

# Effects of Information and Communication Technology Online Platforms on Sustaining Teaching and Learning in Tertiary Institutions during Covid-19 Lockdown in Nigeria

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**Abstract-** The COVID-19 pandemic lockdown in 2019 affected the social services of countries worldwide. Schools were shutdown, which poses a threat to teaching and learning. On March 19, 2020, the Federal Ministry of Education approved the closure of all learning institutions. This abrupt closure led to significant disruptions in the education system in Nigeria, which affected access to quality education generally. However, this propelled schools to adopt measures of teaching and learning using ICT tools in form of online learning, where students are taught while they are at home. The aim of the study is to analyze the effect of ICT tools on sustaining teaching and learning during the COVID-19 lockdown. The study particularly investigated the challenges in adopting online learning as well as students' satisfaction in learning through online learning. The study uses survey method to administer questionnaires to students in order to determine the level of their satisfaction or otherwise of learning through online systems. The numbers of students that filled and returned the questionnaire were 95. The study identified that significant activities which support learning continued during the COVID-19 pandemic. The students of Al-Qalam University Katsina were taught using Zoom and Loom application. However, despite the advantages of online learning, the study identified some challenges in adopting and utilizing the technology. This includes lack of technical infrastructures, poor organizational policies, poor internet service, and lack of access to electricity, among others. The study concluded that online learning cannot completely replace traditional classroom activities; rather it can at best serve as a complement in the event of any disaster that may cause the closure of schools, such as the COVID-19 pandemic. The study recommended that both the Federal government, states and local government should adopt and maintain ICT infrastructures to sustain teaching and learning during any disaster such as the COVID-19 pandemic.

**Keywords:** Education, ICT, learning, online, teaching.

## I. INTRODUCTION

As part of the consequences of COVID-19 pandemic, countries worldwide experiences lockdown in 2020, which in turn led to the closure of schools at all levels of primary, secondary, and tertiary institutions [1]. When the World Health Organization (WHO) came to the resolute conclusion of stopping the spread of this viral pandemic, they suggested a series of safety measures such as hand washing with soap and running water for at least 20 seconds, wearing of face masks, social distancing, and sit-at-home or lockdown orders [2]. According to UNESCO, national school closure has been executed on more than half of the world's student populace, in a bid to stop the spread of the pandemic (UNESCO, 2020). Despite sit-at-home/lockdown ordinances, learning should be a continuous process.

The emergence of the COVID-19 pandemic has made some countries, including Nigeria to consider a web-based learning approach. Online learning is no more to be thought of as in future tense; it is here already, and thankfully, as an answer to teaching problems. Although, a few Nigerian schools, especially private schools came up with the idea of online learning during the global lockdown [3]. Technological growth has brought about major changes in how things are done in all sectors, including learning and schooling methods. The transition of this growth has been somewhat smooth due to easy access to technological devices (internet access, mobile devices, etc.) for teachers and students. According to [4], the majority of students see online learning as groundbreaking for education; others on the other hand have major concerns about the discrepancy associated with its credibility. The Nigeria University Commission (NUC) has vehemently pushed back against online degrees, and in most places of employment, certificates from such programs are frowned upon. As stated by Jones and Blankenship, the traditional face- to-face method of learning is able to provide immediate feedback on students' performance unlike web-based learning [5].

The global spread of the COVID-19 pandemic has led to the closure of educational institutions all over the world. This brings to fore the readiness of educational institutions to deal with a crisis that requires the help of advanced technology including hardware and software to enable effective online learning. Such closure of schools has accelerated the development of the online learning environments so that learning would not be disrupted. Many institutions have become interested in how to best deliver course content online, engage learners and conduct assessments. Hence, COVID-19 while being a hazard to humanity, has evolved institutions to invest in online learning [6].

Online learning systems are web-based software for distributing, tracking, and managing courses over the Internet [7]. It involves the implementation of advancements in technology to direct, design and deliver the learning content, and to facilitate two-way communication between students and teachers. They contain features such as whiteboards, chat rooms, polls, quizzes, discussion forums and surveys that allow teachers and students to communicate online and share course content side by side. These can offer productive

and convenient ways to achieve learning goals. In Nigeria, the institutions are using video conferencing applications, which include Zoom, Loom, Skype for business, Webex and Webinaria etc. [8].

As part of the COVID-19 safety measures, learning activities in Nigerian tertiary institutes were placed on a compulsory lockdown. Some institutions were still involved in teaching students, some examining the students, and others awaiting results approval. While students never expected the pandemic to last this long, tertiary institutions have however been locked for months in Nigeria. This had prompted students to seek alternate sources of learning, especially e-learning, amongst other activities. Thus, this study aims to determine the e-learning attitude of tertiary students during the COVID-19 pandemic in Nigeria [9].

As a result of the COVID-19 halt in school activities, many researchers have taken it upon themselves to carryout findings especially on the effect the closure is having on learners and teachers. Most of these findings are focused on either student's perception of the learning process, courses that can be taught online or grades of students, etc. In all, these findings have either been forecasted for during and after of COVID-19, be it long or short term bases. Pandemics, wars, or natural disasters are not the only cause of change in the educational system as the world globally is evolving, thus focused on learning methods should be based on a safer environment [10]. This study takes its root based on these findings and also focused on the students' online learning perspective, its feasibility, learning pattern, and assessments of Nigerian students during this COVID-19 pandemic.

### A. Objectives of the Study

The objectives of the study are to:

- 1) Investigate the impact of Information and Communication Technology in education.
- 2) Identify the challenges and the different categories of ICT tools applicable to education.
- 3) Evaluate the uses and application of ICT in teaching and learning.
- 4) Investigate the extent of ICT usage as a tool for teaching and learning in schools.

### B. Research Questions

The following research questions guided the study:

- 1) What is the impact of information and communication technology in education?
- 2) What are the challenges and different categories of ICT tools applicable to education?
- 3) What are the uses and application of ICT in teaching and learning?
- 4) What is the extent of ICT usage as a tool for teaching and learning in schools?

## II. THEORETICAL FRAMEWORK

This study adopted the modified version of DeLone & McLean information system success model, which has gained significant attention from researchers in the field of information systems. In 1992, this model was initially developed by DeLone and McLean to measure the dependent construct of IS success [11] was primarily based on following three aspects: study on communications, Taxonomy of measuring information output and research work on information system during that period. There are three levels of communication:

- First Level: Technical: (accuracy of information system)
- Second level: Semantic (success of right information conveyed to the right receiver)
- Third level: Effectiveness (influence of information on the receiver).

The information success model has discussed the six dimensions, such as information quality, system quality, system use, user satisfaction, and organizational impact. After one decade, the author modified the original model by adding service quality dimension and in the end replaced the individual impact and organizational impact with the net benefits. Figure 1 showed the theoretical framework adopted by this study.

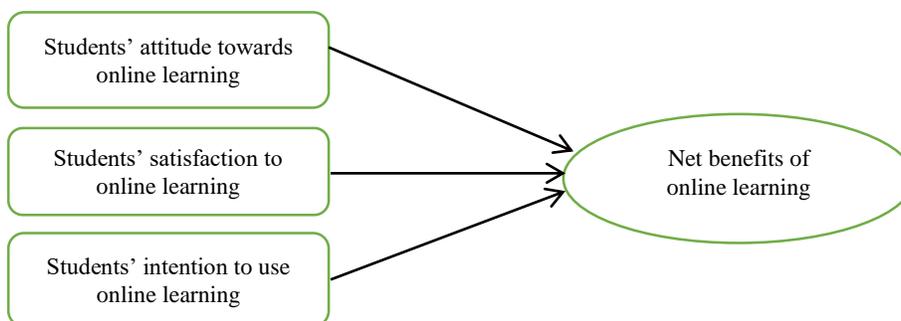


Figure 1: Modified version of D&M model as theoretical framework for the study

The model was designed to measure three basic variables that would determine the level of success for adopting the online teaching and learning activities during the COVID-19 pandemic lockdown. These three variables included students' attitude towards online learning, students' satisfaction to online learning, and students' intention or motivation to use the online learning.

### III. METHODOLOGY

The methodology adopted for the purpose of the study is the descriptive research. Descriptive research involves the systematic collection of data about a given population or area of interest such as individuals, students, teachers and institutions [12]. The design is used for the following reasons;

- 1) To collect evidence concerning an existing situation
- 2) To identify current practices
- 3) To identify standards and norms which to compare and evaluate present conditions.

#### A. Population and Sampling of the Study

This study used the survey method to determine the effects of ICT online platforms on sustaining teaching and learning in schools during COVID-19 pandemic lockdown in Nigeria. Students of Al-Qalam University Katsina were the target population and the sample for the study were the 400 level Computer Science students who were randomly selected. A self-administered questionnaire was administered to 95 students who were asked to fill it based on the knowledge and experiences of using ICT online platforms for teaching and learning during the COVID-19 lockdown.

#### B. Data Collection and Analysis

The data was collected using a questionnaire that was administered physically as hardcopy to the respondents. After gathering the data in its raw form from the respondents, the data was then classified and tabulated after ascertaining its completeness and consistency. This is followed by analysis and interpretation of results as can be seen in subsequent chapters. In analyzing the data, a simple statistical analysis was done based on frequency and percentage. The statistical analysis produced clear results and interpretation of the relative frequencies of the raw scores.

### IV. RESULTS AND ANALYSIS

This section shows the results and analysis of the demographic results as well as the survey questions and responses of the respondents.

#### A. Demographic Results

The Table below shows the results of the demographic information of the respondents, which shows their gender distribution.

*Table 1: Demographic result of the respondents*

Responses	Frequency	Percentage (%)
Male	65	68.4
Female	30	31.6
<b>Total</b>	<b>95</b>	<b>100</b>

From Table 1 above, it can be seen that 68.4% of the respondents are males while 31.6% are females. This is an expected result, because in most developing countries such as Nigeria, the rate of school enrolment is higher in the male than in the female.

#### B. Survey Results

The following were the questions that appeared in the measuring instrument, which is the questionnaire. The respondents were enjoined to answer the questions to the best of their ability, and in the event where they are not sure of the answer, then an option for ‘neutral’ was provided to cater for such issue. The number of questions in the questionnaire are fourteen (14), and the last item was provided in form of recommendations where the respondents were expected to express their opinions on how best to improve the deployment of ICT facilities in education.

- i. Which ICT device did you use to participate in the online teaching and learning?

This question was asked in order to find out the different types of ICT devices used in the online teaching and learning, and which one is mostly used by the students. This is because there is no way a student or teacher can participate in the online teaching and learning without having a device such as computer, smartphone, tablet, etc.

*Table 2: Types of ICT devices used by the respondents*

Responses	Frequency	Percentage (%)
Desktop computer	2	2.1
Laptop computer	5	5.3
Smartphone	79	83.2
Tablet	9	9.4
<b>Total</b>	<b>95</b>	<b>100</b>

Table 2 gives a depiction of the different types of devices that are owned by the respondents, and which they used in participating in the online learning. It can be seen that 83.2% of the respondents uses Smartphones, and only 9.4% use Tablet, while 5.3% uses laptop

computer, and only 2.1% of the respondents' uses desktop computer. The domination of the use of Smartphones by the respondents may not be unconnected with its mobility and ease of use feature, in which it can be used anywhere and anytime.

This result corresponds with the findings of [13], who studied the use and effect of smartphones in students' learning activities, where he identified that Smartphone usage ensures flexible course delivery, makes it possible for learners to access online learning platforms easily, access course resources and interact digitally.

ii. Have you use any online application platforms before the COVID-19 lockdown?

The respondents were asked this question to determine whether they have been using the online application platforms for study or for any other purposes.

*Table 3: Use of online applications before the COVID-19 lockdown*

<b>Responses</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	6	6.3
No	89	93.7
<b>Total</b>	<b>95</b>	<b>100</b>

As seen in Table 3, the number of respondents who had been participating in online learning before the COVID-19 lockdown was a mere 6.3%, while 93.7% of the respondents said they had not been doing online learning before the lockdown. This shows that before the COVID-19 lockdown, online learning is not common in this part of the world. Therefore, the COVID-19 lockdown has made the online application learning more popular.

This result was supported by the findings of [14], in their study on advantages, limitations and recommendations for online learning during COVID-19 pandemic era. They stated that online learning became more popular during the COVID-19 lockdown era due to its advantages, which include the active involvement of students, that is being student-centered learning and it is easily manageable.

iii. Do you know about online application packages for teaching and learning?

The respondents' were asked this question in order to ascertain their level of familiarity with online application platforms for teaching and learning. The result is shown in Table 4.

*Table 4: Familiarity with online application packages*

<b>Responses</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Yes	33	34.7
No	62	65.3
<b>Total</b>	<b>95</b>	<b>100</b>

From Table 4 above, it can be seen that 34.7% of the respondents were aware of online learning applications for teaching and learning, while 65.3% of the respondents were not aware of them.

iv. Which of the online application package was used in teaching you during the lockdown?

The respondents were asked the type of online application packages that were used in teaching them during the COVID-19 pandemic lockdown. This question will particularly help teachers and other relevant stakeholders in schools to know the popular online application used in teaching and learning.

*Table 5: Types of online applications for teaching and learning*

<b>Responses</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Zoom	85	89.5
Loom	7	7.4
Webinaria	3	3.1
<b>Total</b>	<b>95</b>	<b>100</b>

From Table 5 above, it can be seen that 89.5% of the respondents were taught with Zoom application, while 7.4% were taught with Loom application, and then only 3.1% were taught with Webinaria. This result indicates that Zoom application is more popular than the rest of the online application packages. This result corresponds with the findings of [15] in his study on higher education institutions and the use of online instruction and online tools and resources during the COVID-19 outbreak. His findings suggested that Zoom application was the most adopted and preferred tool among the 58 of the 64 universities that were surveyed in the United States.

v. What is your perception and acceptance of the online application packages?

The respondents were asked about their perception and acceptance of the online applications to continue teaching and learning during the COVID-19 pandemic lockdown.

*Table 6: Perception and acceptance of the online applications*

Responses	Frequency	Percentage (%)
Strongly agree	3	3.2
Agree	12	12.6
Neutral	22	23.2
Disagree	30	31.6
Strongly disagree	28	29.4
<b>Total</b>	<b>95</b>	<b>100</b>

The respondents were asked about their perception and acceptance of the online applications to sustain teaching and learning, also if they had gained knowledge from online courses. The result shown in Table 6 shows that 15% of the respondents' agree with the perception and acceptance of the online applications to sustain teaching and learning during lockdown, and 23% remain neutral, while 61% did not agree with the notion of sustaining online teaching and learning.

vi. Students' opinion about replacing classroom teaching with online learning

The respondents were asked their opinion about whether online teaching and learning can eventually replace the traditional classroom teaching and learning method.

*Table 7: Replacing classroom teaching with online learning*

Responses	Frequency	Percentage (%)
Strongly Agree	4	4.2
Agree	7	7.4
Neutral	15	15.8
Disagree	29	30.5
Strongly Disagree	40	42.1
<b>Total</b>	<b>95</b>	<b>100</b>

Table 7 gives a distribution of the respondents' opinions on whether they think online teaching and learning can eventually replace the traditional classroom teaching and learning. The result shows that 72.6% of the respondents believed that online teaching and learning cannot replace the traditional face-to-face classroom teaching, while only 11.6% of the respondents agreed that online teaching and learning can eventually replace the classroom teaching and learning, and finally 15.8% of the respondents decided to remain neutral.

vii. Online application platforms are easy and simple to use

The respondents were asked about the simplicity and ease of use of the online learning application platforms.

*Table 8: Ease and simplicity of online application platforms*

Responses	Frequency	Percentage (%)
Strongly Agree	19	20.0
Agree	55	57.9
Neutral	4	4.2
Disagree	10	10.5
Strongly Disagree	7	7.4
<b>Total</b>	<b>95</b>	<b>100</b>

The results in Table 8 shows that majority of the respondents (totaling 77.9%) accepted that online application platforms are easy and simple to use, while only 17.9% were not in support of this view, and the remaining 4.2% decided to remain neutral.

viii. Online learning applications are suitable to use for both theory and practical

The respondents were asked about the suitability or otherwise of online learning platforms for both theory and practical.

*Table 9: Suitability of online learning applications*

Responses	Frequency	Percentage (%)
Strongly Agree	12	12.6
Agree	23	24.2
Neutral	5	5.3
Disagree	15	15.8
Strongly Disagree	40	42.1
<b>Total</b>	<b>95</b>	<b>100</b>

Table 9 shows a cross-section of respondents' opinion on online learning being suitable for all types of courses, which is both theory and practical. The result shows that 36.8% agreed that online learning applications are suitable for all course types, while 57.9% did not agree with this view, and then 5.3% of the respondents decided to remain neutral.

ix. Time requirement and commitment for online learning

The respondents were asked about the time requirement and commitment for online learning.

Table 10: Time requirement for online learning

Responses	Frequency	Percentage (%)
Strongly Agree	51	53.6
Agree	34	35.8
Neutral	6	6.3
Disagree	3	3.2
Strongly Disagree	1	1.1
<b>Total</b>	<b>95</b>	<b>100</b>

Table 10 shows the distribution of students' opinions on time and commitment as requirements to online learning. A larger percentage of the respondents, 89.4% are in support of the view that online learning requires time and commitment, while 4.3% of the respondents did not agree.

x. Which of the following online learning processes have you enjoyed before?

The respondents were asked whether they have enjoyed any online learning processes.

Table 11: Online learning processes

Responses	Frequency	Percentage (%)
Computer tutorial	15	15.8
Video conferencing	2	2.1
None of above	78	82.1
<b>Total</b>	<b>95</b>	<b>100</b>

Table 11 shows that only 17.9% of the respondents enjoyed the use of computer tutorials or video conferencing before the COVID-19 era, while majority of the respondents, 82.1% indicated that they have never participated in any form of computer tutorial or video conferencing. This result indicates that the COVID-19 pandemic has brought significant changes in the field of education, particularly with regards to online learning activities.

xi. Online learning allows for better interaction between students and teachers

The respondents were asked about their relationship with the teachers during the online learning processes.

Table 12: Online learning has improved interaction between students and teachers

Responses	Frequency	Percentage (%)
Strongly Agree	19	20.0
Agree	27	28.4
Neutral	3	3.2
Disagree	26	27.4
Strongly Disagree	20	21.0
<b>Total</b>	<b>95</b>	<b>100</b>

It was noted in Table 12 that the respondents have an equal view on whether online learning allows for better interaction between students and teachers. The result shows that 48.4% of the respondents are of the opinion that online learning allows for better interaction between teachers and students, while another 48.4% were against this opinion. The remaining 3.2% decided to remain neutral.

xii. Online learning is more interesting than the traditional classroom teaching

The respondents were asked their opinion about whether online learning is more interesting than the traditional classroom teaching and learning.

Table 13: Online learning is more interesting

Responses	Frequency	Percentage (%)
Strongly Agree	13	13.7
Agree	11	11.6

Neutral	4	4.2
Disagree	59	62.1
Strongly Disagree	8	8.4
<b>Total</b>	<b>95</b>	<b>100</b>

Table 13 shows the opinion of all respondents on whether online learning is more interesting than normal classroom teaching and learning. The results show that only 25.3% of the respondents accepted that online learning is more interesting than classroom teaching, while majority of the respondents, 70.5% objected to this view, and the remaining 4.2% decided to remain neutral.

This result corresponds with the result of [16] in their study on comparative study of online education and traditional offline education during COVID-19; the findings revealed that it is impossible for online teaching and learning to fully replace the traditional classroom teaching and learning, but it can play a bit part in complementing it, and generally help in improving the teaching effect significantly.

xiii. Ease of doing online learning

The respondents were asked about their opinion on using online applications to learn at their own pace.

Table 14: Ease of doing online learning

Responses	Frequency	Percentage (%)
Strongly Agree	23	24.2
Agree	52	54.7
Neutral	4	4.2
Disagree	10	10.5
Strongly Disagree	6	6.4
<b>Total</b>	<b>95</b>	<b>100</b>

The results in Table 14 shows that the majority of the respondents, 78.9% agreed that online learning can enable learners to learn at their own pace, because the lectures can be recorded and this can enable the learners to watch the recorded lecture over and over. However, 16.9% of the respondents did not agree with this view, and only 4.2 % of the remaining respondents decided to remain neutral.

xiv. Introduction of online learning to Nigerian tertiary institutions

The respondents were asked their opinion about whether online learning should be imposed on schools as a teaching method even without any pandemic or school closure.

Table 15: Introduction of online learning in schools

Responses	Frequency	Percentage (%)
Strongly Agree	2	2.1
Agree	9	9.5
Neutral	7	7.4
Disagree	59	62.1
Strongly Disagree	18	18.9
<b>Total</b>	<b>95</b>	<b>100</b>

As shown in Table 15, majority of the respondents, 81% objected to this view that the online learning should be imposed on schools, rather they believe that the schools should be allowed to make their decision on whether to adopt the online learning or not. Only 11.6% agreed with this opinion, and the remaining 7.4% decided to remain neutral.

xv. Suggest ways on how the usage of ICT can be improved in education

Finally, the respondents were given the chance to make some recommendations on how ICT can be improved in education. Some of the suggestions made by the respondents include:

- a. ICT facilities should be made cheaper and available in schools.
- b. Those staff with the knowledge of ICT should help enlighten those who are ignorant of it through seminars, workshops, etc.
- c. The achievements of ICT in education as seen in other developed countries should not be downplayed by the government.
- d. Institutions should adapt to the use of learning with ICT facilities and not considering them as immature tools.
- e. Government should take into account the importance of academic autonomy and avoid micromanaging change.
- f. Patronizing the use and application of ICT should be made more attractive.

## V. CONCLUSION

In conclusion, this study was able to highlight the impact of online technology platforms that were used for sustaining teaching and learning during the COVID-19 pandemic lockdown, which causes schools and the country in general to close all activities. This study determined that Nigerian tertiary students have devices capable of accessing online teaching and learning. The beneficial features of online learning are the ability of schools to continue providing students with teaching and learning even in the event of any disaster that may cause the closure of schools. Videos containing lectures can be recorded and sent to students at their homes, which can enable them to learn at their own pace, and the simplicity of the learning materials.

However, the students that participated in the study did not believe that online learning can completely replace traditional classroom activities; rather it can at best serve as a complement in the event of any disaster that may cause the closure of schools. The students support the introduction of online learning platforms to the teaching methods adopted by their tertiary institutions, which enable them to continue learning during the COVID-19 pandemic lockdown.

## VI. RECOMMENDATIONS

Based on the study conducted, the following recommendations were proposed, they include:

- 1) Since the application of ICT in education has brought significant changes in teaching and learning, the school management, education authorities, and the government should make more funds available to sustain ICT infrastructures.
- 2) Internet access service is one of the key requirement for conducting online teaching and learning, therefore, the bandwidth and power supply issues should be tackled with renewed vigor.
- 3) ICT literacy should be a compulsory aspect of teacher preparation programme. This means teachers should be given the opportunity to become ICT literate within a specific timeframe.
- 4) Online learning requires competency and skills in order to manipulate the relevant devices and make the best use of such technologies. Therefore, it is recommended that the staff involved in the online teaching should of necessity be trained and retrained.
- 5) Federal, State and Local Government authorities should ensure the provision of ICT facilities in every school as well as maintaining them.
- 6) Every teacher should view ICT literacy as an indispensable aspect of self/professional development and endeavor to achieve that without waiting for any directive to that effect.
- 7) Those staff with the knowledge of ICT should help enlighten those who are ignorant of it through seminars, workshops etc.

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