Availability of Digital Resources and Institutional Compliance with COVID-19 Mitigation Measures in a Nigerian University: A Descriptive Study

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Abstract
The state of the availability of digital resources and institutional compliance to COVID-19 mitigation measures was evaluated by the researchers in this study. Informed by the need to answer two research questions, the study adopted the descriptive survey design. A sample of 409 participants was drawn from a population of 2,410 academic staff at the University of Calabar, leveraging the multistage sampling process. "Availability of Digital Resources and Institutional Compliance with COVID-19 Mitigation Measures Questionnaire (ADRICCMMQ)" was used for data collection. After administration, we recovered 397 copies of the instrument successfully. We used descriptive statistics to answer the research questions. Our findings indicated a great extent in the availability of digital resources such as computers (91.18%), human capacity (63.48%), network printers (67.76%), projectors (59.19%), websites (92.95%), and wireless networks (86.65%). There was a low extent in the availability of digital resources such as Local Area Network (5.79%), cloud storage systems (2.27%), digital libraries (7.56%), firewalls (1.26%), Internet service (48.36%), routers (23.69%) and zoom videoconferencing platform (23.93%). The unavailability of digital resources such as host/servers (0%) and virtual private networks (0%) in the HEI. Further evidence shows a low extent of institutional compliance with COVID-19 mitigation measures generally and specifically for all indicators. In conclusion, there is a high degree of unreadiness to promote e-learning when flexible learning systems should operate in the institution. Among others, we recommend that the management of the HEI should apportion proceeds from internally generated funds to procure digital resources to increase the institutional capacity to respond to *COVID-19* or similar cases in the future.

Keywords: Availability, *COVID-19*, e-learning, evaluation, HEI, institutional compliance.

Introduction

The Nigeria Centre for Disease Control created new guidelines, which were drafted and passed into law on January 26th, 2021, to restore economic, educational, and social activity in the nation while ensuring safety and limiting the pandemic's spread. Despite these apparent and well-documented mechanisms to promote personal and group safety, how individuals comply with the protocols remains unclear. This suspicion is due to the attitudes of many Nigerians, notably higher education staff and students. For example, the researchers observed that many staff members and students do not utilise face masks as required at school, lecture rooms, and offices/workplaces. Some only use a face mask while entering or exiting a building, school gates, library or security checkpoints. Others are often sighted removing or suspending their face masks after leaving such areas. Students are often seen in overcrowded classrooms beyond the allowable limit of 50 students in a restricted area.

Furthermore, the usage of hand sanitisers at regular intervals and the compliance with regular handwashing protocol seem to be a dead culture among some university instructors and students. Some employees and students seem reluctant to follow physical and social distancing norms (such as keeping at least a two-metre distance while engaging with colleagues, super-

ordinates, and subordinates). Contrary to the rules, they are often seen conversing, laughing, playing, or embracing themselves at will. One potential reason for these negative sentiments among staff regarding adherence to the *COVID-19* preventive measures might be because many individuals believe *COVID-19* is non-existent. Some people who think *COVID-19* is genuine also claim that the pandemic is not in Nigeria. Furthermore, others regard it as political propaganda to get international help. As a result, they are unwilling to follow any so-called preventative step. Available empirical evidence tends to attest to the negative perception of Nigerians toward the *COVID-19* pandemic (e.g., Bolarinwa et al., 2020; Ogbole et al., 2020; Okon, 2021; Oyeyemi et al., 2020). Beyond the perception of staff and students, the researchers contend that the degree of institutional enforcement and practices may promote or hinder staff adherence to the post-*COVID-19* precautionary measures.

Given the importance of education and the virus's unpredictable ending, it is imperative that teaching and learning persist. Consequently, many academics continue to argue for a switch to online education and learning (Müller et al., 2021; Ntshwarang et al., 2021; Owan, 2020; Roman et al., 2021). However, despite the campaign, the situation in Nigeria does seem to be divergent from the one in other nations, wherein learners and instructors in educational institutions have access to smartphones and e-learning capabilities (Fan et al., 2020; Gali et al., 2020; Maphalala & Adigun, 2021; Sung et al., 2016). There is a common problem in Nigeria's educational institutions regarding poor e-learning setups for both group and individual use (Bassey & Owan, 2020). So, with the absence of traditional face-to-face classrooms, how can education and training continue in Nigeria? This study evaluated how digital resources are available based on evidence from a public university. The study also determined the extent to which COVID-19 mitigation measures have been implemented at the public university.

The presence or absence of digital resources determines whether e-learning will occur or thrive. Implementing e-learning is not always easy (Almanthari et al., 2020; Aslam et al., 2021), especially for instructors who are not already experienced with online programs due to a lack of expertise and resources (Zaharah & Kirilova, 2020). For example, it was revealed that the closure of schools led to the wide use of CT for teaching and learning remotely among highly skilled individuals (Agaton & Cueto, 2021; Crompton et al., 2021; Dasinger & Gibson, 2022; Hash, 2021). Besides, many scholars have revealed that e-learning is the most effective method of continuing education in the case of a pandemic (Alkhalil et al., 2021; Çınar et al., 2021; Rahm et al., 2021; Turnbull et al., 2021; Yekefallah et al., 2021). Despite the challenges of COVID-19, educational measures are being taken to keep students in school. Higher education institutions constantly seek alternative solutions to improve curriculum techniques and make them more responsive to students' learning needs, even outside conventional classrooms (Toquero, 2020).

A study conducted by Zhang et al. (2020) found uncertainty and disagreement concerning the content and methods of instruction and the workload of instructors and students. Instructors' inexperience (including uneven learning results generated by teachers' differing experiences), the knowledge gap, and the complicated home environment are all potential challenges for the policy. According to an empirical study conducted by Basilaia and Kvavadze (2020), the swift shift to online education has been a success, and the expertise acquired may be used. Other nations that have not figured out how to make the shift yet might benefit from the knowledge and expertise gained from this research and experience (Iglesias-Pradas et al., 2021; Oliveira et al., 2021; Westwick & Morreale, 2021). It has been made possible for students and educators to access educational materials from the Internet (Owan et al., 2021; Szymkowiak et al., 2021; Wang et al., 2021). Teachers may now utilise applications to connect with students to upload assignments, pre-recorded content, presentations, and voice notes (Doyle, 2020). As well as utilising video platforms like Zoom/Google Hangout and texting and

emailing parents often, some schools are offering virtual lessons (Gordy et al., 2021; Tambyraja et al., 2021).

Researchers also tend to admit that the capability of schools and parents to deliver and efficiently utilise these tools is likely to vary significantly (Dimopoulos et al., 2021; Fontenelle-Tereshchuk, 2021; Minkos & Gelbar, 2021; Yan et al., 2021). Parents who work in retail, supply chain, healthcare, or the supply chain may not have the time or space to devote to their children's education (Song et al., 2021; Storr et al., 2021). In contrast, parents who work full-time may not save as much time for their children's education due to time restrictions (Doyle, 2020; Hjálmsdóttir & Bjarnadóttir, 2021; Petts et al., 2021). As a result, most scholars have concluded that having digital resources available has a beneficial impact on the ways instructional materials are delivered during COVID-19 (Dan et al., 2021; González-Nieto et al., 2021; Pepin, 2021).

Although much research attention has been paid to the role digital resources play in teaching and learning during the pandemic, the extent to which these resources are available for deployment has rarely been quantified from the perspective of developing nations, where there is the problem of inadequate access to ICT resources (Andreev et al., 2019; Dan et al., 2021). Enrique, 2018; Sekulovska-Jovkovska & Tosheva 2021). It is essential to understand the extent to which digital tools are available. Understanding the extent of the availability of digital tools could be crucial in determining the degree of institutional readiness to sustain education amidst the Covid-19 pandemic. Along these lines, this study was conducted to bridge the gap in the literature.

Regarding Institutional compliance with COVID-19 mitigation measures, a literature review revealed that most previous studies focused on students' opinions regarding setup processes. For instance, in several studies, students' understanding of *COVID-19* was previously high (Fatmi et al., 2020; Ngwewondo et al., 2020; Peng et al., 2020). Similarly, Zhong et al. (2020) discovered that virtually all their research participants used masks when they went out. Thus, adhering to the virus's mitigation measures can prevent the infection from spreading. However, Apanga et al. (2021) found that most students did not use a face mask, exercise handwashing/hand sanitising, or maintain social distance regularly. Comparably, Abate and Mekonnen (2020) found that more than a third of the participants lacked information, attitudes, and preventative actions about *COVID-19* illness. Little wonder that Jacobs and Ohinmaa (2020) found that law enforcement officials preferred to educate non-mask wearers rather than rely on civil fines imposed by state decrees.

Insufficient resources were found by Maqbool and Khan (2020) for the implementation of public health and social initiatives (Kujoh, et al., 2020). A significant obstacle to reducing COVID-19 transmission is the report's assertion that this is an important issue. The literature review also showed that researchers in other countries had undertaken numerous studies, especially in China (e.g., Amir et al., 2020; Bajaria & Abdul, 2020; Ningsih et al., 2021; Zhan et al., 2020). Only a few studies have been identified in the setting of Nigeria (e.g., Ogbole et al., 2020; Oyeyemi et al., 2020). Apart from that, most of the cited literature had focused on medical personnel or healthcare workers' knowledge, attitudes, and practices (e.g., Bhagavathula et al., 2020; Corrin et al., 2017) or the general population's knowledge, attitudes, and procedures (e.g., Abdelhafez et al., 2020; Gao et al., 2020; Zhong et al., 2020) and environmental health education (Kujoh, et al., 2020).

The study of Okon (2021), conducted in distance education institutions in Cross River State, seems to be among the few notable research in Cross River State on the managerial enforcement of *COVID-19* precautionary measures. The result of the study found a low extent in the enforcement of handwashing, use of facemask and social distancing policies. Furthermore, Ogarekpe (2021) revealed that the degree of institutional compliance with the provision of safe water supply, handwashing facilities and infrared thermometers in tackling

the *COVID-19* pandemic was low in public but high in private secondary schools in Calabar South Local Government Area (LGA). However, the cited study indicates that both private and public secondary schools had a great extent in the enforcement of social/physical distancing, use of face masks, provision of hand sanitisers, operation of alternative learning timetables and sterilising of school premises). Based on these gaps, this study provided answers to the two questions - To what extent various digital resources are available in higher education institutions? What is the extent of institutional compliance with COVID-19 mitigation measures in the higher education institution?

Methods

This study used a descriptive survey research method to explain its conclusions using data gathered from primary sources. This report aims to accurately represent the status of digital resources and the amount of compliance with COVID-19 mitigating measures at the university. The population of this study comprised 2410 academic staff distributed across 16 faculties in the University of Calabar, Calabar, Nigeria. The researchers adopted the multistage sampling process to select this study's respondents. In stage 1, the stratified proportionate random sampling technique was adopted by the researchers in selecting 50% of the available Faculties in the university. Hence, eight out of the 18 public faculties were selected. In stage 2, we used the simple random sampling technique in selecting 30% of the available departments in each of the desired faculties.

Consequently, 20 departments were picked across the eight selected faculties. In stage 3, the researcher used an accidental sampling procedure to enumerate only the available academic staff for data collection in the assigned departments. A total of 409 academic staff were selected as respondents for the study. The researchers created a standardised questionnaire for collecting data entitled "Availability of Digital Resources and Institutional Compliance with COVID-19 Mitigation Measures Questionnaire (ADRICCMMQ)". The questionnaire was structured into three sections. Section A was dedicated to obtaining the biodata of respondents, such as gender, rank, and years of work experience. Section B was designed with a list of 15 electronic infrastructures for respondents to tick which was available or otherwise in their departments. Two response options (available and not available, were provided for respondents to tick. Section C of the questionnaire comprised 16 items assessing the enforcement of COVID-19 mitigation measures. Respondents were expected to rate the extent of their agreement and disagreement with the items on a four-point Likert scale.

Face and content validity were evaluated by two psychometric specialists at the Department of Educational Foundations, University of Calabar. The instrument's internal consistency was assessed using the test-retest reliability approach. Thirty non-sample lecturers from three University of Calabar departments participated in a trial test performed by the researchers. The participants were chosen from the same population as those in the sample because the researchers assumed they would have comparable characteristics. The respondents were given copies of the instrument, and two weeks later, the same respondents were given new copies of the tool. Pearson Product Moment Correlation Analysis was used to compare the results from the two rounds of testing. According to the instrument's reliability analysis, the result was 0.89, indicating that the equipment measured what it promised to.

Primary data was obtained in this study by administering copies of the instrument. The researchers contacted the selected respondents based on the scheduled date allocated for each department. The researchers visited the assigned departments and could locate staff offices with the help of some students from each department. Although some staff members were not available in their offices during this process, only those available in their offices were used for the study. Upon contacting available staff, the researchers introduced themselves, stated their mission, and pleaded with the busy team to keep copies of the instrument and respond at their

convenience. Some staff members were hectic and could not give the necessary attention. Individuals who agreed to participate in the exercise were fully briefed on its significance and reminded of the necessity to answer the instrument's questions honestly. A guarantee of complete secrecy was also given to those who responded. On a final note, the researchers retrieved 397 of 409 administered copies of the instrument throughout the investigation. Some participants could not return their copies, which resulted in a supply shortfall. It took three weeks to acquire all the data.

In scoring the items, the serial numbers earlier were assigned to each of the retrieved copies of the questionnaire for easy identification. Items in section B of the questionnaire were scored nominally, with one set of responses indicating availability and 0 for unavailability across each digital resource. Section C of the questionnaire has a distinct Likert scale for positive and negative comments. All favourable comments received 4 points, 3 points, 2 points, and 1 point, respectively, for those who strongly agreed, agreed, disagreed, or strongly disagreed. On the other hand, all negative items were scored using a reversal of the standard approach. After the scoring, a computer spreadsheet software was used to code all the scored items on a person-by-item matrix (MS-EXCEL 2019). Descriptive statistics (such as frequency counts, basic percentages, and the mean and standard deviation) were utilised for the study.

Results
Research question 1

To what extent are digital resources available in higher education institutions? The answer to this research question was provided using frequency counts and percentages about the availability of digital resources in higher education institutions. The result in Table 1 shows that computers (91.18%), human capacity (63.48%), network printers (67.76%), projectors (59.19%), websites (92.95%) and wireless networks (86.65%) are the digital resources that are available to a great extent. The availability rate is greater than the 50% average benchmark. Contrarily, digital resources such as Local Area Network (5.79%), cloud storage systems (2.27%), digital libraries (7.56%), firewalls (1.26%), Internet service (48.36%), routers (23.69%) and zoom videoconferencing platform (23.93%) are available to a low/shallow extent in the higher education institution (HEI). Furthermore, host/servers (0%) and virtual private networks (0%) were unavailable in the HEI.

Table 1: Frequency distribution showing the extent of the availability of digital resources in a higher education institution

S/N	Digital resources	Status			
		Available	%	Not available	%
1	Local Area Network	23	5.79	374	94.21
2	Cloud storage systems	9	2.27	388	97.73
3	Computers	362	91.18	35	8.82
4	Digital library	30	7.56	367	92.44
5	Firewalls	5	1.26	392	98.74
6	Host/servers	0	.00	397	100
7	Human capacity	252	63.48	145	36.52
8	Internet service	192	48.36	205	51.64
9	Network printers	269	67.76	128	32.24
10	Projectors	235	59.19	162	40.81
11	Routers	102	25.69	295	74.31
12	Virtual private network	0	.00	397	100
13	Website	369	92.95	28	7.05
14	Wireless network	344	86.65	53	13.35

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15	Zoom videoconferencing platform	95	23.93	302	76.07

Research question 2

What is the extent of institutional compliance with COVID-19 mitigation measures in the higher education institution? Table 2 shows the indicators and measurement of institutional compliance to COVID-19 mitigation measures. In interpreting the results in Table 2, all mean values greater than the criterion mean of 2.50 suggest a great extent of institutional compliance with the indicator. In contrast, the mean values below indicate a low degree of implementation of the indicator. The criterion mean of 2.50 is derived from finding the average of all response probabilities on the four-points Likert scale in the instrument used for data collection. As shown in Table 2, there is generally a low extent of institutional compliance with COVID-19 mitigation measures in the HEI. Specifically, Table 2 shows a low degree of institutional compliance with implementing all the indicators.

Table 2: Mean rating and standard deviation of the extent of institutional compliance with COVID-19 mitigation measures in the HEI

S/N	Indicators	Extent of compliance	
		$\overline{X} \pm SD$	Remark
1	Provision of sufficient water for handwashing	1.83 ± .33	Low
2	Provision of borehole water supply	2.04 ± .43	Low
3	Implementation of the 2-metre sitting arrangement	1.61 ± .61	Low
4	Implementation of classroom shifting structure	1.76 ± .47	Low
5	Full enforcement of the "no mask, no entry" order	2.13 ± .61	Low
6	Punishing staff/students caught without the use of face masks	1.28 ± .37	Low
7	Constant provision of hand sanitisers at school entry points	1.42 ± .45	Low
8	Consistent provision of hand sanitisers at lecture halls' entrances	1.32 ± .69	Low
9	Provision of Antiseptic at all handwashing locations	1.87± .25	Low
10	Provision of mobile handwashing basins at strategic locations	1.33 ± .41	Low
11	Organising *COVID-19* sensitisation campaigns for personnel	2.25 ± .37	Low
12	Checking the temperature of individuals entering/leaving the school	1.43 ± .63	Low
13	Setting up an internal *COVID-19* task force/patrol team	2.41 ± .59	Low
14	Disinfection of lecture halls through weekly fumigation	1.12 ± .21	Low
15	Posters promoting the use of face masks are pasted/distributed	2.37 ± .27	Low
16	Provision of designated drop-off/pick-up points outside the school entrance for visitors	1.73 ± .15	Low
	Average	1.74 ± .43	Low

Criterion Mean = 2.50

Discussion of findings

This study discovered a low extent in the availability status of digital resources in the HEI. This result is because only a handful of e-learning infrastructures are available reasonably in the HEI, while the availability of many digital resources is negligible. This result implies a low degree of resource commitment and willingness to promote e-learning in the HEI. This result also suggests that the HEI under scrutiny is not fully ready to sustain teaching and learning should other waves of the *COVID-19* pandemic or similar pandemics occur. The result of this study agrees with the development of Zhang et al. (2020) that online education infrastructure flaws, instructor inexperience (including uneven learning results due to teachers' differing levels of expertise), e-learning growth are hindered by a lack of knowledge, a complicated home setting, and more. With the backing of public schools and the availability of alternative options (such as Zoom, Slack, Google Meet, or Edu Page), virtual learning and live interaction may be aided by the government.

The second finding of this study generally reveals a low extent of institutional compliance with COVID-19 mitigation measures in the HEI. This finding is not surprising since the institution recorded a low extent in providing sufficient water supply, hand sanitisers at school/lecture halls entry points, mobile handwashing basins at strategic locations, and antiseptic at all handwashing locations. The institution also recorded a low extent in providing designated drop-off/pick-up points outside the school entrance for visitors. The result is that the institution complied poorly with implementing the 2-metre sitting arrangement, classroom shifting structure, "no mask, no entry" order, and setting up an internal *COVID-19* task force/patrol team. Other areas where the HEI failed to comply with the established COVID-19 mitigation measures were punishing staff/students caught without the use of face masks; organising *COVID-19* sensitisation campaigns for personnel; checking the temperature of individuals entering/leaving the school; using posters to promote the use of face masks and disinfection of lecture halls through weekly fumigation.

The poor institutional compliance may be due to the cost of maintaining the protocols or lack of interest among institutional leaders to promote a safe learning environment. This finding aligns with the study of Okon (2021), which also found a low extent in the enforcement of handwashing, use of facemask and social distancing policies. The finding partly corroborates the results of Ogarekpe (2021), which earlier revealed the extent of institutional compliance in the provision of safe water supply, handwashing facilities, and infrared thermometers in tackling the *COVID-19* pandemic to be low in public secondary schools. However, there is a point of disagreement between the result of Ogarekpe and the present study. The cited study found that both private and public secondary schools enforced social/physical distancing, use of face masks, provision of hand sanitisers, operation of alternative learning timetables and fumigation of school premises to a great extent. The disparity between the cited and present studies is evident due to the differences in both studies' areas. While the cited study evaluated public secondary schools, the current study analysed the situation in an HEI. Secondary schools and universities' nature, design, and structure are different, resulting in variations.

Conclusion

The outcomes of this investigation led to the conclusion that both the availability of digital resources and the compliance of the HEI in following post-Covid protocols are low. This implies that there is a high degree of unreadiness to promote e-learning at a time when flexible learning systems are being operated in highly developed nations. This study also implies that the HEI management pays little or no attention to implementing all the COVID-19 mitigation measures. This ugly narrative puts the institution in a state of high health risk. The safety of both staff and students is not guaranteed, especially if there are any unknown active cases of *COVID-19* in the institution. It is recommended that:

i.   the management of the HEI should apportion proceeds from internally generated funds to procure digital resources such as computers, projectors, wireless networks, running websites and host/servers, and so on, to increase the institutional preparedness to respond *to COVID-19*-similar cases in the future.

ii. The Federal Government of Nigeria should try as much as possible to allocate at least the 26% advocated by UNESCO of its budget to the education sector to raise the level of proceeds received from the government. This can help make adequate funds available to procure needed resources to provide a sound e-learning system and implement all COVID-19 mitigation measures.

iii. Private philanthropists, foreign donor agencies and non-governmental organisations should supplement the government's efforts by providing funds or supplying electronic and other facilities needed to enforce COVID-19 mitigation measures in universities.

iv.   Both staff and students should see all the COVID-19 mitigation measures to mitigate the spread of the virus and make efforts to adhere to them. This will help keep them safe for quality teaching and learning in the HEI.

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