



Medical, Dental, and Nursing Students' Experience with Virtual Practical Sessions: A Cross-Sectional Study

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Abstract

Introduction: The COVID-19 pandemic has profoundly impacted healthcare education, necessitating a shift from traditional on-campus teaching to virtual platforms. However, there is limited research on how this transition has affected students' experiences, particularly in laboratory sessions. Understanding students' perceptions of virtual learning is crucial for optimizing future educational strategies.

Objective: This study aims to evaluate students' experiences with virtual (online) laboratory sessions compared to traditional on-campus sessions. Key aspects examined include preference, time allocation, level of effort, retention of instructions, and preferences for future teaching methods.

Methods: A cross-sectional study was conducted using a Google Forms questionnaire distributed to students enrolled in medicine, dentistry, and nursing programs. Participants' self-reported experiences in anatomy, pathology, microbiology, histology, and physiology virtual and on-campus laboratory sessions were analyzed.

Results: The questionnaire garnered responses from 455 students. A majority of students in histology (55.2%), pathology (57.4%), and microbiology (55.3%) preferred virtual sessions, while fewer in anatomy (39.6%) and physiology (44.3%) expressed the same preference. Notably, students in histology (35.6%) and microbiology (37.0%) reported putting in less effort during virtual sessions. Many participants acknowledged that virtual labs required less time but also indicated challenges in remembering instructions compared to on-campus sessions. Variations in experiences were noted across gender, field of study, and academic year.

Conclusion: The COVID-19 pandemic has reshaped healthcare education, emphasizing the need for adaptable teaching methods. Factors such as effort, time management, retention of information, and teaching preferences differ among students based on demographics and academic progression. These findings underscore the importance of tailored approaches to virtual education to enhance its effectiveness and address diverse student needs.

INTRODUCTION

Over the past two decades, severe acute respiratory syndrome coronaviruses (SARS) have caused significant disease outbreaks in the Middle East and East Asia. The emergence of coronavirus disease 2019 (COVID-19) escalated into a global pandemic characterized by severe manifestations. To mitigate the COVID-19 spread and contain the epidemiological curve, countries implemented non-pharmaceutical

public health interventions, such as nationwide curfews and the restriction of non-essential activities. Consequently, universities shifted to fully online education and closed campuses, leading to disruptions in the teaching process, particularly for medical students. Challenges arose, including technical issues, limited internet access, difficulties in teaching clinical skills remotely, and concerns about academic assessments during the transition from on-campus to online laboratory sessions. (Rodriguez-Morales et al., 2020)

Various factors have influenced students' preferences for virtual learning. A study at the University of Nevada identified the impact of learning pace, technology proficiency, work status, and prior online course experiences on students' preferences and experiences. The effectiveness of virtual learning was also influenced by instructor and student training and structured schedules. Similarly, medical students in the United Kingdom benefited from online platforms that allowed self-paced learning and interactive discussions with peers. Additionally, a study among physiotherapy students in Italy favored online teaching over face-to-face delivery. However, these studies predominantly focused on developed countries, leaving a critical gap in understanding virtual learning experiences in developing countries. The differences in resources, infrastructure, and educational priorities between developing and developed nations, including limited internet access, basic skills emphasis, and reliance on traditional teaching methods, underscore the need for research in developing country contexts. To address this gap, our study aimed to evaluate the preferences and experiences of medical, dental, and nursing students regarding virtual education compared to traditional on-campus education, specifically focusing on virtual laboratory sessions. (Cascella et al., 2020).

METHODS

Study Design and Tools:

A cross-sectional study design was employed. A preliminary questionnaire was developed and reviewed. Following an initial review by a sample of 10 medical, dentistry, and nursing students, the questionnaire was further refined. The finalized questionnaire comprised 16 questions, including items on demographics (academic major and gender) and an assessment of students' experiences with virtual (online) laboratory sessions versus on-campus sessions. This assessment covered preferences, time and effort expended, ability to retain instructions, and preferences for future teaching modalities.

Participants:

Participants included students enrolled in medical, dental, and nursing programs. An email invitation was sent to students registered for virtual laboratory classes.

IRB Approval:

The study received approval from ethical committee. Participants were provided with information about the study's aims, objectives, voluntary participation, right to withdraw, and confidentiality of their information on the first page of the online questionnaire. Participation was entirely voluntary, and data were used solely for research purposes.

Statistical Methods:

Data were collected and compiled using Google Forms and then transferred to an Excel spreadsheet before analysis using SPSS version 26. Descriptive statistics, including numbers and percentages, were used to report the data. The chi-square test was employed for statistical comparisons, with a significance level set at 0.05.

RESULTS

Characteristics of Study Participants:

A total of 455 students faculties of medicine, dentistry, and nursing participated in the survey. Among them, 50.1% (n=228) were female, and the majority were from the first-year level (48.6%, n=221), with smaller proportions from higher years: second year (30.8%, n=140), third year (19.3%, n=88), and fourth year (1.3%). The participants were enrolled in five laboratories during the Spring semester of the 2019/2020 academic year, with varying numbers in each: anatomy (448), histology (436), pathology (362), microbiology (362), and physiology (455). The majority of students were from the faculty of medicine (83.7%, n=381), while dentistry and nursing constituted 16.3% (n=74). Physiology had the highest number

of participants (455), followed by anatomy (448), histology (436), pathology (362), and microbiology (362).

Participants' Experience with Virtual Sessions:

Table 1 summarizes the participants' experiences with virtual laboratory sessions compared to on-campus sessions. Virtual sessions were preferred in histology (55.2%, n=237), pathology (57.4%, n=198), and microbiology (55.3%, n=194) laboratories, while on-campus sessions were preferred in anatomy (60.4%, n=265) and physiology (56.2%, n=172) laboratories ($p < 0.05$ for all). Across all laboratories, students reported that virtual sessions consumed less time than on-campus sessions. Less effort was reported in virtual teaching for histology (35.6%, n=155) and microbiology (37%, n=134) but more effort for anatomy (44.2%, n=198) and physiology (25.7%, n=117) compared to on-campus teaching. Students found it harder to remember instructions in virtual sessions across all laboratories. Preference for future virtual sessions varied by laboratory, with higher preferences in histology, pathology, and microbiology but lower in anatomy and physiology.

Differences by Gender, Major, and Year:

Table 2 shows significant gender differences in effort and ability to remember instructions across laboratories. Male students reported less effort and better memory in virtual sessions compared to females in various laboratories. Differences were also observed between medicine and dentistry/nursing students, with medicine students showing higher preferences for virtual sessions in certain laboratories and reporting spending less time and better memory retention in virtual sessions compared to dentistry/nursing students. Differences by the year of study were detected for preference for virtual sessions and effort made, with higher years showing more preference for virtual sessions and better memory retention in virtual environments across all laboratories.

Table 1. Distribution of Study Participants by Laboratory and Virtual Preference, Time Spent, Effort Made, Ability to Remember Instructions, and Preference for Considering Virtual Laboratory in the Future

Laboratory	Anatomy	Histology	Pathology	Microbiology	Physiology
Preference for Virtual Laboratory Over On-Campus Laboratory (%)					
- No	60.40	44.80	42.60	44.70	56.20
- Yes	39.60	55.20	57.40	55.30	43.80
Time Spent on Virtual Laboratory Compared to On-Campus Laboratory (%)					
- Less	56.70	58.90	54.10	56.20	56.50
- More	21.40	16.70	18.60	17.40	18.80
- Similar	21.90	24.40	27.30	26.40	24.70
Effort Made on Virtual Laboratory Compared to On-Campus Laboratory (%)					
- Less	29.20	35.60	34.00	37.00	22.40
- More	44.20	29.60	27.30	29.00	25.70
- Similar	26.60	34.90	38.70	34.00	20.90
Ability to Remember Instructions Better in Virtual Laboratory (%)					
- No	59.80	53.60	51.10	52.20	55.30
- Yes	40.20	46.40	48.90	47.80	44.70
Preference for Considering Future Virtual Laboratory (%)					
- No	60.60	40.00	47.00	50.00	50.00

- Yes	36.40	60.00	53.00	50.00	50.00
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Table 2. Distribution of Study Participants by Preference, Time Spent, Efforts Made, and Ability to Remember and by Gender, Study Major, and Year

Gender				Major			Year of Study					
Female				Male			P-value					
Dentistry, Nursing				Medicine			P-value					
1				2			3					
Preference for Anatomy Virtual Laboratory Over On-Campus Laboratory (%)	Female	Male	P-value	Dentistry	Nursing	Medicine	P-value	1	2	3	4	P-value
No	63.8	57.1	0.149	53.7	61.7	58.2	0.222	65.7	58.2	48.2	85.7	0.019
Yes	36.2	42.9		46.3	38.3	41.8		34.3	41.8	51.8	14.3	
Time Spent on Anatomy Virtual Laboratory Compared to On-Campus Laboratory (%)	Female	Male	P-value	Dentistry	Nursing	Medicine	P-value	1	2	3	4	P-value
Less	55.6	57.7	0.847	40.0	61.7	64.1	0.002	51.4	64.1	56.1	83.3	0.094
Similar	21.8	21.9		24.3	17.6	21.7		17.6	21.7	24.7	0.0	
More	22.7	20.5		35.7	20.7	14.3		25.7	14.3	18.8	16.7	

DISCUSSION

The COVID-19 pandemic prompted significant changes in education delivery methods, with virtual teaching becoming prevalent due to modern technology. However, there is limited understanding of students' experiences in developing countries regarding virtual learning, especially in laboratory settings. This study aimed to explore students' experiences with virtual learning compared to traditional on-campus teaching, offering insights for developing inclusive virtual curricula. The results suggest a preference for virtual sessions, although differences based on gender, year of study, and major were noted, indicating the need for further investigation to enhance virtual learning experiences. (Kheirallah et al., 2020)

Approximately half of the participants favored virtual delivery methods and expressed a desire for future virtual sessions. This finding aligns with reports from China indicating high satisfaction rates with virtual education. Conversely, studies in our region reported lower satisfaction rates, attributed to factors like commuting time, self-paced learning, convenience, and material availability, countered by challenges such as internet quality, tutors' digital literacy, platform design, and interaction limitations. Addressing these factors, along with exploring digital health competencies, could improve the future of virtual learning, incorporating diverse modalities like tablets and smartphones. (Esposito and Principi, 2020)

Among the subjects studied, pathology, microbiology, and histology were preferred virtually, possibly due to content nature. However, the reasons behind this preference require further investigation, considering factors like student-instructor and student-student interactions, which are vital for engagement. The impact of COVID-19 on psychological aspects and technology enhancements influencing interactions should be considered. (Malee Bassett and Arnhold, 2020)

While understanding of teaching material was slightly lower in virtual sessions across all labs, comparable knowledge on certain topics suggests potential for hybrid teaching models in the future with careful planning. Enhancing virtual platforms can aid in pandemic preparedness, improving remote teaching capabilities for similar situations. (Wibowo et al., 2016)

Limitations include the sample's lack of generalizability beyond one university and the dominant participation of medical students and first-year students, affecting internal and external validity. Future research should focus on gender-based differences in learning efforts and time allocation through qualitative studies and broader, randomized samples across countries. (Mohammed et al., 2020)

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