



Online Learning Using Google Classroom: Undergraduate Medical Students and Paediatric Residents Perspectives in the University of Port Harcourt, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author IEY designed the study, performed the statistical analysis, and wrote the first draft of the manuscript. Author EF wrote the protocol. Author IOO designed and administered the study tool. Authors IOO and IEY managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Schools in Nigeria were shut down and lectures stopped altogether. The capacity of the Nigerian educational environment to carry out these online interactions may be stretched thin with many foreseeable challenges.

Objectives: To identify the current familiarity and use of online classroom platforms by medical students and Paediatric residents, and to identify the barriers to its use for medical education.

Methods: A descriptive comparative study design using a semi-structured online questionnaire Google survey of 128 medical students and residents in training in University of Port Harcourt Teaching Hospital assessing demographics, availability of tools for online learning and application.

Results: Both groups had high familiarity, but low use, of Google classroom, and preferred mobile devices to laptops. There was high familiarity 90.6%, but low use 42.2%, of Google classroom and

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the ease of using Google classroom for interphasing or interacting between learners and facilitators was affected by Internet availability, Pearson correlation, 0.185, $p = 0.037$, but not electric power availability, Pearson correlation, 0.135, $p = 0.133$.

Conclusions: There is an overall high awareness of a range of the Google classroom LMS platform by both medical students and residents. However, constant electric energy supply, availability of internet and competence in preparing multimedia presentations and uploading these for assessment may enhance the use of online learning platforms in Nigeria for undergraduate and post graduate medical education.

Keywords: Online learning; COVID 19; medical education; e-learning.

1. INTRODUCTION

Online learning in medical education is not new to the world as many students read materials, watch videos, learn skills and even debate information using various platforms [1,2,3]. Online learning is any form of electronically transmitted learning where learners and facilitators interphase between content and context of learning using internet devices and being remotely connected. Many studies on online learning in Nigeria have centered on the availability of tools and readiness and not the interaction between learners and facilitators [4,5,6]. Other studies however have looked at experiences of students and faculties on online interactive learning processes but these are mostly in more developed countries where these platforms are used [7,8].

Having lectures online with the professors or interphasing between learners and facilitators is a different curve that must be achieved in the era of 21st century learning with medical students in Nigeria and other low to middle income countries (LMIC) [9]. When the Corona virus pandemic started, schools in Nigeria were shut down and lectures stopped altogether. The capacity of the Nigerian educational environment to carry out these online interactions may be stretched thin with many foreseeable challenges including but not limited to availability of data, power supply to the living quarters and homes, and distractions [10-12]. Other constraints likely to make the online learning a challenge include cost effectiveness, inadequate infrastructure, low bandwidth and lack of trained personnel to produce these learning templates and help students navigate them [13,14].

As part of data driven instructional design, the lead author started an online class for his students using the WhatsApp platform, which graduated to Google classroom and then Zoom

meeting (webinar). However, the level of participation of the students in the classroom was low, and we sought to find out the students' perspectives, challenges and opportunities for improvement in the learning processes. We hypothesized that the students' and residents' level of participation in the online learning process is influenced by the availability of internet, electric power, and knowledge and applicability of the Google classroom LMS platform. It is hoped that when this is known and solutions implemented, the quality and richness of the lectures, participation and debates will reach high tempos that may generate creative ideas for better learning processes.

Objectives: To determine the ease of use and challenges of students and residents in using online classroom platforms for medical undergraduate and postgraduate education. The following questions were generated in the course of preparing this manuscript; what are the perspectives of students and residents using the online Google classroom learning management system (LMS)? What are the constraints encountered by medical students and residents in using the Google classroom LMS in Nigeria?

2. MATERIALS AND METHODS

Descriptive comparative study design using a self-administered semi-structured online survey questionnaire carried out over a two [2] week period from 4th of May – 17th of May, 2020. The study participants were medical students in their 5th and 6th year of study and residents in Paediatrics department of the University of Port Harcourt Teaching Hospital. Convenience sampling method was used. Participants were recruited from the University records with their email addresses obtained from the office of the Provost, College of Health Sciences and from the Paediatrics Department. The link to the Google form was sent to all the email addresses and

WhatsApp numbers of the students and residents. The 10-minute survey was available online for a pre-announced duration of two weeks until the form was set to no longer receive responses. All potential study subjects had equal opportunity to be recruited into the study if they consented by filling the form. Hence, the findings can be generalized to reflect the perspective of the study population.

2.1 Questionnaire and Data

The questionnaire was created on Google Forms (Mountain view, CA, USA) and the link sent to the emails and Whatsapp numbers of students in the University of Port Harcourt in the fifth and sixth year of training and residents in Paediatrics Department of the hospital. Participants who received the link gave consent to participate by filling the form as this was optional and not compulsory. There were 4 main sections in the closed-ended questionnaire, i.e.

1. Demography; age, sex, ownership of smart phones and personal computers;
2. Availability and accessibility of tools used for online learning; internet services and providers, electric power supply, amount spent on internet data monthly, and what the data was mostly used for.
3. Technical knowledge and application of Google classroom and other online learning platforms with technical application of skills needed in using online platform. The participants were asked if they had taken part in any online classroom or course, the functions and applications of Google classroom, to submit a one-slide power point presentation on prevention methods of the COVID-19, using animations and transitions.
4. Attitude towards using the google classroom platform for learning. For attitude, the questions were semi structured, with "Yes" or "No", multiple choice options and 5 – point Likert scales of strongly agree to strongly disagree. Participants were also asked whether the Google classroom was learner or teacher centered, if they were comfortable working and learning independently or if they studied better in a group. The frequency of assignments was also asked and whether they procrastinated before turning in their assignments.

2.2 Method of Data Analysis

Data retrieved was exported from the Google forms to excel sheet and after decoding, this was then analyzed using IBM SPSS version 20. Descriptive analyses were done for categorical variables and presented as frequencies and / or percentages. Continuous variables were analyzed as means and standard deviations and comparison between the students and residents was done using Student's t test for continuous variables and Chi squared test or Fisher's exact test for categorical variables. Correlation analysis was done to find the association between ease of using the google classroom platform and some variables like electricity availability, Internet data, and interphasing between facilitators and learners, and for all analyses, the level of significance was set at $p < 0.005$.

3. RESULTS

At the close of the survey, 128 (91.4% response rate) learners filled and submitted the forms online, with a male to female ratio of 1:1.56 (78 females and 50 males). Age range of learners was 21 – 45 years and the mean was 26.46 +/- 6.18 years with fewer residents than students (32 vs 96) Table 1.

3.1 Internet Service and Electric Power Availability

Two learners did not have access to internet services at the time of the survey while the remaining had internet service available on their smart phones only (96, 75%) and others had additional devices like home Wi-Fi along with their cellular internet (30, 23.4%). The same proportion of learners preferred using their mobile devices for online study rather than the computers, and this difference was significant, $\chi^2 = 58.4$, $P = 0.001$. Eighty-six learners (67.2%) of those with internet service had access for up to 6 hours in a day and power supply was irregular (< 4 hours/day) for 52.3% of learners. The average expense on data monthly was N 3, 093 +/- 1, 604 (US\$ 7), with a range of N1,000 – N5,000/month, Table 1.

3.2 Technical Knowledge and Ability to Use Online Learning Tools

In the past one year, 90 (70.3%) of participants had participated in online courses, with equal proportion among residents and students (70.8%

vs 75.%), $\chi^2 = 0.201$ P = 0.650. Another 90.6% knew about Google classroom, but only fifty-four (42.2%) had participated in online Google classroom and larger percentage of these were students, 79.6% as against 20.4% residents.

3.3 Study Pattern of Participants Using the Online Learning Platforms

In the Likert scale to assess ease of using the Google classroom interface between facilitator and participants, for those who have used Google classroom, 24 (18.8%) of participants thought it was easy as against 64 (50%) who did not find it easy and the difference was not significant $\chi^2 = 0.714$, P = 0.369, Table 2.

Sixty-four (50.0%) participants turn in their assignments on time without reminders and the rest need prompting several times to accomplish this task. With regards to frequency of

assignments and tasks to be submitted, 59 (46.1%) wanted once a week, as against 22 (17.2%) who wanted this to be minimized to once a month, and the difference in proportion was significant P = 0.013, Fig. 1.

Correlation analyses of factors associated with ease of using the Google online learning platform Table 3 shows that data expenses correlated significantly with use of Google classroom, interphasing with facilitators and electricity availability. Checking ease of interphase with electric power supply regularity, the difference was not significant between those who had regular and those whose power supply was irregular, Pearson correlation = -0.135, P = 0.130. For participants who had better interface with the facilitators, their monthly average data expense was N 3, 782. 60 as against N 2, 612. 90 for those who did not find it easy to interphase with their facilitator, and the difference was significant t = 2.903, P = 0.005.

Table 1. Demographics and accessibility to some tools needed for online learning

Variable	Students (n = 96)	Residents (n = 32)	t/ χ^2	P value
Mean age (SD)	23.46 (2.1)	34.53 (3.7)	-20.76	< 0.001
Sex of respondents F (%)	58 (60.4)	20 (62.5)	0.044	0.7834
Mean data spending/month	2916.7 (1626)	3875 (1184)	-3.06	< 0.001
Do you have a personal laptop? (YES) n (%)	58 (60.4)	32 (100)	18.01	< 0.001
Do you own a smart phone device? YES n (%)	94 (97.9)	32 (100)	1.00	0.561
Do you have access to internet for > 6 hours/day? YES n (%)	58 (60.4)	28 (87.5)	7.98	< 0.001
Which device do you prefer for online learning? Smart phones	88 (91.7)	8 (25)	58.41	< 0.001
Have you participated in online course? YES n(%)	68 (70.8)	24 (75.0)	0.201	0.650
Do you know of Google classroom? YES n (%)	88 (91.7)	28 (87.5)	0.490	0.483
Have you participated in Google classroom LMS (YES) n (%)	43 (79.6)	11 (20.4)	1.068	0.301

Study pattern of participants using the online learning platforms

Table 2. Comparison of perceived ease of use of Google interphase between lecturers and learners and studying together as students

Groups	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Perceived ease of use of Google interphase between lecturers and students					
Students	2(1.6)	16 (12.5)	28 (21.9)	48 (37.5)	2 (1.6)
Residents	0 (0)	6 (4.7)	12(9.4)	14 (10.9)	0 (0)
Perceived ease of group study in online learning platform					
Students	16 (12.5)	0 (0)	68(53.1)	0 (0)	12 (9.4)
Residents	14(10.9)	0 (0)	18 (14.1)	0 (0)	0 (0)
Starting assignments online without procrastinating in online learning platform					
Students	4 (3.1)	22 (17.2)	50(39.1)	18 (14.1)	2(1.6)
Residents	0 (0)	10 (7.8)	12 (9.4)	10 (7.8)	0 (0)

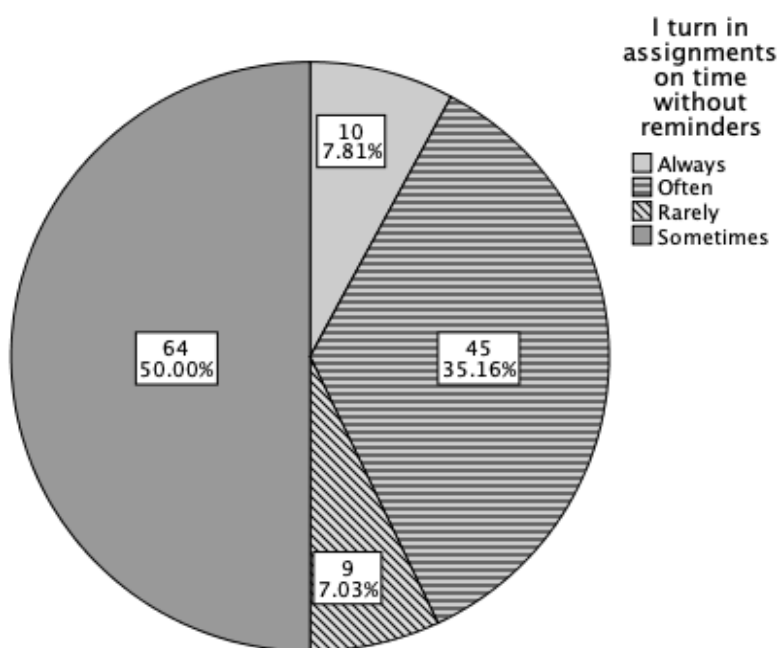


Fig. 1. Participants attitude towards turning in their assignments for online learning

Table 3. Correlation analyses of factors associated with ease of use of Google classroom

		Data Expenses	Group	Google Classroom Use	Interphase With Facilitators	Electricity
Data Expenses	Pearson Correlation	1	0.162	-0.185	-0.174	0.219
	Sig. (2-Tailed)		0.067	0.037	0.049	0.013
	N	128	128	128	128	128
Google Classroom Use	Pearson Correlation	-0.185*	0.091	1	0.540**	-0.095
	Sig. (2-Tailed)	0.037	0.305		0.000	0.287
	N	128	128	128	128	128
Interphase With Facilitators	Pearson Correlation	-0.174*	0.052	0.540**	1	-0.135
	Sig. (2-Tailed)	0.049	0.561	0.000		0.130
	N	128	128	128	128	128
Electricity	Pearson Correlation	0.219	0.072	-0.095	-0.135	1
	Sig. (2-Tailed)	0.013	0.418	0.287	0.130	
	N	128	128	128	128	128

*. Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

4. DISCUSSION

To prepare the Nigerian doctor for the challenges of digital learning, availability of internet services is obviously a prerequisite for the achievement of this goal [3]. With almost all participants having internet services, this was far from when only about 25.9% of a population studied by Ajuwon

et al. in 2011 [11] had Internet access readily. However, many participants and indeed facilitators keep their mobile data offline for a long duration of time to preserve battery lives of their smart devices and prevent exhausting internet subscription, thereby making them miss important updates on the class assignments online. In the more developed economies of the

world, data Wi-Fi is free in many institutions and available in the students' accommodation with limited facilities, to prevent torrent downloads and also in trains and buses [3,9,12].

In our study, participants who have easy interphase with their facilitators were likely to spend more for data purchase. Availability of Internet data would make the learner participate in discussions with his facilitator, conduct more research on subject matters and download materials for future referencing and study. Providing internet services for free or for a small amount in the University campus or hostels will certainly improve the virtual classroom learning environment for students and facilitators [14]. Giving each student limited data bytes per month with their log in details will also help monitor their usage preventing unnecessary downloads and excuses for not turning in assignments on time.

Power supply in Nigeria is at best described as abysmal, [15] and this challenge will need to be overcome before any meaningful online learning process can happen for students [3,14]. Because the academic buildings and hospitals have relatively regular electric power supply, students and residents have from time to time charged their phones when they are in the institutions or move around with power banks to replenish discharged batteries. Electricity facilitates both improved quality and quantity of education, so provision of power seems to have positive impact on the literacy of the youth [9]. In Zimbabwe, children in a household with solar energy spend more time doing homework compared to those without access. In Malawi, literacy level was lower in fuel wood stressed regions because of reduced time of study for participants who had to go fetching wood. While advocating for improved power supply, learners should also prioritise their goals and reduce entertainment on their mobile devices and focus on information that promote acquisition of knowledge and development of skills.

Learners retrieve information from their smart phone devices much more readily than with their laptops. In the situated learning activity of ward rounds or clinic consultations, the bulky laptop will prevent some form of face – face communication with the facilitators and will be cumbersome for the learner when manoeuvres are demonstrated. The issue arising from using these smart phones is the risk of visual impairment in later life, when they have to view fine prints constantly, and distractions from

regular telephone calls and messaging, thereby increasing the time between information retrieval and processing [16]. While there is advocacy for increasing social media dissemination of information and discussion participation, this should happen outside the ward rounds or clinic setting where distractions will impede proper patient consultation and management. Learners' extensive use of various mobile applications including music, Facebook, WhatsApp and Twitter and watching movies on apps such as Netflix will increase the level of distraction, they encounter during their study time.

Forty-two percent of participants had participated in online Google classrooms before the survey despite the use of this technology for over a decade in other climes. Learners are likely to use the tools recommended by their facilitators and when cultural resistance prevents teachers from developing this e learning, [9] students will remain in their traditional learning modes without catching up with the changing technological world. With persistent use of these technological advances in learning, the contents of learning can gradually increase to more creative levels as the learners advance [14,17,16]. For this barrier to be overcome also, facilitators must be willing to self-develop and remove their anxiety about ICT [5,9,18] or undergo intermittent training in syllabus building to suit the e learning platforms and assessment methods for the courses delivered as well as find ways to motivate the learners to participate actively. The online classroom functions well in promoting independent studies but it also promotes interaction between peers and facilitators. So, while the medium can serve for individual learning, group assignments can be given and tasks assigned to various members of the group and they can be assessed collectively or independently. The platform allows for comments and debates between peers to go on until there is saturation, however the content of discussion is enriched by the depth of knowledge of the discussant and the moderator [19].

In our study, 46.1% of learners turn in their assignments on time without reminders and the rest need prompting several times to accomplish this task and this is similar to reports by Bridges et al 2008). [2] This is low for online learning because it reduces the motivation for facilitators, especially those who already feel burdened, to continue the process but the learners will need to understand that punitive measures can be applied to late submission of assignments as

obtained on offline real time learning classrooms. Many respondents prefer to use their smart devices for turning in assignments as these seem to work faster than with laptops [18]. Getting notifications and prompts in the smart devices allow motivated learners get their tasks done on-the-go, in the train, bus rides or cafeteria based on their competence. The lack of competence in navigating the Google classroom in the mobile device may however impede smooth learning, uploading and downloading files and even creating PowerPoint for seminar presentations, so the learners should also be taught on the use of these tools before launching them. As learners prefer having one assignment in 2 weeks, facilitators should therefore give tasks that will test competence in higher order reasoning and have scoring templates that learners can access and learn their strengths and weaknesses. This is also apt as the learners have many other courses they are dealing with within the curriculum and syllabus. The study is limited by the inability to train the learners and facilitators before doing the survey, however, it has given the researchers some insight into the training needs and to assess learning outcomes post training.

5. CONCLUSION

Students are familiar with the online class but there are certain barriers that might have hampered their learning using these platforms. Some of the barriers are poor electric power supply to keep their mobile devices on, lack of regular internet data supply due to cost constraints, lack of motivation of learners and facilitators to engage in a new cultural concept. For the online learning to continue without hinderance, the learners must find ways of motivating the facilitators by turning in their assignments early. Training of learners and facilitators and engaging digital technologists may improve the delivery of learning activities using these media.

This can be achieved by developing and making templates available for editing by the facilitators and getting learners to participate in the training workshops for their facilitators.

DISCLAIMER

The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the

authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

Informed consent was obtained. Participants who completed the survey had an opportunity to enter a draw for gift cards to encourage their participation. Personal identifiable details were not requested from the participants and they gave consent by filling the forms as it was stated that they were not compelled to continue after reading the opening and introductory statements. Confidentiality was maintained in the handling of information provided.

ETHICAL APPROVAL

This study received approval from the Research and Ethics committee of the University of Port Harcourt.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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