



Exploring the E-learning Habits among the Students: A Cross-sectional study of Healthcare Systems in India

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Abstract

During the COVID-19 period, there is a huge disturbance in all fields, including Medical, dental, allied sciences, and economic disruption throughout the world in India. To overcome the academic loss, the Government of India has taken great initiative towards the conduct of online classes and practical to streamline the academic year. A cross-sectional study was conducted among 100 medical students and involved 3 medical colleges, and distributed questionnaires through Google Forms. Data was entered and analyzed with the Statistical Package for Social Sciences (SPSS). Oral informed consent and confidentiality of the personal identity were maintained. About 47% of the study group were under 21-23 years of age, and females were 76%. Nearly 1/3rd (32%) of the study population mentioned interaction during the class, and about 75% were revealed as educational domains compromised during the COVID-19 period. Overall satisfaction with online classes as "poor" was 27% and the mean overall satisfaction and standard deviation was 2.4 ± 1.17 . There was a statistically significant association observed with different online first-class scorers (30%), with offline first-class (45%) scorers ($P < 0.05$). Based on the study results, overall satisfaction with online classes was poor, and less interaction during the classes was observed. Online classes initiation is a time-sensitive approach and will be utilized in a proper way; responsibility lies in multiple ways from the students, faculty, resources from both sides, and management support.

Keywords: Medical Students, Online Classes, Perceptions, Interaction, Satisfaction.



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Introduction

Universities, higher education institutions (HEIs), higher learning institutions (HLIs), and medical colleges faced challenges during COVID-19 while switching to e-learning mode or distance learning. The problems and challenges faced were lack of financial support, budgets, digitalization, maintenance support, technical support, internet issues, lack of trainings, audio video clarity, most importantly ease of use were faced by the students and faculty members (Fulop *et al.*, 2023). As a result of the COVID-19 pandemic, most countries suffered in all aspects, including the economy, growth of gross domestic product, education, research, and many more at the individual level as well as country level, along with psychological factors on individuals such as stress, anxiety (Pasha *et al.*, 2023). During this pandemic, there is tremendous implementation of online classes for the students to combat the loss of academic year and studies.

On the contrary, the Government of India, the National Medical Commission, has given direction to all educational institutes to implement online classes for the students (National Medical Commission, 2020). This change was considered as a part of curriculum development, and individual departments have taken the initiative to cover the theory as well as the practical to their students through online classes. In 2020, the WHO declared outbreak of COVID-19, which was a threat to public health. C-19 spread rapidly and caused severe complications. Everyone was at risk, especially older people, because of a weaker immune system. Countries impose lockdown and social distancing as mandatory precautionary steps. Face masks, the use of sanitizer, and gloves were mandatory. Due to these issues, it was not possible to arrange physical teaching classes at educational institutions. Due to the pandemic, online teaching and learning were the only options for educational institutions.

E-learning is one of the substitutes for traditional learning. The medical students who are learning in today's environment are totally different from those of the past. Nowadays, medical schools and colleges are using audiovisual clips for teaching, and today information communication technologies and the internet are so dominant compared to the past. Now, new methods of e-learning possess several benefits as compared to traditional procedures. These benefits include online teaching, interaction from a far distance, uploading instructional material, students can download slides from anywhere, teachers can teach, take quizzes, give presentations, and track attendance. E-learning encourages the medical students to have great control over their learning, and these conventional methods are easy to use. Through such new models of e-learning, instructors can send feedback to students about the exam assessment. Various aspects of the use of multimedia tools in the process of professional training of a future specialist in distance learning require further research (Mamchych *et al.*, 2023). The current study has tried to answer the following research question:

RQ1: What is the level of Overall satisfaction of medical students about online classes.

Literature Review

Online learning has become increasingly important in contemporary society, particularly given the disruptions caused by the COVID-19 pandemic. It is noteworthy that more than 1.5 billion students across the world have been affected by the pandemic, with their learning being disrupted. Nevertheless, online learning has taken up the mantle, with the assistance of digital technologies and the increased penetration of the internet in contemporary society. As much as this new technology may be effective in enhancing learning, the lack of motivation, coupled with its negative effects on social relations and engagements of students, can have a negative impact on perception (Alzahrani, 2022).

A study conducted in Hyderabad by Bathini *et al.* (2022) on the effectiveness of exclusive e learning among medical students during the COVID-19 period among 227 participants. They revealed that the medical students and faculty quickly adapted to the online mode and e learning needs self-motivation and huge commitment from the participants and stated that online teaching is less effective when compared to traditional teaching (Bathini, Kundoor, Mathai, 2022). Another study conducted among medical students at a tertiary care center in Hyderabad about students' perceptions on online teaching, the study concluded that online classes must be more interactive and to generate more



interest, need to have quizzes, problem-solving activities, and discussions in the classes (Tekulapally, 2021). Medical education is such a field in which every time there is a need to continue the completion of an educational domain, including patient care. For example, in such forthcoming disasters as floods, tsunamis, earthquakes, and COVID-19-type respiratory epidemics, where a large population will be affected, preparedness is required at the district, state, and country levels.

Our study focuses on the preparedness of the students to overcome such problems in the future. However, Medical students nowadays are not serious about preparedness, which could be due to personal motivation, family role in terms of financial conditions, and government and private management resources support is required as compared to the resources of developed countries. In relation to medical manpower preparedness, the need to involve medical, nursing, allied health professionals, and even administrative medical and non-medical sectors' involvement is also required (Weiner, Irwin, Trangenstein, & Gordon, 2005; Xia, Li, Chen, Jin, & Zhan, 2020).

The current online education system demands future online strategies such as telemedicine, video conferencing, e learning platforms. Tele medicine and e learning platforms for medical fraternity also highlighted in his article by Omboni, Padwal *et al.* (2022) for the importance of tele medicine for health care and also recommended for the future strategies based on different countries experience in the past (Xia, Li, Chen, Jin, & Zhang 2020) This COVID-19 situation has paved a way for the Medicos for future targets in the field of novel technologies. The students should be competent enough to overcome all upcoming problems for the sake of education to become good doctors to serve the community in a better way. This study is exclusively meant for the improvement in future online teachings, in case of any unforeseen situations of COVID-19 variants or any other disastrous situations. Not only this, but also the study does not test the integrity of the institution or the integrity of any participant.

In view of the above situations and circumstances, the present purpose of our study is to examine the endurance of the students to prepare them to overcome such critical situations in the medical education fraternity and to find out their perceptions about online teaching to improve further in such forthcoming situations in the future. In view of these, the objective of this study was to find the demographic characteristics of the students and perceptions of students about online teaching, and to determine the overall satisfaction of online teaching and to find the association between online and offline scores with students' grades and academic performance (Banu *et al.*, 2023; Mukhtyar *et al.*, 2024).

E-learning was the only option for institutions to continue educational and curriculum activities, especially for medical students. Use of technologies, information communication technologies in online learning and teaching is called e-learning. The first-century dynamism of the education system depends on e-learning. By using online teaching and learning tools and technologies, time, cost, and energy can be saved. Students can access teaching materials anytime from anywhere. Students can upload their assignments and can attend quizzes, midterms, and final term exams. E-learning can be classified into different categories: internet-based learning, virtual classrooms, computer-based learning, and digital collaboration.

There are several benefits of e-learning, such as better interaction between students and teachers, group discussions, and easy-to-use new technology that saves time and money. Several studies have investigated the use of e-learning among medical students, but there is a need to fill the gap in the Indian perspective regarding medical students' e-learning satisfaction. Benefits of e-learning include time and cost saving, user interactions, and communication from far areas, as there were restrictions during COVID-19 (C-19).

Medical colleges consider it as an expense, such as development of new software, provision of internet, and training to faculty members on how to efficiently and effectively use the software for online teaching, but this is an investment, not an expense; it provides users with ease of use, students and teachers can interact, conduct exams, and give presentations as well. Retrieval of the data at anytime from anywhere is possible (Fulop *et al.*, 2023). Acceptance of technology can be measured by perceived benefits and perceived ease of individual use.

Materials and Methods

Study Setting and Target Population

A sample of 100 medical students was obtained from three medical colleges in Hyderabad, India. Namely, Ayaan Institute of Medical Sciences, Dr. VRK women's medical college, and Shadan Institute of Medical Sciences.

Study Design

An institution-based cross-sectional study conducted during the period from September 2022 to November 2022.

Data Collection Tool

The questionnaire consists of four parts. The first part dealt with the demographic variables like age, gender, year, income of the family, and occupation of the father. The second part deals with the perceptions of the students about online classes in relation to duration of the class, time management of the speaker, interaction during class, and the third section is related to any internet issues, audio clarity, video clarity, concentration, and the COVID-19 effect, etc. The fourth part denoted the outcome of the student (result). There was a total of 5 demographic questions, i.e., age, gender, Education, income, and occupation of the father/guardian. In addition, the second section consists of 7 items measured on 1= yes, 2= No, 3= maybe regarding perceptions of medical students about online learning, and the third section consists of 3 items which are measured on 1= bad, 2= below, 3= average, 4= good, and the fourth section is about results. See Table 1

Table 1
Variable Descriptions

Variable	Description
Age	18-20 years
	21-23 years
	24-26 years
	More than 26 years
Gender	Female
	Male
Education	First year MBBS
	Second year MBBS
	Final year part -1 MBBS
	Final year part -2 MBBS
Income	Income category: Lower class
	Middle class
	Upper class
	Elite
Occupation	Occupation father: Business
	Engineer
	Doctor
	Skilled worker
	Teacher
	Retired
	Unemployed
	Private job
	Perception of students
Perception of students	Satisfied with duration of classes
	Interaction during class

Measurement	Any internet issues during class
Perception about videos audio	Educational domains compromised
	Strictly followed like offline class
	Bore and sleepy during class
	Help from google or other source
	1= yes, 2= No, 3= May be
	Video clarity
	Audio clarity
	Level of concentration
Measurement	1= Bad 2= Below, 3= Average 4= Good
Final Results	Fail (below 50%)
	Second class (50%-65%)
	First class (65%-75%)
	Distinction (above 75%)

Data and Instrument Reliability

A questionnaire was developed based on the previous literature availability, and validation of the questionnaire was done by the experts in the field of research and peer faculty in the medical colleges in Hyderabad, India. As there is no Likert scale used in this study, and it is a descriptive study, Cronbach's alpha and factor analysis do not apply to such types of studies for reliability and validity. The questionnaire is adopted from previous studies in which the questionnaire was already validated, so in this study, expert opinion was taken to make sure the questionnaire is reliable and valid from an Indian perspective. Online learning, Video and audio clarity, satisfaction of the medical students, and internet issues were measured in this study.

Sampling

In Hyderabad, within the 50-kilometre radius, there are 20 plus medical colleges in Telangana state (Omboni *et al.*, 2022). Now, Hyderabad city has extended to many surrounding districts, some of which come under Hyderabad Metro Development Authority (HMDA) limits, and some medical colleges are just outside the HMDA limits. But all these colleges have very close proximity to Hyderabad city properly, as the urban area is growing at a rapid pace. Out of 20 Medical colleges, the study has selected 3 colleges randomly. Close to 1600 medical students are available in the selected three medical colleges. Of which, 20% of the students were selected for the distribution of the questionnaire through Google Forms. This 20% of 1600 students comes close to 320 students. As the sample frame is not defined, we considered a convenient sampling method used to distribute the Google Form questionnaire to approximately 320 participants. Finally, 100 medical students completed their questionnaires. Interns were excluded from studying.

Ethical Considerations

Before sharing the internet form, oral consent was taken. Individual information and confidentiality of information are maintained throughout all the courses of research. Data will not be shared with any private or public agencies for any other purpose.

Statistical Analysis

For the descriptive variables, numbers and percentages were calculated. Categorical variables, to find the associations, the chi-squared test was used. In our study, statistical significance was considered based on the probability (P) value, which is less than or equal to 0.05. The overall reliability of the scale was above 0.70, which met the threshold suggested by Field (2013). Some of the items were binary; therefore, they were excluded from the reliability and validity analysis. Chi-square was used to check the correlation between constructs.

Results and Findings

Table 2

Demographic Characteristics among the Study Population

Variables	Number of participants	Percentage
18-20 years	42	42.0%
21-23 years	47	47.0%
24-26 years	10	10.0%
More than 26 years	1	1.0%
Female	76	76.0%
Male	24	24.0%
First year MBBS	12	12.0%
Second year MBBS	44	44.0%
Final year part -1 MBBS	24	24.0%
Final year part -2 MBBS	20	20.0%
Income category: Lower class	5	5.0%
Middle class	73	73.0%
Upper class	19	19.0%
Elite	3	3.0%
Occupation father: Business	27	27.0%
Engineer	19	19.0%
Doctor	15	15%
Skilled worker	15	15%
Teacher	13	13%
Retired	04	4%
Unemployed	06	6%
Private job	01	1%
Total	100	100%

Table 2 showed that 42% of respondents were aged 18-20 years, but the majority were 47 years old, 21-23 years, only 10 students were in the range of 24-26, and 1 was more than 26 years of age. In addition, most of the respondents were females, as 76% and 24% were males. Moreover, most of the students were in the second year of MBBS, i.e., 44%, followed by final year part students i.e., 24% and part 2 20%, only 12% were in the first year of MBBS. Regarding income, most of the respondents belong to the middle class 73%, upper class 19%, lower class 5% and elite 3% respectively. Likewise, respondents were asked about their father's occupation; 27% belong to the business community, 19% engineers, 15% doctors and skilled workers, 13% teachers, 4% retired, 6% unemployed, and 1% private job holders.

Table 3

Perceptions of Medical Students about Online Classes Learning During COVID-19 Period

Perceptions	Yes (%)	No (%)	May be (%)
Satisfied with duration of classes	49 (49%)	38 (%)	13 (13%)
Interaction during class	32 (32%)	52 (52%)	16 (16%)
Any internet issues during class	67 (67%)	22 (22%)	11 (11%)
Educational domains compromised	75 (75%)	14 (14%)	11 (11%)
Strictly followed like offline class	20 (20%)	62 (62%)	18 (18%)
Bore and sleepy during class	83 (83%)	11 (11%)	06 (6%)
Help from google or other source	61 (61%)	24 (24%)	15 (15%)

Table 3 depicted that about 1/3rd (32%) of the study population mentioned as interaction during the class, about 75% were revealed as educational domains compromised during COVID-19 period. Almost 83% of students replied as boring and sleepy during the online class.

Table 4

Perceptions students about Video clarity, audio clarity, level of concentration during the class and overall satisfaction about online classes

Perceptions	Bad	Below Average	Average	Good	
Video clarity	06 (6%)	07 (7%)	62 (62%)	25 (25%)	
Audio clarity	13 (13%)	06 (6%)	49 (49%)	32 (32%)	
Level of concentration	21 (21%)	19 (19%)	42 (42%)	18 (18%)	
Overall satisfaction of medical students with online classes					
Grade	Poor	Fair	Good	Very good	Excellent
Response	27 (27%)	30 (30%)	29 (29%)	6(6%)	8 (8%)
Mean ± SD			2.4 ± 1.17		

Table 4 stated that the video quality and audio quality depicted that as “bad” 6% and 13% respectively. Overall satisfaction about online classes as “poor” was 27% and mean satisfaction level was 2.4 $\pm$ 1.17.

Table 5

Average online and offline score of students in the study population

Score category	Online score	Offline score	Total
Fail (below 50%)	10 (10%)	09 (9%)	17 (100%)
Second class (50%-65%)	55 (55%)	34 (34%)	19 (100%)
First class (65%-75%)	30 (30%)	45 (45%)	75 (100%)
Distinction (above75%)	05 (5%)	12 (12%)	89 (100%)
Total	100 (100%)	100 (100%)	200 (100%)

$\chi^2 = 10.89$, 3df, $P < 0.012$.

Table 5 revealed that regarding result, in relation to second class, about 55% were scored in online exam. Whereas 34% of students got second class in offline exams. There was a statistically significant association observed with different online first-class scorers (30%), with offline first-class (45%) scorers ($P < 0.05$). Chi-Square results showed that the results were significant at $P < 0.05$ level.

Discussion

The present institute based cross-sectional study conducted among the three medical college students of Hyderabad during the period from September 2022 to November 2022 about perceptions of medical students on online teaching and learning during the COVID-19 period. Under the new Competency-based medical education (CBME), students' perceptions play a vital role in curriculum development as well as the better delivery of education tasks, completion, and their evaluation. On the contrary, COVID-19 triggered and created a tough time to complete the students' curriculum on time and gave an accelerated new direction of online teaching and learning techniques or modalities to students as well as faculty. In the current study, about 73% of students belong to middle-class families according to the students' self-declaration in the survey. Similar observation was not found in many studies as per the literature search, but there is a hypothetical assumption that many students from middle-class families do not prepare to have software logistics at home during this COVID-19 period. Some of the families, close relatives, and elderly people lost their lives due to COVID-19, and some parents lost their jobs during the same period. Hence, this economic disruption in the family also presented as an obstacle in online teaching to students during the COVID-19 period. Of course,

there is little difference that may be observed in relation to the procurement of smartphones and their support logistics from the private medical college people versus government medical college students in some studies.

In our study, it was depicted that only 32% of the study population mentioned interaction during the class; a slightly higher percentage was mentioned in the study conducted by [De Ponti et al. \(2020\)](#) in Italy, as 55%. Also, many studies revealed that based on literature, interaction with students will enhance learning ([Verma, Shinkar, Pandey, 2021](#)). A study conducted on medical students about online teaching in India revealed that 91% of students expressed that student/teacher interaction is a matter of concern during online class ([De Ponti et al., 2020](#)). Many educationalists encourage interaction during the class to enhance the students' interest in the content. Nearly 67% of the students mentioned internet problems. A study conducted in Hyderabad mentioned that the internet problem was 86% in their study. Also, a study conducted among Polish medical students revealed that 54% encountered technical problems during the COVID-19 period for online teaching sessions. In the United Kingdom (UK), among the medical students, a study stated that internet problem among them was only 21.53% ([Dost et al., 2020](#)). Generally, internet problems depend upon the country's resources as well as bandwidth, speed, and the type of mobile or electronic gadget used during the online teaching activity.

In the present study, about 75% of medical students revealed educational domains compromised during the COVID-19 period. Numerous studies mentioned that during the COVID-19 pandemic, most of the medical institutes throughout the world have compressed medical education hours, as well as skills acquisition in many institutes. Some studies conducted in the West Indies, two studies in Singapore, the United States of America (USA), and Australia stated that during this COVID-19 period, there is a disturbance in the delivery of educational domains, and their assessment was grossly disturbed. Medical education needs to endure transformation during the pandemic in terms of delivery, content, and assessments, and indirectly, this leads to increased pressure on Academic leadership ([Gaur et al., 2020](#); [Goh & Sandars, 2020](#); [Liang et al., 2020](#); [Torda et al., 2020](#); [Gallagher & Schleyer, 2020](#); [Fernandez & Shaw, 2020](#)). Almost 83% of students replied as boring and sleepy during the online class. A study conducted among Pakistani medical students revealed that during the COVID-19 period, it created a new window for online education and mentioned that online learning is a bad outcome for learning ([Ahmed et al., 2021](#)). Another study conducted in China ([Wang et al., 2021](#)) mentioned that online education created more stress for the medical students during the COVID-19 period; as such, because COVID-19 induces some stress, online teaching itself also created another step for increasing the stress. Another study conducted in Egypt among the medical students about online teaching, more than fifty percent (55%) agreed that online teaching is not effective, as face-to-face education is lacking, which will induce sleep ([Mortgagee et al., 2022](#)). Almost similar observation found with a study conducted among the Dental students of Nepal ([Gupta et al., 2020](#)).

A study conducted by [Suzuki et al. \(2022\)](#) in Japan also revealed that online classes lack the ability to make relationships with faculty, friends, and highlighted that the scope of research is lacking, as well as extracurricular activities. These activities lead to inactivity, sleepiness, and a lack of concentration. In our study, we stated that the overall mean satisfaction level about online classes was 2.4 ± 1.17 . Like our variable overall satisfaction with online teaching, a study conducted in the UK recorded responses on a Likert scale from 1 to 5. The lowest mean score response was recorded in the domain of face-to-face communication, at 1.69 ± 1.48 , and for the variable of teachers prepared well, the overall mean satisfaction score was 3.36 ± 1.42 . For most other variables, the medical students' mean overall satisfaction ranged from 1.69 to 3.36 ([Dost et al., 2020](#)). This could be due to multiple factors such as study conduction time, technology adoption, training, devices, audio and video clarity, delivery of lecture, interaction, clarification of students' doubts, students' interest, domestic situations, prolonged stay in the houses, as well as continuous lockdowns, etc, played a role.

Some of the other studies conducted in the Philippines, Sudan, and Uganda also revealed that they identified some barriers, such as face-to-face interaction, internet purchase, and speed of internet, domestic situations are lacking in smooth functioning of online classes ([Baticulon et al., 2021](#); [Gismalla et al., 2021](#); [Olum et al., 2020](#); [Altameemi & Alomaim, 2022](#)). Certain good aspects were observed in our study from the medical students' perspectives; more than 80% of students gave the opinion that the audio and video quality was good.

For improving e-learning in medical education, the arrangement and the competencies acquired by educationalists, overseers, and learners can be employed in the post-pandemic period, particularly presuming a parallel condition in the future. Future studies assessing the teaching methodologies, quality of the e-learning, and students' satisfaction with existing tools and platforms are to be conducted for better implementation and knowledge gain. This will help in understanding people's readiness for online education. The facility of the e-learning platform allows the students to catch up or recover if some lectures are missed due to sickness or other reasons (Ahmed *et al.*, 2020). Learning platform makes the students feel different in a new environment (Avilova *et al.*, 2022). This blended way of teaching and learning gives benefits to medical students as well as faculty (Baczek *et al.*, 2021). An e-learning platform allows students to get clarity via audio and video regarding content, quizzes, exams, and presentations, and helps ensure high student academic success.

On the contrary, according to Ilic & Boudville (2021), the traditional way of teaching is more beneficial as compared to online e-learning, but one cannot deny the significance of e-learning during turbulent environments such as pandemic. During the time of the pandemic, when there were restrictions e-learning got so much focus because students could communicate easily, and interaction was possible using software. They can ask questions from teachers, talk to their classmates, discuss new and novel ideas, share notes, and conduct an exam (Shin, Prasad & Sabo 2022). Students can access the teaching course and content even from their smartphones, tablets, and laptops (Todorovic *et al.*, 2021).

Conclusion

In conclusion, the study findings suggest that online teaching is a viable option for medical education but requires improvements in quality and interaction to improve student satisfaction. Based on the study findings, the perception of students on the mean overall satisfaction with online classes was poor, and less interaction during the classes was observed. Online classes' introduction in medical institutes paved the way for a new dimension to compensate for academic loss due to lockdowns during the COVID-19 period. Certain modifiable factors like internet issues, technical issues, interest, and motivation from the students are also required to streamline the online teaching, when unforeseen situations arise in the state as well as the country. Periodical feedback, evaluation, and research is required to improve further in medical education, and responsibility lies on both students and faculty. In conclusion, the study findings suggest that online teaching is a viable option for medical education but requires improvements in quality and interaction to improve student satisfaction.

Practical Implications

The existing study has implications for higher education institutions, medical colleges, academicians, and medical students. The findings of this study would help practitioners to make policy regarding online learning and distance learning during turbulent environments such as the COVID-19 pandemic. Higher education institutions need to make available high-speed internet and user-friendly software to ensure that online classes can be conducted effectively. The software must be user-friendly so that teachers and students can easily interact with each other.

Limitations

The current study has offered several contributions, but it is essential to mention limitations as well. The first limitation is venue, i.e., medical colleges; the findings can be generalized to medical colleges in Hyderabad, India. One must be careful while generalizing the findings of other sectors. Secondly, the sample size is small; future studies should collect more than 500 samples and add other higher education institutions, such as degree and commerce colleges, universities as well. The third limitation is sampling techniques, which might be changed in the future to get more in-depth knowledge of the sample characteristics. Fourth, confounding variables could be added to have confounding effects. Fifth, as there is some amount of recall bias from the students, as our self-administered Google form, there is some chance of misinterpretation of questions while answering, and a lack of physical presence to clarify the doubts.

Needing similar studies in multiple settings is required for the generalizability of the results. Overall, this study sheds some light on further improvement when such circumstances arise in the future.

Declarations

Ethical Approval and Consent to Participate: This study strictly adhered to the Declaration of Helsinki and relevant national and institutional ethical guidelines. Informed consent was obtained. All procedures performed in this study were by the ethical standards of the Helsinki Declaration.

Consent for Publication: Here, the author gives my consent for publication.

Availability of Data and Materials: Data will be provided upon written request from the corresponding author.

Competing Interest: There is no conflict of interest among the authors.

Funding: Not Applicable.

Authors' Contribution: Being single author, I take responsibility for the findings of the study however, appropriate credit is given to the cited studies. I have reviewed and approved the final version of the paper.

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References

- Ahmed, H., Allaf, M., & Elghazaly, H. (2020). COVID-19 and medical education. *The Lancet Infectious Diseases*, 20(7), 777-778, 2020. doi: 10.1016/S1473-3099(20)30226-7.
- Ahmed, S., Raza, S. Z., Raes, Z., & Saleem, S. (2021). Covid-19: Influence on academic and personal lives of medical students. *Journal of Pakistan Psychiatric Society*, 18(04), 9-12.
- Altameemi, Y. M., & Alomaim, T. I. (2022). Analyzing assistance discourse provided to stakeholders to utilize e-learning in higher education. *Amazonia Investiga*, 11(52), 318-333. <https://doi.org/10.34069/AI/2022.52.04.34>
- Alzahrani, A. (2022). Online learning during the Covid-19 Pandemic: A review of literature. *Amazonia Investiga*, 11(50), 188-203. <https://doi.org/10.34069/AI/2022.50.02.19>
- Avilova, O., Erokhina, V., Mpolokeng, K., Luckrajh, J., Vovk, O., Stepanenko, O., & Nguyen, U. (2022). Do to, experience of distance learning of medical science disciplines as a result of the global pandemic COVID-19 in Ukraine and South Africa. *Duzce Medical Journal*, 24(1), 26-33, doi: 10.18678/dtfd.1036902
- Bączek, M., Zagańczyk-Bączek, M., & Szpringer, M., (2021). Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students," *Medicine (Baltimore)*, 100(7), e24821.
- Banu, S., Jehan, M., & Pasha, S.A (2023). The impact of physical activities on the academic performance, and burnout of female medical students in India. *Health Sciences Journal*, 1(1), 20-25 [https://doi.org/10.59365/hsj.1\(1\).2022.25](https://doi.org/10.59365/hsj.1(1).2022.25)
- Bathini, P.P., Kundoor, N., & Mathai, D. (2022). Effectiveness of exclusive E-learning during COVID-19 in a medical school in India—A student perspective. *Journal of Clinical and Scientific Research*, 11(1), 22-27.
- Baticulon, R.E., Sy, J.J., Alberto, N.R., Baron, M.B., Mabulay, R.E., Rizada, L.G., Tiu, C.J., Clarion, C.A., & Reyes, J.C. (2021). Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines. *Medical Science Educator*, 31, 615-26.
- De Ponti, R., Marazzato, J., Maresca, A.M., Rovera, F., Carcano, G., & Ferrario, M.M. (2020). Pre-graduation medical training including virtual reality during COVID-19 pandemic: a report on students' perception. *BMC Medical Education*. 20, 1-7.
- Dost, S., Hossain, A., Shehab, M., Abdelwahed, A., & Al-Nusair, L. (2020). Perceptions of medical students towards online teaching during the COVID-19 pandemic: A national cross-sectional survey of 2721 UK medical students. *BMJ open*. 10(11), e042378.



- Fernandez, A.A., & Shaw, G.P. (2020). Academic leadership in a time of crisis: The Coronavirus and COVID-19. *Journal of leadership Studies*, 14(1), 39-45.
- Field, A. (2013) *Discovering statistics using IBM SPSS statistics: And Sex and Drugs and Rock "N" Roll*, 4th Edition, Sage, Los Angeles, London, New Delhi.
- Fulop, M.T., Breaz, T.O., Topor, I.D., Ionescu, C.A., & Dragolea, L.L. (2023) Challenges and perceptions of e-learning for educational sustainability in the new normality era. *Frontiers in Psychology*, 14, 1104633. doi: 10.3389/fpsyg.2023.1104633
- Gallagher, T.H., & Schleyer, A.M. (2020). We signed up for this! Student and trainee responses to the Covid-19 pandemic. *New England Journal of Medicine*, 382(25), e96.
- Gaur, U., Majumder, M.A., Sa, B., Sarkar, S., Williams, A., & Singh, K. (2020). Challenges and opportunities of preclinical medical education: COVID-19 crisis and beyond. *SN Comprehensive Clinical Medicine*, 2(11), 1992-7.
- Gismalla, M.D., Mohamed, M.S., Ibrahim, O.S., Elhassan, M.M., & Mohamed, M.N. (2021). Medical students' perception towards E-learning during COVID 19 pandemic in a high burden developing country. *BMC Medical Education*, 21(1), 1-7.
- Goh, P.S., & Sandars, J. (2020). A vision of the use of technology in medical education after the COVID-19 pandemic. *Med Ed Publish*, 9(49), 49.
- Gupta, A., Shrestha, R.M., Shrestha, S., Acharya, A., & Pandey, N. (2020). Perception of BDS students at Kathmandu University on online learning during COVID-19 pandemic. *Orthodontic journal of Nepal*, 10(2), 20-8.
- Ilic, D., & Boudville, A. (2021). Anatomy practical classes during the COVID-19 pandemic: Alternatives to cadaveric specimens. *Medical Journal of Australia*, 214(5), 218-218, doi: 10.5694/mja2.50987.
- Liang, Z.C., Ooi, S.B.S., & Wang, W. (2020). Pandemics and their impact on medical training: lessons from Singapore. *Academic Medicine*, 95(9), 1359-1361. <https://doi.org/10.1097/ACM.00000000000003441>
- Mamchych, O., Rusyn, H., Bosa, V., Nikitina, O., & Moiseienko, N. (2023). Teaching students in high school using multimedia technologies. *Amazonia Investiga*, 12(72), 180-191. <https://doi.org/10.34069/AI/2023.72.12.16>
- Mortagy M., Abdelhameed, A., Sexton, P., Olken, M., Hegazy, M.T., Gawad, M.A., Senna, F., Mahmoud, I.A., Shah, J., & Aiash, H. (2022). Online medical education in Egypt during the COVID-19 pandemic: a nationwide assessment of medical students' usage and perceptions. *BMC Medical Education*, 22(1), 1-3.
- Mukhtyar, M., Mukhtyar, S., & Mukhtyar, M.A (2024). Exploring the Impact of Obesity on Social Cohesiveness among 10th Grade Students. *Open Access Public Health and Health Administration Review*, 2(2), 22-29. [https://doi.org/10.59644/oaphhar.2\(2\).84](https://doi.org/10.59644/oaphhar.2(2).84)
- National Medical Commission (2020). *Introduction*. Available from: <https://www.nmc.org.in/about-nmc/introduction>
- Olum, R., Atulinda, L., Kigozi, E., Nassozi, D.R., Mulekwa, A., Bongomin, F., & Kiguli, S. (2020). Medical education and E-learning during COVID-19 pandemic: awareness, attitudes, preferences, and barriers among undergraduate medicine and nursing students at Makerere University, Uganda. *Journal of Medical Education and Curricular Development*, 7, 2382120520973212
- Omboni, S., Padwal, R.S., Alessa, T., Benczur, B., Green, B.B., Hubbard, I., Kario, K., Khan, N.A., Konradi, A., Logan, A.G., & Lu, Y. (2022). The worldwide impact of telemedicine during COVID-19: current evidence and recommendations for the future. *Connected Health*, 1, 7.
- Pasha, A.A.A., Pasha, S.A., & Jehan, M. (2023) impact of psychological factors on eating habits during pandemic lockdown in India, *Health Sciences Journal*, 1(1), 50-54 [https://doi.org/10.59365/hsj.1\(1\).2022.33](https://doi.org/10.59365/hsj.1(1).2022.33)
- Shin, M., Prasad, A., Sabo *et al.*, (2022). Anatomy education in US medical schools: before, during, and beyond COVID-19. *BMC Medical Education*, 22(1), 103, doi:10.1186/s12909-022-03268-x.
- Suzuki, T., Murayama, A., Kotera, Y., Bhandari, D., Senoo, Y., Tani, Y., Harada, K., Kawamoto, A., Sato, S., Sawano, T., & Miyata, Y. (2022). Cross-country student perceptions about online medical education during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19(5), 2840.
- Tekulapally, K. (2021) Students' perception on online learning during COVID pandemic in a tertiary care teaching hospital. *Indian Journal of Pharmacy and Pharmacology*, 8(4), 284-290
- Todorovic, M., Jones, G. Perez-Padilla A., & Finucane, P. (2021). Online learning of anatomy during the COVID-19 pandemic: A qualitative study. *Anatomical Sciences Education*, 14(6), 643-651, 2021. doi: 10.1002/ase.2077.



- Torda, A., Velan, G., & Perkovic, V. (2020). The impact of COVID-19 pandemic on medical education. *The Medical Journal of Australia*. 14,1 <https://www.mja.com.au/journal/2020/impact-covid-19-pandemic-medical-education>
- Verma, A., Shinkar, S., & Pandey, N. (2021). An insight into distance e-learning perspectives amongst undergraduate medical students during COVID-19 pandemic. *Global Journal of Medicine and Public Health*, 10(4).
- Wang, J., Liu, W., Zhang, Y., Xie, S., & Yang, B. (2021). Perceived stress among Chinese medical students engaging in online learning in light of COVID-19. *Psychology Research and Behavior Management*. 14, 549-562.
- Weiner, E., Irwin, M., Trangenstein, P., & Gordon, J. (2005). Emergency preparedness curriculum in nursing schools in the United States. *Nursing Education Perspectives*. 26(6), 334-339.
- Xia, R., Li, S., Chen, B., Jin, Q., & Zhang, Z. (2020). Evaluating the effectiveness of a disaster preparedness nursing education program in Chengdu, China. *Public Health Nursing*. 37(2), 287-294.

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