Learning effectiveness of the online mode of study during the COVID-19 pandemic: Perspectives of the clinical medical and dental students from a Nigerian university

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ABSTRACT

Introduction: The Coronavirus pandemic resulted in a global lockdown which had a major impact on Education. The training of the medical and dental students whose structure is largely based on hands-on, face-to-face teachings and physical engagements had to change into a virtual mode of training. This study assessed the perspectives of the clinical medical and dental students at the University of Ibadan, Nigeria about the effectiveness of the E-learning mode of study occasioned by the COVID-19 pandemic.

Methods: The study design was a descriptive cross-sectional survey using the proportionate stratified sampling technique to recruit participants. An online self-administered questionnaire was used to collect data on sociodemographic characteristics and perceived effectiveness of the e-learning mode of study from the clinical students. Chi-square and logistics regression tests were conducted at a 5% level of significance.

Results: A total of 395 undergraduate clinical students in their various study levels (400 level- 77, 19.5%; 500 level- 153, 38.7%; 600 level- 165, 41.8% were involved. They were mostly males (56.2%), and their MBBS: BDS ratio was 3: 1. The mean (SD) age was 24.23 (2.65) years with ages ranging between 20-40 years. Overall, the majority of participants (335, 84.8%) perceived that the e-learning method of study was ineffective for learning. Although the majority of the respondents (77.5%) admitted that the COVID-19 pandemic affected their general learning negatively, most of them found online communication with teachers through chat boxes more effective and believed students used it freely (86.1%; 68.4% respectively). In terms of collaboration with colleagues, learning satisfaction, and evaluation of student performance, most participants did not consider the e-learning method effective (82.0%; 69.1%; 56.7% respectively). Students perceived effectiveness of the e-learning method improved with a rising level of study, increasing age, and among those with positive attitudes towards e-learning (p=0.003; p=0.038; p<0.001, respectively).

Conclusion: Although the clinical medical and dental students considered the online learning method, during the COVID-19 pandemic lockdown as beneficial as it enabled the continuity of their education, they had a low perception of its effectiveness as a mode of learning.

Keywords: clinical medical and dental students, COVID-19 pandemic, education, learning effectiveness, online, university

INTRODUCTION

Electronic (E) learning also referred to as online learning, is the use of electronic technology to transmit educational information or skills, monitor learners' performance, and report learner's progress using electronic applications (Ajadi *et al.*, 2008; Hromalik & Koszalka, 2018; Piccoli *et al.*, 2001). The use of this method as a major part of learning in educational institutions has gained support since the advent of COVID-19 (Yates *et al.*, 2021) in December 2019, when the first case of COVID-19 was found in Wuhan, China. Shortly after then, the effect of the disease became felt globally, resulting in a pandemic that is still underway. Evidence of COVID disease devastation was seen in all spheres of life and livelihood including socio-economic, political, communication, educational, technological, environmental, and social lives, globally (Akanji *et al.*, 2022; Buheji *et al.*, 2020; Yu *et al.*, 2021). The World Health Organization (WHO) designated the disease a worldwide public health emergency of international concern, and a pandemic on January 30, 2020, and March 11, 2020, respectively. Following the first reported case of COVID-19 in Nigeria on the 26th of February 2020 (Etteh *et al.*, 2020), the Nigerian government like governments in every other country of the world took up some anti-epidemic measures to control the spread of the ravaging disease in various sectors.

In Nigeria's educational sector, the effect of the COVID-19 pandemic has been immense. Consequently, the academic calendar of schools including higher institutions was seriously disrupted (Aiyedun & Ogunode, 2020; Jacob *et al.*, 2020). Some authors described it as the greatest challenge the education system has faced so far (Daniel & Marquis, 2020; Marinoni *et al.*, 2020; Ogunode *et al.*, 2021). Following the government's directives, all forms of face-to-face training and physical gathering were brought to a halt. Many educational institutions were compelled to transit from the traditional method of learning, which was majorly physical and in-person contact to a completely virtual learning mode, almost immediately (Daniel & Marquis, 2020; Maqsood *et al.*, 2021; Marinoni *et al.*, 2020). As such the gathering of students for lectures in classrooms, lecture halls, or small-group rooms had to stop during the COVID-19 pandemic.

The virtual learning mode which includes e-lectures, e-tutorials, e-case-based learning, and other methods was delivered through various platforms like Zoom, WhatsApp groups, Google Meet, and Telegram, all to ensure a continued educational process during the lockdown (Abbasi *et al.*, 2020; Khawar *et al.*, 2021; Rose, 2020).

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Similarly, the ensuing examinations also transitioned to online settings (Daniel & Marquis, 2020; Rose, 2020). Consequently, valuable experiences from presentations, clinical clerkships, clinical rotations, and collaborative experiences through medical conferences which were hitherto, standards that helped previous generations become future doctors have been missed (Ferrel & Ryan, 2020). With the realities of the challenges of e-learning methods on all stakeholders in clinical medicine and dentistry, there were rising concerns about how effective e-learning has been. Available studies in Nigeria, which were conducted to evaluate the effectiveness of the e-learning mode of education on clinical medical and dental students' educational programme had focused on the perspectives of the institution (Eli-Chukwu et al., 2023; Ogunode et al., 2021; Oyediran et al., 2020), whereas, studies evaluating the e-learning methods from the clinical students' point of view, are scarce, hence this study. Information derived will be useful for a holistic assessment of the e-learning method for better outcomes in our settings and others and useful for future lockdowns.

MATERIALS AND METHODS

This descriptive cross-sectional survey was conducted among clinical medical and dental students of the College of Medicine, the University of Ibadan between March and April 2021. The study was part of a larger survey that investigated the perspectives of clinical medical and dental students on the impacts of the Covid-19 pandemic on learning. Approval for the study (UI/EC/21/0095) was obtained from the UI/UCH ethical review committee.

From a total population of 576 clinical medical and dental students in their 4th to 6th years in training, the required sample size was determined based on a precision of 0.05 and a prevalence of 50% since estimates from previous studies representative of a similar population for this study were not found. Using an expected loss of 20%, a minimum sample size of 289 participants was obtained (Daniel & Cross, 2018). A proportionate stratified random

sampling technique was used to stratify the sample (289) into the two Faculties in which the programmes or courses were domiciled. The Faculty of Clinical Sciences had a total medical student population of 458, while the Faculty of Dentistry had a total dental student population of 118, all within the clinical posting years. After calculations, minimum sample sizes of 230 and 59 were obtained for the medical and dental students respectively. Thereafter, aggressive awareness campaigns were done through the social media platforms that housed the students in various groups including the use of personalized contacts via emails. As much as possible, all the medical and dental students of College of Medicine, the University of Ibadan undergoing their clinical postings within the period of study were reached out to and invited to participate in the study.

Data collection was self-administered using an online link to the study instrument prepared into Google form and delivered via WhatsApp message to the clinical medical and dental students. These were followed by friendly reminders through the same medium. A total of 426 acknowledged receipt of our messages, and 31 of these declined participation in the study, giving a response rate of 93%.

Instrument: The perspectives of students about the effectiveness of online learning methods were adapted (Amir *et al.*, 2020; Basar *et al.*, 2021; Forson & Vuopala, 2019; Van Wart *et al.*, 2020). The following domains were involved: engagement and motivation, learning satisfaction, group study, access to reading/study materials, collaboration with peers/ colleagues, and performance evaluation. A second construct, attitude toward online learning was also adapted from other studies (Peytcheva-Forsyth *et al.*, 2018; Ullah *et al.*, 2017; Wijaya *et al.*, 2020). The questionnaire instrument was made up of a combination of multiple-choice questions, rating scales, open-ended questions, and Likert scale assessments.

A pilot survey was done to assess the feasibility of the study and assess the practicability of the study questions and the online platform. The pilot study was also used to validate the questionnaire. The data collected was checked daily to detect errors in the filling of the forms and missing values. Data was coded and entered into a password-protected personal computer and analysis was done using the Statistical Package for Social Sciences (SPSS) Version 23.

Analysis: The participants' ages were categorized into age groups: 20-24 years, 25-29 years, and >=30 years (Fabunmi & Asubiojo, 2013). The responses from the survey were analysed in terms of the values of proportion on each question (Basar *et al.*, 2021; Derapa & Mohamed, 2018). ie., if an item achieved a percentage score between 0% and 49%, it was considered as low, a 50-74% score is considered an average score, while a score of 75% or above is considered to be within the highest quartile.

For further analysis, the effectiveness of online learning was computed in 3 categories. The first category was from students' ratings of the effectiveness of online learning questions involving rating responses on a scale of 0 to 10. Ratings of 6 and above were coded as 1 and those with a rating less than 6 were coded as 0 (denoted as C1). The second domain on effectiveness has 10 questions: 5 yes and no response questions and 5 questions on a Likert scale. "Yes" was coded as 1 and "No" was coded as 0 which translates to a maximum score of 5. For the questions on the Likert scale, strongly disagree was coded 0, disagree was coded 1, agree was coded 2, and strongly agree was coded 3. This implies that 5 questions on a Likert scale with a maximum obtainable score of 3 in each question of those 5 questions will give a total score of 15. Consequently, for this second category, a composite score of 5 and 15 gives a total composite score of 20. This category's composite score was converted into percentages by dividing the students' obtained score by the maximum obtainable score of 20 and multiplying by 100. Scores of 60 percent and above had a code of 1 and scores lesser than 60 percent had a code of 0 (denoted as C2). The third domain of effectiveness was generated from students' responses to questions, about online learning as a good evaluation method. Yes was coded as 1 and no was coded as 0 (denoted as C_3). To compute effectiveness from all categories, a code of 1 in all the 3 categories was used. That is, students that perceived online training as being effective were those coded as 1 in C1 and C2, and C3.

Attitude of students towards the online learning method of study was adapted and constructed from 10 questions on a Likert scale. Strongly disagree was coded 0, disagree was coded 1, agree was coded 2, and strongly agree was coded 3. However, some questions were reversed where appropriate, Hence, 10 questions with a maximum obtainable score of 3 will give a total obtainable score of 30. Attitude composite score was converted into a percentage by dividing the students' obtained score by the maximum obtainable score of 18 and multiplying by 100. Students with scores of 75 percent and above had a positive attitude and those with scores lesser

than 75 percent had a negative attitude toward online learning (Ajayi *et al.*, 2018).
The chi-square test and logistics regression were used to explore associations between categorical variables while the student t-test was used for continuous variables. All analysis was done at a $p < 0.05$ level of significance.

RESULTS

A total of 395 students comprising 297 (75.2%) medical students and 98 (24.8%) dental students, were involved. The mean (SD) age of all participants was 24.23 (2.65) years with an age range of 20-40 years. Male respondents were 222 (56.2%) in number and the number and percentage distribution of participants according to their levels of study are 400 level (77, 19.5%); 500 level (153, 38.7%), and 600 level (165, 41.8%) respectively (Table 1). The majority were single 382 (96.7%), living with their parents 250 (63.3%), and were educationally sponsored by their parents 329 (83.3%) Table 1.

Table 1: Sociodemographic distribution of the participants

Socio-demographics	Category	Number	Percentage
Age as at last birthday(years)	20-25	314	79.5
	26-30	72	18.2
	31-40	9	2.3
Gender	Male	222	56.2
	Female	173	43.8
Course of study	Dentistry	98	24.8
	Medicine and Surgery	297	75.2
Level of study	400level	77	19.5
	500level	153	38.7
	600level	165	41.8
Marital status	Single	382	96.7
	Married	13	3.3
Residential arrangement	Living alone	90	22.8
	Living with family/Relatives	26	6.6
	Living with Friends	29	7.3
	Living with Parents	250	63.3
Educational Sponsorship	Self	22	5.6
	Relatives	32	8.1
	Parents	329	83.3
	Grants	1	0.3
	Communal efforts	1	0.3

Table 2 shows the frequency distribution of some items on the effectiveness of the e-learning methods inquired into from participants in decreasing order of frequency: It shows that despite the claim by the majority (77.5%) that the COVID-19 pandemic negatively affected their studies. Many found benefits in the opportunity for indirect communication with teachers through the chat box, online, to be more effective than physical communication with teachers (86.1%; 68.4%). However, the majority did not consider the e-learning method effective for collaboration with colleagues, assimilation, and evaluation of student performance (18.0%; 30.9%; 43.3% respectively).

In Table 3, the majority of participants (335, 84.8%) perceived that the e-learning method of study was ineffective. Perception of effectiveness of the e-learning method of study was upheld by the younger age student categories and students in the higher classes/ level of study ($p<0.05$).
Positive attitude towards the e-learning method was associated with perceived effectiveness of the e-learning method

Table 4 reveals that students living with friends were significantly more likely to see online training as being effective than students living with parents. (OR: 2.88; 95%CI: 1.11 - 7.48). Similarly, students that were in the 600 level students were significantly more likely to see online training as being effective compared to students in the 400 level. (OR: 3.99; 95%CI: 1.53 - 10.40). Students with positive attitudes towards online learning were significantly more likely to see online training as being effective compared to students with negative attitudes to online training (OR: 2.37; 95%CI: 1.28 - 4.37).

Table 2: Respondents' response to items on the effectiveness of e-learning; N = 395 (100%)

Variable	Frequency N=395	Percentage (100%)
E-learning mode enabled the continuation of learning despite the lock-down caused by the Covid-19 pandemic	395	100.0
Considered the use of the chat box in communicating ideas in the class/group more effective than during physical classes	340	86.1
Believe that question-and-answer sessions with lecturers and colleagues during physical classes are more effective at engaging students than the e-learning sessions	339	85.8
Online learning reduced my collaboration with my colleagues compared with physical learning	324	82.0
Have less access to reading/study materials online, compared to physically	321	81.3
Have less access to my tutorial groups online, compared to physical	312	79.0
Covid 19 pandemic affected general learning negatively	306	77.5
When comparing assimilation between E-learning lectures and physical classes, I prefer the physical learning method.	273	69.1
Believed students/lecturers utilize the chat box effectively and freely	270	68.4
Online mode is not a good method for evaluating students	171	56.7
Found the lecturer's explanations of topics more effective during e-learning compared to physical	178	45.1
More engaged and motivated in following up with studies and learnings through E-learning	172	43.5
Online mode is a good method for evaluating students	171	43.3

Table 3: Perceived effectiveness of the e-learning method of study and sociodemographic variables

Variables	Effective n=60	Ineffective n= 335	Total	X^2	p
Age group					
20-24 years	36 (13.9)	223 (86.1)	259	6.520	0.038*
25-29 years	18 (15.0)	102 (85.0)	120		
>=30 years	6 (37.5)	10 (62.5)	16		
Gender					
Male	33 (14.9)	189 (85.1)	222	0.042	0.838
Female	27 (15.6)	146 (84.4)	173		
Course of study					
BDS	10 (10.2)	88 (89.8)	98	2.515	0.074
MBBS	50 (16.8)	247 (83.2)	297		
Level of study					
400	6 (7.8)	71 (92.2)	77	11.950	0.003*
500	17 (11.1)	136 (88.9)	153		
600	37 (22.4)	128 (77.6)	165		
Marital Status					
Single	58 (15.2)	324 (84.8)	382	0.000	0.984
Married	2 (15.4)	11 (84.6)	13		
Residential Arrangement					
living alone	18 (20.0)	72 (80.0)	90	7.906	0.048*
Living with Family/Relatives	5 (19.2)	21 (80.8)	26		
Living with Friends	8 (27.6)	21 (72.4)	29		
Living with Parents	29 (11.6)	221 (88.4)	250		
Educational sponsorship					
Self	3 (13.6)	19 (86.4)	22	0.059	0.971
Parents	50 (15.2)	279 (84.8)	329		
Others	7 (15.9)	37 (84.1)	44		
Attitude					
Positive	26 (27.1)	70 (72.9)	96	13.926	0.000*
Negative	34 (11.4)	265 (88.6)	299		

Table 4: Logistics regression table showing the association between perceived effectiveness and relevant socio-demographic variables

Variables	Odds Ratio	95% CI	P
Age group			
20-24 years	1		
25-29 years	0.62	0.31 - 1.24	0.176
>=30 years	2.62	0.77 - 8.90	0.123
Level of study			
400	1		
500	1.67	0.60 - 4.67	0.328
600	3.99	1.53 - 10.40	0.005*
Residential Arrangement			
living with parents			
Living alone	1.70	0.82 - 3.50	0.152
Living with Family/Relatives	1.28	0.41 – 4.00	0.670
Living with Friends	2.88	1.11 - 7.48	0.029*
Attitude Group			
Negative	1		
Positive	2.37	1.28 - 4.37	0.006*

DISCUSSION

This study was designed to evaluate the perception of the clinical medical and dental students at the University of Ibadan about the effectiveness of the online mode of study for learning. From the findings, although the students were able to identify a few benefits of the online learning mode, the general perception was that the online teaching method was not effective for learning.

The complete switch to the online mode of learning in the advent of the COVID-19 pandemic was greeted with mixed reactions from all stakeholders. Although e-learning had been before the advent of the COVID pandemic, its growth rate in educational institutions globally was approximated to be 15.4% annually. But since the pandemic, the use of e-learning was brought to the fore and explored much more (Alqahtani & Rajkhan, 2020). Universities all over the world, particularly in Nigeria are seen to attempt to capitalize on the technology revolution to improve the educational learning environment for stakeholders (Diab & Elgahsh, 2020; Fauzi *et al.*, 2022). The Medical and Dental Colleges continue to explore methods to deliver successful e-learning to ensure that education continues uninterrupted for the clinical students, whenever there is a challenge such as a lockdown (Adefuye *et al.*, 2021; Hayat *et al.*, 2021; Jeenia *et al.*, 2021).

No doubt, teething challenges are expected in its implementation in a developing country, and it is hoped that these challenges are overcome shortly. However, it must be stressed that the transition from the medical school environment setting to the home setting is a big deal of change and have implications for learners (Rose, 2020). The clinical medical and dental students were particularly challenged because of the peculiar nature of their training structure at this stage which is largely based on face-to-face interactions. Learning activities such as clinical clerkships, presentations, clinical rotations, etc., were tough to be substituted through online methods (Ferrel & Ryan, 2020). Their general perception of the ineffectiveness of the online learning method by the clinical medical and dental students is therefore not surprising. The perception of the ineffectiveness of the e-learning method of study is also corroborated by students in an earlier report from a study conducted among university students, which revealed a low acceptance of the virtual mode of learning. Correspondingly, the traditional face-to-face method was preferred over the virtual mode (Egielewa *et al.*, 2022). In another study, students believed that face-to-face classroom contact was important to receive reassurance, gain a broader perspective, troubleshoot, and establish further learning goals as well as connect with peers with opportunities for informal learning from each other's experiences (Hill & Fitzgerald, 2020). Furthermore, learning in a classroom was reported to be associated with a free, non-judgmental environment where students can explore, share ideas, and create understanding (Hill & Fitzgerald, 2020).

Examining the students' perceptions on specific issues about the effectiveness of the method: The majority of them admitted to having less access to tutorial groups, less collaboration with colleagues, and less access to reading/ study groups during the

e-learning period when compared to the face-to-face traditional method of learning. Quite understandably, the students' feeling of isolation from others while in the home setting may have played a role in the negative perceptions of the e-learning method (Rose, 2020). Similarly, distractions from continuous struggles with establishing boundaries between work and home, in terms of chores as well as increased use of social media platforms, are all important distraction factors to consider in the home environment used for learning (Bezak *et al.*, 2022; Eddleston & Mulki, 2017) and for a clinical student, this may be a daunting task. In terms of understanding and assimilation of lecture topics, the majority of the students found the online mode less effective. Although some authors will argue that the e-learning conditions that can promote learning in an online environment be examined instead (Baran *et al.*, 2011; Koehler *et al.*, 2004; Osuh *et al.*, 2021; Salter, 2003). Conditions such as user-friendly technologies (Mastel-Smith *et al.*, 2015), and competence of online teachers in the use of such technologies (Baran *et al.*, 2011) should be examined. This is because technology has been recognized to have the potential to enhance and transform teaching, notwithstanding this, the same technology can also be used inappropriately or in ways that interfere with learning (Baran *et al.*, 2011; Koehler *et al.*, 2004; Salter, 2003). Perhaps for the reason of appropriate technology and its deployment and possibly other reasons, the students did not consider the online method good for evaluating students' performance. Further studies will be required to understand what technologies are available for e-learning and how they were deployed for use in the online environment.

Not all the issues examined were negative in outcome, the findings also suggest that the students believe that the virtual learning process has enabled them to continue with their studies despite the lock-down caused by the COVID-19 pandemic which implies that the clinical students appreciate the importance of the virtual instructional process similar to a finding from the report conducted among another group of university students in Nigeria (Oniye *et al.*, 2022). Surprisingly, the students found the indirect ways of communication through the use of chat boxes with teachers more effective. This may be because the online platform affords some degree of privacy, comfort, and free interaction access with lecturers (Abdulmajeed *et al.*, 2020; Oniye *et al.*, 2022; Sari & Oktaviani, 2021). Other key benefits of the virtual teaching-learning process include flexibility and a convenient time frame flexible to the learner, thus accommodating various styles for learning, easy and quick sharing of educational material, interactivity among students, and quick feedback between the students and their instructors (Oniye *et al.*, 2022). Our study findings support other study reports (Hill & Fitzgerald, 2020; Muthuprasad *et al.*, 2021; Oniye *et al.*, 2022; Sari & Oktaviani, 2021) whose findings also identified easy access to online learning materials, non-judgmental learning environment, study at personal pace as well as fluid feedback between students and teachers.

As Ferrel and Ryan stated, the impact of COVID-19 will continue to be felt by medical students in every aspect of their career progression and general lives (Ferrel & Ryan, 2020). With the new normal experienced in the post-COVID-19 era, it is clear that the e-learning method of education may continue. As the E-learning process in education keeps evolving, the need for capacity building in institutions cannot be overemphasized. This involves training and retraining e-learning stakeholders on the appropriate use of e-learning tools and strategies that can bring about its effective deployment in the online environment with minimal flaws and to the benefit of all. (Hameed *et al.*, 2022; O'Doherty *et al.*, 2018). These are essential for the effective transfer of knowledge that can facilitate good performance among clinical students in the post covid era.

CONCLUSION

Although the clinical medical and dental students considered the e-learning method beneficial as it enabled them to continue their education during the COVID-19 pandemic lockdown, overall, learning through the educational method was perceived as ineffective. As there may be no going back from the e-learning mode, all stakeholders in education need to explore ways of improving the service quality of the e-learning methods to improve acceptance and better learning opportunities among the students.

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The authors declare that they have no conflicts of interest.

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