutional support, adaptability, and mental health concerns.	9 MCQs
4. Assessment of "Man and His Environment" Block	Evaluation of curriculum and teaching methods.	8 Rating Scale Questions

- A panel of experts tested the content validity of the questionnaire and Cronbach's Alpha coefficient was used to measure the internal consistency of items, and it demonstrated a reliable acceptable tool.
- Piloting: The questionnaire was piloted on a small group of students before distributing it on the designated cohort in order to check for clarity and do needed changes.
- The questionnaire was distributed online on official students' emails with clear guidelines and instructions for answering the questions.

2.5. Data analysis

All analyses were conducted using SPSS (Version 21). Descriptive statistics (frequency and percent) summarized student performance and survey responses.

Inferential statistics:

Chi-square test compared academic performance scores between the two cohorts as well as among courses.

A p-value < 0.05 was considered statistically significant.

2.6. Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) at King Saud University (Approval No: KSU-HE-24-512)

Participation was voluntary, and informed consent was obtained from all students.

All responses were anonymized to ensure confidentiality.

3. RESULTS

3.1. Phase One Results:

Academic records of a total of 45 students in the pre-COVID-19 (2019/2020) group and 60 students in the COVID-19 (2020/2021) group were collected from Jouf university college of medicine database. These included two courses delivered in the first semester and three courses delivered in the second semester in addition to one longitudinal course delivered throughout both semesters. A comparison of academic performance between the two cohorts revealed mixed findings across different courses. While some courses showed comparable grade distributions, others demonstrated significant declines in performance, namely the 'Man & his environment' course and the 'Musculoskeletal system' course. The former had the highest failure rate rising from 11.8% (pre-COVID cohort) to 46.4% (COVID-19 cohort) and a significant difference between the two cohorts among students obtaining D grade ($p < 0.012$). In the latter, the proportion of students securing A and A+ grades decreased significantly, with an increase in C and D grades among the COVID-19 cohort when compared to the pre-COVID-19 cohort ($p = 0.002$). Table 1 shows the statistical analysis of performance of the two cohorts in all 6 courses.

	Course	Cohort	n/ %	Grade									Total	Chi square	P value
				A+	A	B+	B	C+	C	D+	D	Fail			
Semester 1	Concepts & Principles of Medical	Pre-COVID	N	8	13	14	11	2	1	3	1	0	53	12.3	0.136
			%	15.1 %	24.5 %	26.4 %	20.8 %	3.8 %	1.9 %	5.7 %	1.9 %	0.0 %	100 %		

	Education	COVID time	N	3	13	13	9	9	5	3	1	3	59	45	NS
			%	5.1 %	22.0 %	22.0 %	15.3 %	15.3 %	8.5 %	5.1 %	1.7 %	5.1 %	100 %		
	Growth & Development	Pre-COVID	N	0	1	2	5	5	10	5	11	13	52	6.526	0.476 NS
			%	0%	1.9 %	3.8 %	9.6 %	9.6 %	19.2 %	9.6 %	21.2 %	25.0 %	100 %		
		COVID time	N	0	2	3	5	6	5	9	7	23	60		
			%	0%	3.3 %	5.0 %	8.3 %	10.0 %	8.3 %	15.0 %	11.7 %	38.3 %	100 %		
Longitudinal Course	**Health and Illness in the Community**	Pre-COVID	N	2	4	7	10	7	9	3	0	3	45	10.996	0.202 NS
			%	4.4 %	8.9 %	15.6 %	22.2 %	15.6 %	20.0 %	6.7 %	0.0 %	6.7 %	100 %		
		COVID time	N	2	4	10	7	4	3	0	2	0	32		
			%	6.3 %	12.5 %	31.3 %	21.9 %	12.5 %	9.4 %	0.0 %	6.3 %	0.0 %	100 %		
Semester 2 Courses	**Man & his environment**	Pre-COVID	N	0	1	1	4	7	7	9	16	6	51	**19.608**	**0.012 S**
			%	0.0 %	2.0 %	2.0 %	7.8 %	13.7 %	13.7 %	17.6 %	31.4 %	11.8 %	100 %		
		COVID time	N	1	1	2	2	6	6	6	6	26	56		
			%	1.8 %	1.8 %	3.6 %	3.6 %	10.7 %	10.7 %	10.7 %	10.7 %	46.4 %	100 %		
	Musculoskeletal System	Pre-COVID	N	22	19	4	5	2	2	0	1	6	61	**24.509**	**0.002 S**
			%	36.1 %	31.1 %	6.6 %	8.2 %	3.3 %	3.3 %	0.0 %	1.6 %	9.8 %	100 %		
		COVID time	N	3	4	3	8	2	7	1	2	2	32		
			%	9.4 %	12.5 %	9.4 %	25.0 %	6.3 %	21.9 %	3.1 %	6.3 %	6.3 %	100 %		
	Principles of Disease	Pre-COVID	N	0	2	0	3	9	8	8	9	16	55	6.311	0.612 NS
			%	0.0 %	3.6 %	0.0 %	5.5 %	16.4 %	14.5 %	14.5 %	16.4 %	29.1 %	100 %		
		COVID time	N	2	1	2	1	6	5	7	6	11	41		
			%	4.9 %	2.4 %	4.9 %	2.4 %	14.6 %	12.2 %	17%	14.6 %	26.8 %	100 %		

Table (1): Chi square test comparing students' performance in the two cohorts in year one courses

P-value ≤ 0.05 is considered significant

S: Significant

NS: Non-significant

Figure (1) shows the comparison of different grades secured by students in Man & Environment course during Pre-COVID-19 & COVID-19 time. The distribution of different grades were found to be significantly different among the two study cohorts. The proportion of failed candidates were found to be significantly high among COVID-19 cohort.

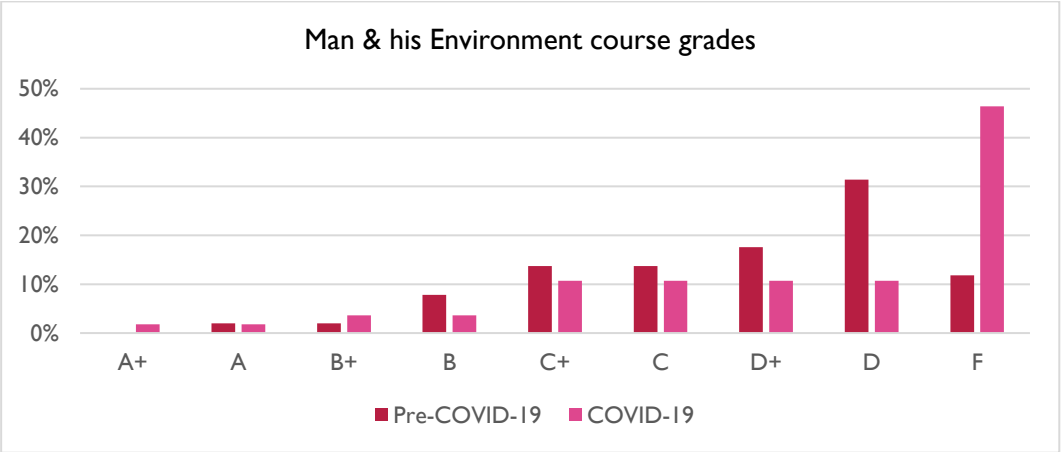

Figure (1): Grades distribution among the two study cohorts in the 'Man & his Environment' course

Figure (2) shows the comparison of different grades secured by students in Musculoskeletal System course during Pre-COVID-19 & COVID-19 time. The distribution of different grades were found to be significantly different among the two study cohorts. The proportion of A & A+ were found to be significantly high among pre COVID-19 cohort.

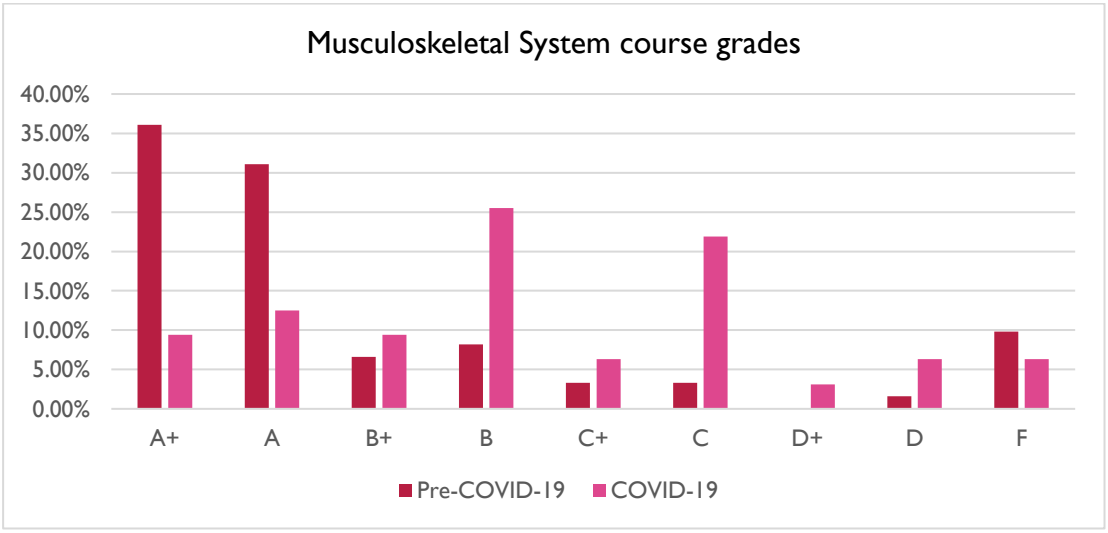

Figure (2): Grades distribution among the two study cohorts in the 'Musculoskeletal System' course

When comparing the passing percentage between the two cohorts (pre-COVID-19 and COVID-19) among year one courses, all the courses did not show any significant difference in passing percentage except the 'Man & His Environment' course where the passing percent significantly declined from 88.2% (pre-COVID-19) to 53.6% (COVID-19) marking the most substantial drop among all courses. This course experienced a statistically significant drop in passing percentage in COVID-19 cohort compared to pre-COVID-19 cohort. ($p < 0.001$). Table (2) and figure (3) shows the passing percent of the two cohorts in all courses.

Table (2): Chi square test comparing passing rates in the two cohorts in year one courses

Passing percentage							
Course Cohort		Concepts and Principles of Medical Education	Growth and Development	Health and Illness in the Community	Man & his Environment	Musculo-skeletal system	Principles of Disease
Pre-COVID	N	53	39	42	45	55	39
	%	100.0%	75.0%	93.3%	88.2%	90.2%	70.9%
COVID time	N	56	37	32	30	30	30
	%	94.9%	61.7%	100.0%	53.6%	93.8%	73.2%
Chi square		2.769	2.271	2.22	15.3	0.343	0.059
P value		0.245 NS	0.158 NS	0.262 NS	<0.001 S	0.710 NS	0.999 NS

P-value ≤ 0.05 is considered significant

S: Significant

NS: Non-significant

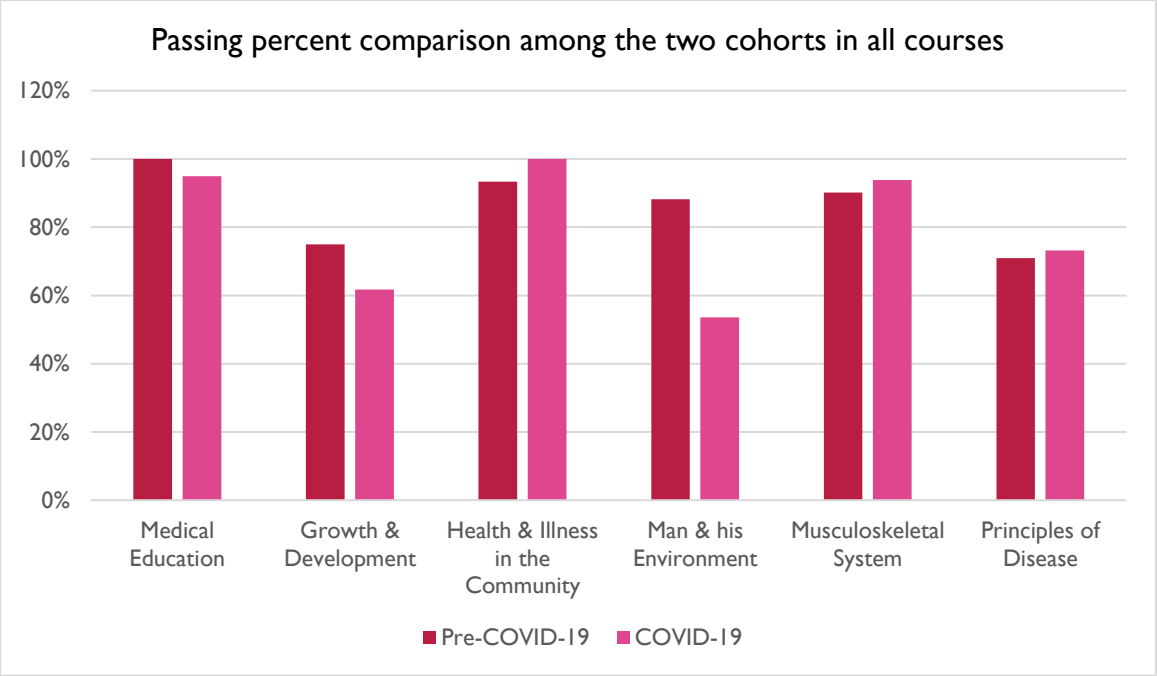

Figure (3): Passing percent among the two study cohorts in all year one courses

3.2. Phase Two Results:

Following the statistical analysis of students' grades, the online survey was sent to all students in the COVID-19 cohort. A total of 48 students participated in the online survey, evaluating their engagement, satisfaction, and confidence in online learning.

Regarding the impact of COVID-19 pandemic on the students' academic performance, 25% of students were satisfied with remote teaching methods, while 29% were not satisfied, 10.4% felt engaged with online teaching while more than half the students (56.3%) found it hard to engage, 25% were satisfied with the online exam strategy during the pandemic while 35.4%

were not satisfied, 62.5% believed their exam performance worsened due to online learning, while 18.8% noted an improvement and 50% of students felt unprepared for upcoming exams due to online learning, with only 22.9% expressing confidence as stated in table 3.

Table (3)

Section 1: Questions about Impact of COVID-19 Pandemic on Academic Performance										
How would you rate the effectiveness of online instruction in your academic performance during the pandemic?	Much better		Somewhat better		About the same		Somewhat worse		Much worse	
	N	%	N	%	N	%	N	%	N	%
	5	10.4	11	22.9	5	10.4	17	35.4	10	20.8
Has online instruction increased, decreased, or maintained your engagement with block material?	Increased engagement				Same level of engagement		Decreased engagement			
	N		%		N	%	N		%	
	5		10.4		16	33.3	27		56.3	
How has online instruction impacted your performance in block exams?	Improved exam performance				No significant change in exam performance		Decreased exam performance			
	N		%		N	%	N		%	
	9		18.8		9	18.8	30		62.5	
How confident do you feel about your readiness for upcoming blocks or exams as a result of your experience with online learning during the pandemic?	Very confident		Confident		Neutral		Not very confident		Not at all confident	
	N	%	N	%	N	%	N	%	N	%
	6	12.5	11	22.9	13	27.1	12	25.0	6	12.5
Have you experienced any disruptions to your academic progression during the pandemic?	Yes				No					
	N		%		N		%			
	35		72.9		13		27.1			
How satisfied are you with remote teaching methods employed by instructors?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	2	4.2	10	20.8	17	35.4	13	27.1	6	12.5
How satisfied are you with remote assessment methodology used in blocks?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	5	10.4	7	14.6	19	39.6	11	22.9	6	12.5
How do you feel about the online instruction provided during the pandemic?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	

	N 6	% 12.5	N 8	% 16.7	N 15	% 31.3	N 10	% 20.8	N 9	% 18.8
How has your time management been affected by online learning during the pandemic?	Improved time management				No significant change		Decreased time management			
	N 17		% 35.4		N 9	% 18.8	N 22		% 45.8	

Regarding the students' perceptions and experiences, 35.5% of students were satisfied with the support of their instructors and 31.3 were not satisfied. On the other hand, only 27.1% of students were satisfied with the support they receive from their peers while 43.8% were not. More than half the students were satisfied with the provided online resources (54.2%) and 16.7% were not satisfied as shown in table 4.

Table (4)

Section 2: Perceptions and Experiences										
How well do you feel supported by your peers in online learning environments?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N 6	% 12.5	N 7	% 14.6	N 14	% 29.2	N 15	% 31.3	N 6	% 12.5
How satisfied are you with the responsiveness of instructors to student queries and concerns in online blocks?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N 9	% 18.8	N 8	% 16.7	N 16	% 33.3	N 12	% 25.0	N 3	% 6.3
How have online office hours or virtual consultations with instructors impacted your learning experience?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N 6	% 12.5	N 3	% 6.3	N 24	N 50.0	N 9	% 18.8	N 6	% 12.5
How would you rate the level of interaction with instructors in online blocks?	High level of interaction				Moderate level of interaction		Low level of interaction			
	N 9		% 18.8		N 20	% 41.7	N 19		% 39.6	
How satisfied are you with the variety of instructional methods used in online blocks (e.g., lectures, discussions, simulations)?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N 8	% 16.7	N 5	% 10.4	N 16	% 33.3	N 17	% 35.4	N 2	% 4.2
How effective do you find online assessments (e.g., quizzes, exams) in evaluating your understanding of block material?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%

	8	16.7	12	25.0	16	33.3	7	14.6	5	10.4
To what extent do you agree with the statement: "Online instruction has provided opportunities for personalized learning and individualized support from instructors"?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	6	12.5	11	22.9	17	35.4	7	14.6	7	14.6
How satisfied are you with the opportunities for peer interaction and collaboration in online blocks?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	4	8.3	11	22.9	11	22.9	16	33.3	6	12.5
How effective do you find online resources (e.g., recorded lectures, multimedia materials) in supporting your learning?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	12	25.0	14	29.2	14	29.2	6	12.5	2	4.2

Regarding student support, adaptation and mental health 41.7% of students reported increased stress levels due to the transition to online learning while 15.4% reported decrease stress. 23.2% of students were satisfied with the mental health support provided by the college while 39.6% were not satisfied and 22.9% of students were satisfied with the resources provided by the college for mental support while 37.5% were not satisfied as shown in table 5.

Table (5)

Section 3: Student Support, Adaptation, and Mental Health										
How satisfied are you with the availability of technical support for online learning platforms and tools?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	7	14.6	13	27.1	18	37.5	9	18.8	1	14.6
How has your stress level been impacted by the transition to online learning during the pandemic?	Increased stress				No significant change		Decreased stress			
	N		%		N	%	N		%	
	20		20.8		23	47.9	5		10.4	
How satisfied are you with the accessibility of online learning resources and materials?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	7	14.6	19	39.6	15	31.3	5	10.4	2	4.2

To what extent do you agree with the statement: "The institution has provided adequate mental health support services during the pandemic"?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	2	4.2	9	18.8	18	37.5	5	10.4	14	29.2
How satisfied are you with the clarity and organization of online block materials?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	4	8.3	13	27.1	14	29.2	12	25.0	5	10.4
How would you rate the availability of academic support services (e.g., tutoring, academic advising) during the pandemic?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	4	8.3	11	22.9	13	27.1	7	14.6	13	27.1
How effective have online support groups or counselling services been in addressing your mental health needs during the pandemic?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	7	14.6	7	14.6	19	39.6	9	18.8	9	18.8
To what extent do you agree with the statement: "The institution has provided adequate resources for managing academic stress and workload during the pandemic"?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	6	12.5	5	10.4	19	39.6	12	25.0	6	12.5
How satisfied are you with the opportunities for extracurricular involvement or social interaction provided by the institution during the pandemic?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	6	12.5	5	10.4	17	35.4	8	16.7	12	25.0

Regarding the 'Man & his Environment' course, more than half the students (56.4%) found the online delivery of the course very challenging while 20.9% did not find any challenges. 27.1% of students were satisfied by the instructors' support during the course delivery while 47.9% were not. 37.5% found the assessment activities not engaging while 29.2% found them engaging as shown in table 6.

Table (6)

Section 4: Assessment of Man and His Environment Block										
How would you rate the overall effectiveness of online instruction for the "Man and His Environment" block in facilitating your understanding and application of environmental health concepts?	Very effective		Effective		Neutral		Ineffective		Very ineffective	
	N	%	N	%	N	%	N	%	N	%
	3	6.3	9	18.8	11	22.9	10	20.8	15	31.3

How satisfied are you with the level of support and guidance provided by instructors during the "Man and His Environment" block, including feedback on assignments and availability for clarifications?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	1	2.1	12	25.0	12	25.0	10	20.8	13	27.1
How satisfied are you with the variety, relevance, and accessibility of instructional materials (e.g., readings, videos, interactive content) provided for the "Man and His Environment" block, including resources for conducting Problem-Based Learning (PBL), labs, seminars, and lectures?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	4	8.3	10	20.8	14	29.2	7	14.6	13	27.1
On a scale of 1 to 5, how challenging do you find the "Man and His Environment" block in an online learning environment?	1 (Not challenging at all)		2		3		4		5 (Extremely challenging)	
	N	%	N	%	N	%	N	%	N	%
	3	6.3	7	14.6	11	22.9	10	20.8	17	35.4
On a scale of 1 to 5, how often have you faced technical difficulties or issues related to accessing resources or participating in activities for the "Man and His Environment" block?	1 (Rarely)		2		3		4		5 (Frequently)	
	N	%	N	%	N	%	N	%	N	%
	5	10.4	10	20.8	17	35.4	6	12.5	10	20.8
On a scale of 1 to 5, how engaging do you find the activities and assignments related to the "Man and His Environment" block, including Problem-Based Learning (PBL) sessions, labs, seminars, and lectures, in promoting active learning and critical thinking?	1 (Not engaging at all)		2		3		4		5 (Extremely engaging)	
	N	%	N	%	N	%	N	%	N	%
	8	16.7	9	18.8	15	31.3	9	18.8	7	14.6
How satisfied are you with the opportunities provided for interaction and discussion with peers related to the content of the "Man and His Environment" block, including activities during PBL, labs, seminars, and lectures, in fostering collaborative learning and knowledge sharing?	Very satisfied		Satisfied		Neutral		Dissatisfied		Very dissatisfied	
	N	%	N	%	N	%	N	%	N	%
	1	2.1	7	14.6	12	25.0	13	27.1	15	31.3
On a scale of 1 to 5, how well do you think assessments (e.g., OSPE, modified essay questions, MCQs, seminar evaluation) in the “Man and His Environment” block measure your understanding of the material and your ability to apply knowledge to practical situations?	1 (Not engaging at all)		2		3		4		5 (Extremely engaging)	
	N	%	N	%	N	%	N	%	N	%
	11	22.9	7	14.6	16	33.3	6	12.5	8	16.7

4. DISCUSSION

The present study examines the educational experiences of Saudi undergraduate medical students at Jouf University College

of Medicine who commenced their studies during the COVID-19 pandemic, highlighting the challenges, adaptations, and implications of remote learning. Despite the availability of cutting-edge infrastructure in Saudi universities, widespread internet coverage, and prior experience with online education platforms, the findings of this study revealed significant academic disruptions, variations in student performance, and psychological challenges associated with the transition to online education. These results align with prior research, which underscores the profound impact of the pandemic on medical education worldwide [1-3].

4.1. Educational Outcomes and the Digital Divide in Higher Education

This study was conducted in two phases. The first phase involved analyzing the academic performance of the COVID-19 cohort and comparing it to the pre-COVID-19 cohort. Institutional data revealed substantial disparities in student performance between the two groups. A dramatic decline was observed in two out of the six first-year courses: Man and His Environment and Musculoskeletal System. In the former, the failure rate increased significantly from 11.8% to 46.4% ($p < 0.001$), while the latter exhibited a significant decline in the proportion of students achieving A and A+ grades ($p = 0.002$).

These findings align with previous studies indicating that courses requiring hands-on learning, clinical application, and interactive problem-solving suffered the most in remote settings [9-10]. The sudden shift to online learning limited real-time interaction, reduced access to laboratory work, and restricted clinical exposure, all of which likely contributed to the observed decline in performance [9]. Furthermore, courses that emphasized higher-order cognitive skills and practical application—such as those involving physiological mechanisms and biochemical reactions—proved more challenging in an online setting [10-12]. Research suggests that lack of real-time faculty support and hands-on practice disproportionately affects student outcomes in these courses [13-14].

4.2. The Student Experience: Engagement, Adaptation, and Challenges in Digital Learning

The second phase of this study involved an online survey to gather students' opinions on online learning during the pandemic. The survey results revealed predominantly negative perceptions of remote education. More than half of the students (56.3%) reported decreased engagement, while 62.5% felt their exam performance worsened. Additionally, 20.8% of respondents described online learning as "much worse" than traditional methods, while only 10.4% rated it as "much better." Furthermore, 50% of students felt unprepared for upcoming exams due to online learning, with only 22.9% expressing confidence in their preparedness.

These findings are consistent with research demonstrating lower student engagement in asynchronous or passive online learning environments [32-33]. Technical difficulties, lack of diverse instructional methods, and minimal real-time faculty interaction were among the primary barriers identified, aligning with global trends in medical education [34]. Moreover, a study by Singh et al. [35] found that 51% of medical students preferred in-person classes over online learning, emphasizing the challenges of replacing interactive, clinical, and hands-on learning experiences with virtual instruction. Faculty involvement plays a crucial role in mitigating these challenges, as research suggests that active faculty engagement in online teaching enhances student participation and satisfaction [36].

Although students expressed dissatisfaction with the complete shift to online education, their overall academic achievement was not as drastically impacted as anticipated. This highlights the need to consider the psychological well-being of students, who were overwhelmed not only by the educational transition but also by the broader uncertainty and fear associated with the pandemic.

4.3. Navigating Higher Education in Crisis: How Students Adapted to Online Learning

Despite the challenges of online learning, students employed various adaptive strategies to cope with the constraints of remote education. Self-directed learning, peer study groups, and increased reliance on digital resources emerged as key mechanisms for overcoming barriers. However, these efforts were often limited by inadequate institutional support. Only about one-third of students (35.5%) were satisfied with the support provided by their instructors during online sessions, and just 27.1% were satisfied with peer support. On the other hand, more than half of the students (54.2%) were satisfied with the availability of online resources, particularly recorded lectures, which they found highly effective for their learning.

Previous research highlights that students who successfully adapted to online learning relied on continuous feedback mechanisms to refine their study habits [37]. Furthermore, institutions that integrated interactive, technology-driven educational approaches—such as real-time polling, virtual case discussions, and structured breakout sessions—helped students maintain engagement and self-motivation [38-39].

4.4. Discipline-Specific Challenges in Online Education: A Case Study of Medical Training

The shift to online education was particularly challenging for students enrolled in the Man and His Environment course, which had the highest failure rates among all six first-year courses. A dedicated section of the online survey was designed to explore student reflections on the difficulties encountered in this course.

More than half of the students (56.4%) found the online delivery of the course highly challenging, while 47.9% were dissatisfied with the level of instructor support. Given that the course involves extensive physiological mechanisms and biochemical reactions, even the recorded online resources that were sufficient for other courses were deemed inadequate by 41.7% of students. Furthermore, 37.5% of students expressed dissatisfaction with the assessment activities used in the course.

These findings underscore the difficulties associated with online medical education, particularly for courses that require interactive learning and practical application. Targeted interventions, such as enhanced faculty support, structured assessments, and improved online engagement strategies, are necessary to address these issues. Research suggests that adapting mentoring programs to online platforms significantly improves student satisfaction [40-41]. Similarly, peer interaction plays a crucial role in enhancing engagement and academic success in virtual learning environments [42].

4.5. The Mental Health Toll of Online Learning: Institutional Gaps and Policy Needs

The mental health and well-being of students have emerged as critical factors influencing academic performance during the pandemic. In this study, 41.7% of students reported increased stress levels due to the transition to online learning, 37.6% were dissatisfied with the online counseling services available, 39.6% expressed dissatisfaction with overall mental health support provided by the college, and 37.5% were dissatisfied with the mental health resources available to them.Despite the provision of mental health support services, the magnitude of change during the COVID-19 pandemic—both in education and in everyday life—proved overwhelming for many students. This likely contributed to higher levels of dissatisfaction with the support systems in place.

Previous studies have similarly reported an increase in stress, anxiety, and depression among medical students during the pandemic, exacerbated by the transition to online learning [43-44]. Implementing comprehensive mental health support programs, including counseling services and stress management initiatives, is essential to mitigate these effects and support students' overall well-being.

5. CONCLUSIONS

The current study concludes that during the COVID-19 pandemic, the interruption of education put a huge burden on the educational process, affecting not only the change in the educational strategy, but causing unprecedented mental stress to students and exposing them to the feeling of uncertainty about their future. But with crisis come opportunities that may not be sought in ordinary times. The COVID-19 pandemic forced all universities to use and rely on online education, accelerating the experience of both instructors and students in getting the best of online platforms and putting online education as a permanent component of education in a blended form. It also put the education sector on track to be prepared for any future crisis. Incorporating face-to-face learning with online education combines the benefits of both strategies where hands-on training, critical thinking, group work, soft skills are gained during students' interactions and self-paced, personalized and flexible learning is available online. This mix will widen the opportunity to accommodate diverse learning styles. It will also foster self-directed learning that is essential for future physicians in the rapidly developing world of medicine. Additionally, students will be more competent and prepared for the era of artificial intelligence (AI) with better digital literacy and self-management ensuring their ability to thrive in technology-driven environments.

The COVID-19 pandemic also brought to the frontline the importance of student mental health and wellbeing and the responsibility of educational institutes to support student wellness. Mental health not only affects academic achievement, but it also influences personal development in this critical age of transition to adulthood. Thus, it is important that universities provide mental health support through counselling, coaching programs, peer-support networks and stress-management programs. Mental health support became a solid component of services provided by most universities after the pandemic, and this is another benefit the crisis brought.

Recommendations:

The current study suggests a number of recommendations to enhance online learning as well as academic and mental support for university students:

- Shifting to user-friendly online platforms for better communication and interaction.
- Training both students and instructors on the effective use of online educational tools.
- Increasing academic support services like tutoring, mentoring and academic advising.
- Proposing personalized educational plans to students at risk of failure.
- Orienting students about the importance of mental wellbeing and necessity of seeking help.
- Using surveys to identify students with mental health issues needing intervention.

Providing various mental support resources like counselling, peer support groups, stress management workshops and

coaching programs

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