

Teaching pre-clinical medical students remotely in Nigeria post Covid-19 pandemic: Can past experiences shape future directions?

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Abstract

Purpose - Online teaching has gained popularity in recent years, but changes have been slower to implement in Lower to Medium Income Countries (LMIC). The aim of this research was to build upon educators' experiences of remote teaching during Covid-19 to inform the development of a blended learning approach for teaching pre-clinical subjects at Obafemi Awolowo University, Nigeria (OAU).

Methods - The Critical Incident Technique (CIT) was used in this exploratory study. Participants were invited to either complete an online qualitative questionnaire or take part in an online interview, which were hosted on Microsoft platforms. Data were obtained from eighteen educators and were analyzed using thematic analysis.

Results - Five main themes captured educators' experiences of online teaching including: skill and training, teachers' motivation and attitudes, internet and connectivity, learners' behaviors, and socio-economic constraints. They considered remote teaching beneficial and suggested that some form of asynchronized online teaching should continue to support face to face teaching.

Conclusion - Findings provided additional evidence on the way in which educators in LMIC would like to build upon the positive aspects of online teaching and move towards a blended learning model, considering the socio-economic constraints.

Introduction

The last decade has been characterized by an increase of remote teaching of pre-clinical subjects such as anatomy, biochemistry, and physiology across the globe^{1,2,3}. Such changes have been slower to implement in Lower to Middle income Countries (LMIC) and it was the abrupt shift to remote delivery that served as a catalyst to change.⁴ The COVID-19 pandemic brought about significant changes in educational systems, and this was the situation in OAU College of Health Sciences. Pre-covid, the teaching of pre-clinical subjects were only conducted face to face as there were no institutional guidelines or facilities regarding online teaching. During lockdown, educators had to put emergency measures in place and migrated to remote teaching after attending a one-day rotational training. Several variants of methods and platforms were used, depending on what was considered convenient and feasible. This practice continued until lockdown measures had eased and educators and learners were able to return to classes. Educationalists were then faced with the question of what next, and whether and how online teaching should continue.

The aim of this study was to explore the experiences of educators in order to ascertain whether the lessons learnt can inform future institutional directions regarding the teaching of pre-clinical subjects.⁵ This was in line with Adult Learning Theory that recognizes experience and perceptions of needs as a source of learning and development.⁶ Context specific factors were also explored as these are capable of shaping the effectiveness of teaching and learning.⁷

Methods

Design and sample

The study utilized the Critical Incident Technique (CIT⁸) as a framework for data collection and analysis. A critical incident focuses on reflection of specific events that allows the use of open-ended procedures to encourage sharing of experiences directed by research questions and provides flexibility of the data collection process.⁹ A sample of 18 educationalists volunteered to take part, consisting of eight, seven and three participants from the Departments of Anatomy and Cell Biology, Physiological Sciences and Medical Biochemistry College of Health Sciences, respectively. Most participants were male (n = 17) and in the age range 41–50 years.

Materials

Data collection was carried out using an online questionnaire via Microsoft Forms. Although the technique is most often used in interviews or focus groups, researchers have also adapted a questionnaire approach as a way of ensuring anonymity and preventing bottlenecks and delays.¹⁰

Participants provided information such as age, gender, department, and length of time in their educational role. In addition, information related to their use of remote teaching methods during, and post pandemic, was assessed and they were asked to indicate whether and what type of online teaching methods they used during the pandemic and whether they continued to teach virtually post pandemic. An open-ended question asked them to indicate the reason for why they teach or do not teach virtually post pandemic. The main part of the questionnaire was qualitative and was based on CIT philosophy and questions asked participants to reflect on a particular example (incident) of something or someone that enabled or challenged their online teaching. They were asked to describe what happened and how things turned out in as much detail as possible.

Procedure

Participants were contacted via an institutional email list and were briefed on the purpose of the study. Volunteers were provided with a link to the questionnaire that included an informed consent statement. Structured interviews were conducted with three educators who preferred this option, in which case the questionnaire was used as a template and the interview was transcribed onto the form. The questionnaire was initially piloted with three academic staff at the Department of Medical Pharmacology and Therapeutics due to the similarity of course structure with the Pre-Clinical Departments.

Results

Online teaching post-pandemic

Participants were asked if they continued to teach remotely post pandemic, out of which the majority (72%) said they have. The remaining had fully gone back to the face-to-face mode. The reasons for

continuing to use remote teaching were varied. For some, the motivation to continue teaching remotely came from students' preference. For example, *'After the pandemic, students don't want to come for physical classes (3)'*, and *'They prefer the online method'*. One participant noted that *'Students demanded for it' (13)* and that *'Students like it' (17)*. Other comments suggested that despite the challenges, teaching online during the pandemic provided an opportunity for change and diversification of teaching through the use of technology. The comment made by one of the participants highlighted how teaching online during the pandemic taught him a new way of delivering his lectures: *'Students on resumption early this year were to take my class, but it could not hold because of the strike action. I then decided to post my lectures online, hoping that they will soon resume, and we will have face to face interactions for explanation' (16)*. One participant noted that *'Online teaching seems to be an easier way of reaching our to students' (2)*. It is possible that this acted as a catalyst for continuing this practice, as noted by participant 18: *'The Institution encouraged online teaching for large classes'*.

Educators who abandoned virtual teaching as soon as they were able to fully resume face to face teaching expressed different views. As suggested by participant 9, *'I thought that the University wants us to discontinue online teaching after the pandemic (09)'*. Another participant made a particular reference to teaching practical classes, which are central for pre-clinical teaching. He noted that he wished to *'engage the students in full face-to-face practical classes (15)'*.

Practical classes are pivotal to the teaching of pre-clinical subjects and had to be postponed as noted by participants: *'Physical classes were conducted after students returned to the campus with students being divided into small groups' (01)*, and *'We brought in students in batches for physical interaction during practical...our practical sessions were not so effective because limited time was available for each batch of students(18)'*. Whilst most educators agreed that some elements of online teaching worked well, this was not the case with practical classes. *'...online classes may not replace the practical demonstration and so online teaching has its limitations and shortcomings, ... it should not be over romanticized" (02)*. *"In human Anatomy, 3-dimensional presentations make it easy to understand anatomical models, but some online platforms could only accommodate 2-dimensional pictures" (16)*. Most respondents indicated that face to face practical classes are indispensable as it will be difficult to impart procedural skills to learners via online demonstrations.

Reflecting on experiences

Critical incidents were thematically analysed and were assigned a code to capture and identify conceptually recurring themes that were reviewed and defined among members of the research team.¹¹ Five main themes were identified that captured participants' reflections on their experiences of teaching remotely that can inform future directions. There were: Skill and training, Motivation and attitudes, Internet and connectivity, Learners' behaviors, and Socio-economic constraints (see Table 1).

Table 1
Themes and definitions of enablers and challenges to online teaching

Theme	Definition
Skill and training	Previous experience of online teaching and or benefited from attending training sessions
Teachers' motivation and attitudes	Being motivated to commence online teaching to meet the pressing needs of learners and appreciating the perceived benefits of online teaching
Internet and connectivity	Access to internet on the University campus or at home. Situations of power outage, fluctuations in internet service
Learners' behaviors	Conduct or misconduct of learners online, leading to discouragement and frustration
Socio-economic constraints	Financial constraints impacted the availability and access to internet and technology

Skill and Training

This theme reflects comments that highlighted the benefits of having some previous experience of online teaching and the usefulness of training that was available to them. As noted by one participant, *"Previous use of zoom for informal activities helped me to adjust to online teaching"* (11). Similarly, participant 9 commented on how he was able to benefit from his previous experience of teaching *'part-time Nursing undergraduate students of the open distance learning programme online for a few years before the pandemic'*. This supports previous literature showing that educators with prior experience and knowledge of ICT found it easier to migrate to online teaching during the pandemic.¹²

Studies have shown that training and perception of proficiency helps educators to develop confidence to engage learners and this impacts on performance, satisfaction and outcome¹³. Indeed, even a one-day training event organised by the University was useful, with comments such as *"Training was organized ... and this helped me to handle the classes"* (02), and *"My understanding of the technology for online teaching improved appreciably after undergoing the training organized by the University"* (03). Participants who took advantage of unplanned external and informal training opportunities also noted some benefits, such as *'At the onset of online real time teaching using Google meet, I was faced with the challenge of 100 space limit ... a colleague from AISPI (African Institute for Science Policy and Innovation) sent notice for a workshop on methods by which google meet could be used without limit to the number of participants'* (18). Some also learnt from more experienced colleagues: *'Colleagues in my Department who are familiar with online methods also assisted me'* (16). Online teaching poses a challenge to teachers primarily trained to teach face-to-face and this theme highlights their need to upskill and adapt to new pedagogical concepts and modes of teaching delivery.¹⁴

Teachers' motivation and attitudes

This theme reflects educators' comments that capture their motivation to continue meeting students' educational needs. Some educators commented that it was their duty as teachers and that *'it was just a necessity'* (5) and that *'the need to engage students for productivity was the driving force for the online teaching'* (04) and that they *'had to adapt'* (12). Teachers who are advocates of remote teaching often argue that one of its key advantages is the flexibility and convenience.¹⁵ This provides the teacher and the learner with an element of control over the environment that works best for their needs and gives a feeling of safety. As noted, *'It was convenient and safe for both the teacher and the students (15).'* Similarly, participant 3 said that he *'enjoyed the ease and comfort of being able to work remotely'*. For some, it eliminated the time and expenses required for travelling, as noted by participant 7 *'It saves me the trouble of going to school whenever I have lectures. I teach in the comfort of my house'*. These comments further suggest that teachers who are motivated by the enjoyment, responsibility and potential benefits to student learning are more likely to embrace this mode of teaching.¹³

Internet and connectivity

The availability of resources and internet facilities constituted a major factor to online teaching and learning and was one of the greatest challenges in LMIC^{16,17} This theme reflects issues such as frequent power outage, poor internet service, and shortage of technical support. Educators who were able to access the campus took advantage of the internet services available there. As suggested by one participant: *"The internet facility provided by the university was very strong and stable without extra cost. This enabled me to conduct classes smoothly."* (14). However, the same participant also observed that power outage sometimes made the internet unstable.

Frequent power outage and incessant disruptions in internet connection was a major challenge. Participants referred to incidents where teaching had to be re-scheduled and sometimes cancelled altogether due to loss of connectivity, for example, *'Sometimes you may be set for a lecture and light will go off which will also affect the internet connectivity'* (6). Participant 9 provided more detail and said that *"Frequent power outages interfered with internet services. Lecture periods were interrupted and sometimes unnecessarily prolonged, thereby making the students lose concentration. Classes that were badly interrupted had to be rescheduled"*. Participant 4 described a specific incident: *"During one of the sessions, I was with the students on zoom and sharing some slides, there was power outage, ... I tried to connect with my phone, but the service was poor, and I could no longer communicate effectively with the students. The class had to be cancelled."*

Others also provided examples when the teaching process and time were severely impacted due to loss of connectivity and indicated that it limited the teaching process in terms of the type of tools and methods that were employed. Participant 7 noted that *'There were challenges of network failure during lectures. One day, I had a lecture at 9am but I could not link up until 9.30am'*. Another participant said that *'Internet facility was cut off during a lecture due to power outage, thereby disrupting the lecture. I had to restart lecture several times, although I managed to finish up'* (14).

This was aggravated by perceptions that they had to work things out for themselves as noted by one participant: *'...did not provide adequate technical support to both teachers and students to make learning easy. Many could not afford using their personal mobile data for zoom or Google meet and many educators merely dumped materials on google classroom for students to read (18)'*. This issue is reflected in comments made by others. For example, participant 2 highlighted *'hardship and discouragement as a result of internet fluctuations from network provider'*. Participant 12 described a similar incident where *'There was this time I was having an online class and I ran out of data. The class had to end abruptly. There are times students will complain of not having network to connect to the class or not being able to charge their devices due to power outage.'* Thus, educators were restricted to the use of high immediacy and low bandwidth applications such as WhatsApp and telegram, which are restrictive and not specifically designed for educational purposes. As noted by participant 12, *'We attempted to use google classroom but there were always internet fluctuations. We had to shelve the idea and settle for WhatsApp platform' (12)*. Previous research indeed suggests that if internet services are inadequate and the technology available for teachers and learners is limited, they are unable to use advanced education-oriented platforms.^{12,17} This is by far the most significant factor for that will need to be considered when developing an institutional strategy.

Learners' behaviors

This theme is defined by situations in which the behaviors of learners impacted the teaching and learning experiences. Whereby positive behavior encouraged and motivated teachers to put more effort into their online teaching, negative behavior had the opposite effect. For example, non-attendance and lack of proper comportment in class created a sense of frustration and discouragement for the educator and constituted a barrier to smooth running of classes. Poor attitude of learners has been identified as a challenge to online teaching in many studies and is likely to demotivate the teacher and reduce teaching effectiveness.^{12,18} For example, *'Students either joined the class late or left without notice. Low turnout was very discouraging (1)'*. Another participant noted that he *'..started a class with full attendance and then students started to leave. This got me demotivated and frustrated. I later took time to express my feelings to them and their attitude changed' (13)*.

On occasions, negative behaviors during online sessions resulted in termination of classes. *'On a particular day, students were just so uncontrollable that I had to exit the class. There was so much noise making and this obstructed the smooth flow of the class for the day. Generally, there were too many interruptions from the students, noise making, intermittent disturbances and they could not be controlled, probably because they lacked experience (5)'*. Participant 8 made a similar comment *'Some students made rude remarks on the chat page. I was discouraged and had to suspend the class. The class representative later apologized on behalf of the class'*.

On the other hand, when teachers felt that their teaching *'worked well' (12)*, and when they received positive feedback from learners, they became more motivated to teach. Comments such as *'students showed preference for online teaching' (07)*, and *"Students responded promptly to questions and*

submitted assignments on time” (11), reinforce the reciprocal nature of the learning experience. For some, motivation came from students’ requests and desire to be engaged online as they were getting fed up with staying idle. As noted by participant 8, ‘Students requested for it based on their inability to convey in their physical classrooms’. For others, receiving positive feedback from students was a motivating factor, which encouraged them to put more efforts into preparing for the classes. As noted by participant 13, ‘students informed me that they were benefitting a lot from the online classes as it inspired them to learn more on their own. This made me decide to put in more efforts’).

Socio-economic constraints

This theme reflects comments made by educators related to theirs as well as learners’ financial constraints and lack of access to data and technology. Research suggests that in environments where there is high poverty rate and internet access is not easily affordable, learning was greatly impacted during the pandemic.¹⁹ This is not surprising as most students only had basic smartphones to access the internet and limited access to adequate technological tools such as computers, laptops or tablets. Furthermore, although the University provided internet service for staff and students, access was not free. Monthly deductions were made from salaries of staff and students purchased daily subscriptions in order to access the internet on campus. Power outage on campus translated to non-availability of internet service. The alternative was to use mobile internet providers, which was expensive and unsustainable. It is therefore understandable that this constituted a major barrier to online teaching in the institution.

Many educators received complaints from learners that they could not afford to participate in zoom lectures or access uploaded videos because of the large volume of data required. Some educators also complained about out-of-pocket spending to purchase data or repair their faulty devices. As pointed out by participant 2, *‘There was a lot of out of pocket spending as I tried to find an alternative source of internet service’ (2)*. Having to look for alternative internet services impacted the teaching and learning experience, and this was echoed by others. *‘Some students are unable to buy data. This reduced number of participants in class. Many students and teachers could not afford to use their personal data for zoom or google meet teachings’ (15)*. The impact on teaching was also noted by participant 3 who said that he *‘missed one or two classes because my device misbehaved. It was not a palatable experience. I had to apologize to the students. Lecturers and especially students who do not have electronic devices due to economic factor cannot participate in online class (03)’*. When teaching is described as unpleasant by the teacher, it carries with it inevitable consequences. Learners can become unruly and disorganized when they are not satisfied with the environment and condition of learning.²⁰ Addressing this challenge may therefore have a positive impact on learner’s attitudes and behaviors.

Discussion

Studies conducted post pandemic point towards an increased demand for online teaching and that the experience has brought about an openness towards innovation and new learning opportunities^{21,22} Data gathered in this study provided additional evidence of this, as most participants expressed a desire to

continue with some form of online teaching of pre-clinical subjects. Indeed, the unintended gains propelled higher education institutions to revise their educational strategy towards a blended model²³ and OAU may reflect on the lessons learnt to ensure they develop a strategy that addresses the needs of stakeholders.

Many institutions were able to quickly transition to online teaching during the pandemic because they had customized Learning Management Systems where instructional materials were hosted and the teaching process was facilitated (e.g., Moodle, Blackboard and Canvas). In developing countries where such systems were not in place pre-pandemic, the transition to online teaching was more challenging^{24, -27}, and this was the case at OAU. In such instances quality of teaching varied from one educator to another and content was delivered via different platforms. The University is now considering the use of a LMS, and this is an important step forward towards a blended learning model that meets the needs of teachers. A strategy that demonstrates commitment to a blended learning approach is one that acknowledges the importance of resources and opportunities for upskilling and training for staff^{28, 13}.

It is important to note that this study was context specific and only considered the experiences of teachers of pre-clinical subjects. Thus, the institution may wish to research other subjects. Doing so will provide an opportunity to examine the validity of findings and can also help shape other subject specific planning. Findings highlight that educationalists who teach pre-clinical subjects would like for didactic based content to be available online, but for practical classes to be conducted in-person as they believe that hands-on laboratory experience cannot be replicated online.

The unstable and inconsistent access to the internet highlights that synchronous discussions such as webinars may be a disadvantage to learners and may be replaced by asynchronous activities.²⁹ Discussion forums, interactive texts, formative assignments, quizzes, interactive digital workbooks, and downloadable text files that can be accessed at learners' convenience could be hosted on the institutional learning management system. Cost-effectiveness should be a guiding principle and the use of materials that will require substantial amount of data to download should be avoided. Indeed, remote teaching and learning in resource-constrained countries is primarily supplemental to provide content offline so it can be accessed at time and place convenient to learners.^{5, 30}

Conclusion

The pandemic opened-up opportunities for innovations and learner-centered learning approaches that can be harnessed in the teaching of pre-clinical courses in Obafemi Awolowo University. A cost-effective blended learning programme with a mix of face to face and online activities that fully considers the contextual constraints is recommended for the teaching of these courses. The existing traditional face-to-face teaching can be expanded to incorporate more elements of blended learning and the implementation of an institutional strategy that takes into account stakeholders' needs is likely to be more successful in its implementation.

Declarations

Ethics approval and consent to participate - The research was performed in accordance with the principles of the Declaration of Helsinki and all methods were carried out in accordance with relevant guidelines and regulations. We received approval from Cardiff University's School of Medicine Research Ethics Committee (SMREC 22/47, Dated: 06/07/2022). Informed consent was obtained from all participants included in the study.

Consent for publication – N/A.

Availability of Data and Materials

All data are stored at Cardiff University in compliance with the University Research Records Retention Regulations and can be made available upon request to the corresponding author.

Competing Interests

The authors report no conflict of interest.

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Authors' Contributions

BE contributed to the conceptualization of the research, data collection and analysis, and the writing of the manuscript.

RA and OA collected and analyzed the data and contributed to manuscript writing.

MT contributed to the conceptualization of the paper, to data interpretation and analysis, and to the writing of the manuscript.

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