

## Efficiency of Online Education in Nigeria during COVID-19 Pandemic Period

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**Abstract:** In this article, the effectiveness of emergency online education introduced by the Federal Government of Nigeria during the period of the first wave of COVID-19 pandemic has been investigated. The effectiveness of online education has been compared to the traditional classroom teaching. A survey was carried out to gather information on the experiences and opinions of students about the virtual education. A two-sample t-test and a Wilcoxon rank-sum test of hypotheses were carried out to investigate if there were significant differences in the responses of male and female to the ratings of the virtual education and the financial cost of weekly internet subscription respectively. Analysis of Variance (ANOVA) and Kruskal Wallis rank test were also used to investigate if there were significant differences across the academic levels in the ratings of the virtual classes and the financial cost of weekly internet subscription respectively. The study showed that the virtual education was generally effective except for few challenges encountered by the students. The challenges include high cost of internet subscription, poor internet connectivity, unstable electricity supply, lack of adequate computer skills for students and inadequate orientation about the online classes.

**Keywords:** COVID-19, pandemic, isolation, classroom, online teaching

### 1. Introduction

The World Health Organisation proclaimed the deadly Corona Virus Disease, popularly known as COVID-19, a pandemic in December 2019 due to its high rate of spreading throughout the world. It was first discovered in Wuhan, China and spread across the world within a very short period (Chakraborty et al. 2020). The use of nose masks, hand sanitizers, washing of hands with soap under running water and social distancing of 2 meters among individuals were put in place as measures to keep the virus from further spreading (Amir et al. 2020, Quinn et al. 2020). The impact of the disease has been felt globally as it has affected every aspect of human lives and world's economy. The educational sector too has not been spared as all primary, secondary and tertiary institutions had to shut down to curtail the spread of the virus and the traditional face-to-face teaching became virtual (Dhawan 2020, Khalil et al. 2020, Bao 2020). The online education involves the use of some software applications and internet to disseminate educational materials to students virtually (Olasile and Soykan 2020).

### 2. Significance of the Study

Most institutions of learning especially in Africa did not envisage that the traditional face-to-face method of teaching will be replaced with an online education. These institutions lack the skills and resources for online education. In Nigeria, only private schools were able to convert the physical classes to online education initially while public/government schools could not. The pandemic has now made both teachers and students to forcefully embrace the online teaching. This serves as an alternative to the traditional method of teaching in the classrooms. Some of the virtual platforms used for the online teaching include; Zoom, Google Meet, Google Classroom, Microsoft Teams etc. These platforms ensured smooth transitioning from classroom to virtual learning as seminars were replaced with webinars (Mishra, Gupta and Shree 2020). The platforms allow live interaction between teachers and students through audio conferencing and video conferencing (Khalil et al. 2020). Some students believed they learn better in the physical classrooms than the online classrooms (Zhang et al. 2020, Bojovic et al. 2020). The significance of this study is to examine the effectiveness of the emergency online education during the first wave period of COVID-19 pandemic lockdown in Abuja, Nigeria.

### 3. Review of Related Studies

Dhawan (2020) conducted a research to examine the effectiveness of online education in India during the period of crisis such as natural disasters and pandemic, where traditional method of teaching in the classroom will not be possible. A descriptive analysis coupled with Strengths, Weaknesses, Opportunities and Challenges (SWOC) analysis were carried out to examine how effective online education was during these periods. The study was able to highlight the efficiencies, inefficiencies and the challenges of online education during the period of crisis. A systematic review research was carried out by Suryaman et al. (2020). The study involved reviewing published articles for information on the effectiveness of online education during the Corona virus pandemic period. The article discovered that online education has been better and more efficient than the physical classroom teaching. This came with little shortcomings such as long working hours for teachers and extra work for parents helping their children to navigate around the online teaching platforms. Amir et al. (2020) examined the opinions of university students on the face-to-face teaching method and online learning during the pandemic period of Corona Virus Disease. The online learning was more effective than the classroom teaching and it provided better studying materials. A qualitative research was conducted by Khalil et al. (2020) on the perception of medical students in Saudi Arabia about online teaching during the COVID-19 period. The standard content analysis method was used to analyse the transcribed interviews of respondents. It was discovered that that online education improved learning and examination performances.

### 4. Objectives of the Study

The objectives of this study include:

- to investigate if there is significant difference between male and female responses with respect to the good rating of the online education;
- to test if there is significant difference between male and female responses on how much they spend weekly on internet services for the online education;
- to investigate if there are significant differences across the academic levels with respect to the good rating of the online classes;
- to investigate if there are significant differences across the academic levels with respect to the amount students spend weekly on internet services.

### 5. Hypotheses of the Study

The hypotheses considered in this study are:

- there is no significant difference between male and female responses with respect to the good rating of the online education;
- there is no significant difference between male and female responses on the amount they spend weekly on internet services for the online classes;
- there are no significant differences across the academic levels with respect to the good rating of the online education;
- there are no significant differences across the academic levels with respect to the amount students spend weekly on internet services.

### 6. Population and Sample

The population considered in this study is comprised of private university students taking part in the online education using Zoom platform in the Federal Capital Territory, Abuja, Nigeria. A convenience sampling method was used to select 609 students in private universities in Abuja, Nigeria. A questionnaire (Google form) was used as a tool for data collection. The questionnaire consisted of questions on personal information, online teaching experience, availability of internet, electricity supply etc.

#### 6.1. Statistical Techniques Used in the Present Study

The statistical analyses carried out in this study include descriptive statistics and hypothesis testing. The tests of hypothesis include two-sample t-test, two-sample Wilcoxin rank sum test, analysis of variance (ANOVA) and Krsukal-Wallis rank test. Microsoft Excel and STATA 15 softwares were used for the analyses at 5% significance level.

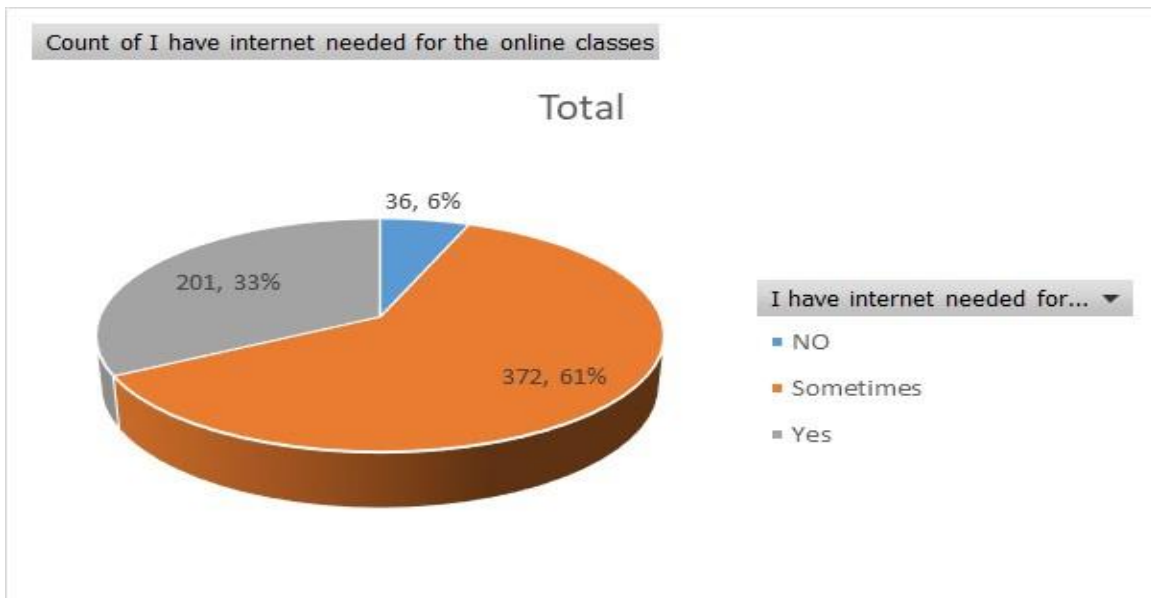
## 6.2. Data Analysis and Interpretation

**Table.1.** Summary statistics of students' responses by academic levels.

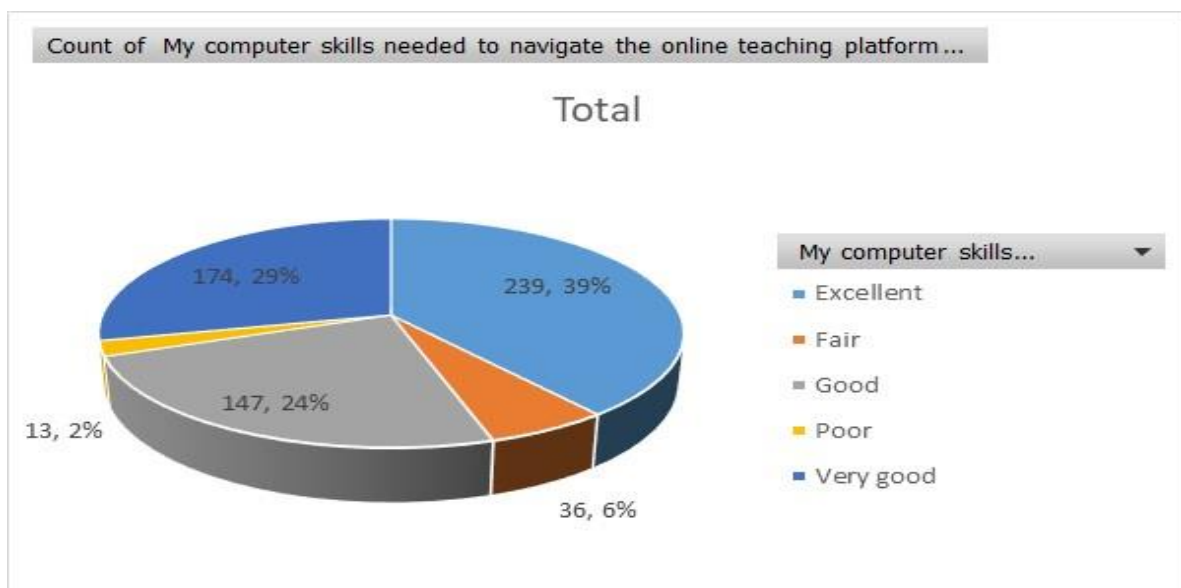
Variables	Level					
	100 (n=279)	200 (n=167)	300 (n=116)	400 (n=36)	500 (n = 10)	PG (n= 1)
Age (years)	17.60 (1.38)	18.57 (1.47)	20.00 (1.87)	21.47 (3.39)	22.10(1.45)	20.00 (-)
<b>Gender</b>						
Male	141 (50.54%)	85 (50.90%)	32 (27.59%)	12 (33.33%)	8 (80%)	1(100%)
Female	138 (49.46%)	82 (49.10%)	84 (72.41%)	24 (66.67%)	2 (20%)	0 (0%)
<b>Number of Online Courses</b>	6.72 (1.70)	7.74 (1.94)	7.06 (1.78)	5.14 (2.18)	9.10 (1.79)	7.00 (-)
<b>Amount spent on internet subscription per week (Naira) *</b>	3000 (4000)	3000 (3000)	3000 (3500)	2000 (2500)	5000(3000)	3000 (-)
<b>Network</b>						
2G	9 (3.23%)	2 (1.20%)	0 (0%)	1 (2.78%)	0 (0%)	0 (0%)
3G	97 (34.77%)	50 (29.94%)	31 (26.67%)	18 (50%)	4 (40%)	0 (0%)
4G	173 (62.01%)	115 (68.86%)	85 (73.28%)	17 (47.22%)	6 (60%)	1(100%)
<b>Number of Telecommunication subscribed to for classes*</b>	2(1)	1(1)	2(1)	1(1)	1(1)	2(-)
Mean(standard deviation), * = median(interquartile range), number(proportion), PG – Post Graduate						

The table 1 above shows the summary statistics of the respondents that took part in the survey. The mean age increased across the levels with 100 level having the mean age of 17.60 years while the 500 level was having a mean age of 22.10 years. The number of male and female respondents decreased across the levels. 100 level students took an average of 7 courses while 500 level students took an average of 9 courses. Students across the levels spent a minimum of 2000 naira and a maximum of 5000 naira on internet for the online classes on weekly basis. A large number of students in 100 level (106) was using 2G and 3G internet connectivity respectively. This could be the reason why some of them missed online classes or experience network connection issues as 2G and 3G networks are not fast enough for online education. Only 47.22% of respondents in 400 level can afford 4G networks for the online classes while above 50% were using 2G and 3G. This could also contribute to the reason why some of them missed the online classes or have network connectivity issues. Several students subscribed for internet on more than one telecommunication network to be able to join the online classes.

The following are some of the pie charts of the responses from the survey:



**Figure. 1.** Pie chart of access to internet for online classes



**Figure. 2.** Pie chart of students' computer skills for online classes

Figure 1 shows that 61% of the respondents claimed to sometimes have internet to join the online classes while 6% claimed not to have internet needed to be partaking in the online classes. Figure 2 shows that 39% of the respondents claimed to have excellent computer skills to navigate the online teaching platform while 2% had poor computer skills.

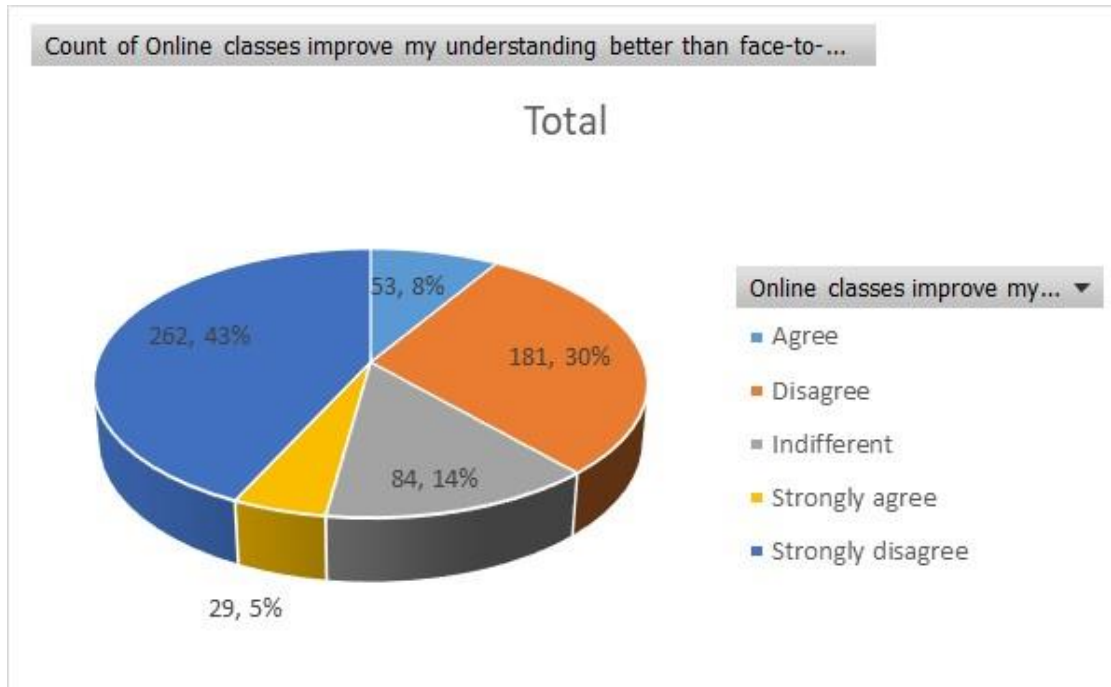


Figure 3. Pie chart of improved understanding better than face-to-face teaching

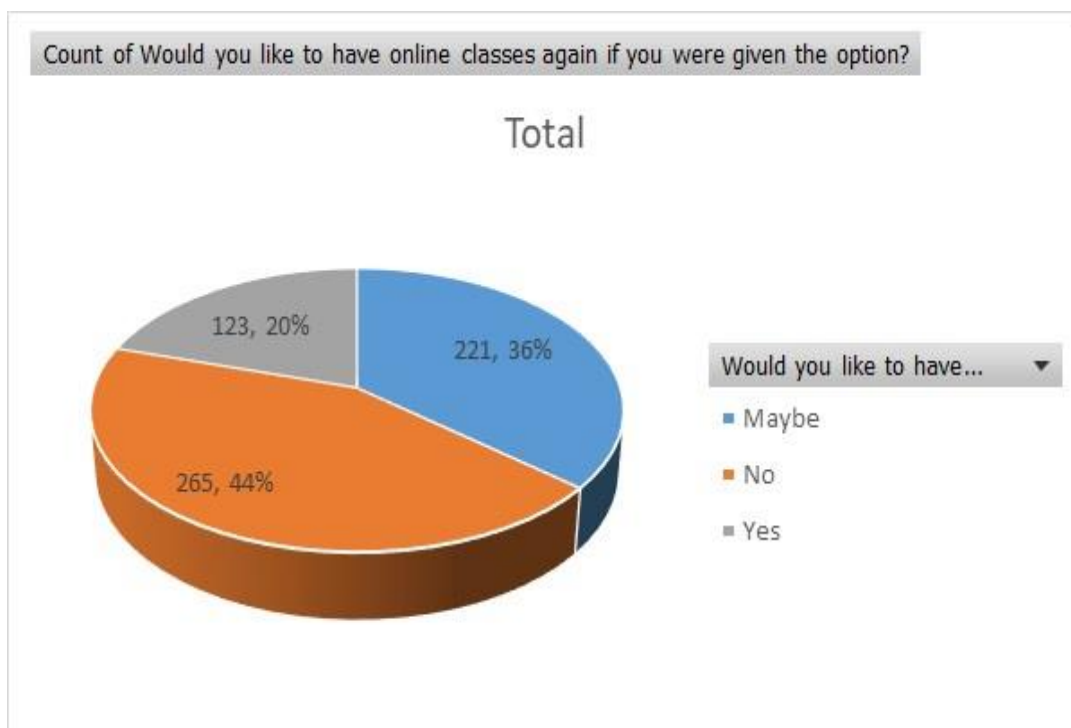
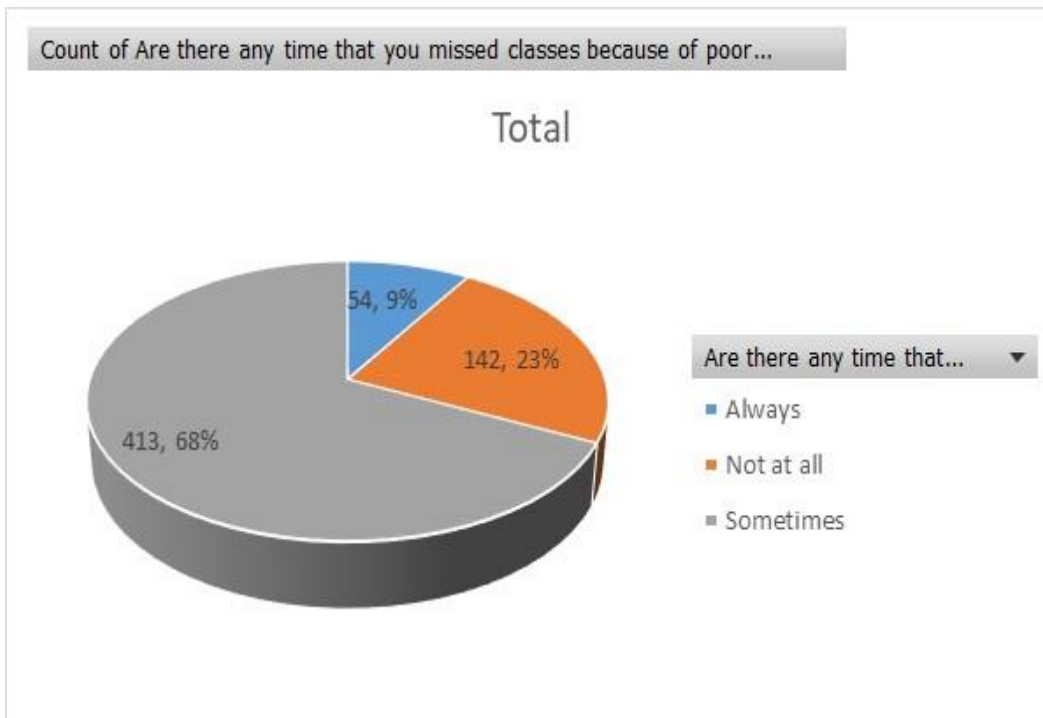
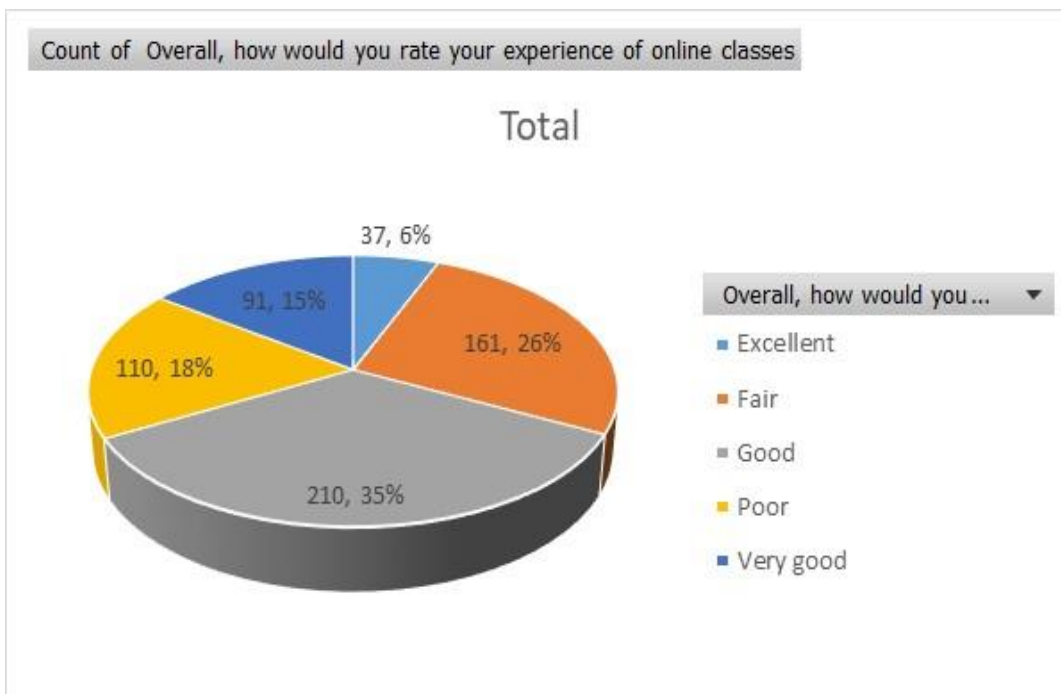


Figure 4. Pie chart of having online classes again if given the option

Figure 3 shows 13% of the respondents agreed that the online classes improved their understanding better than the face-to-face teaching. 14% was indifferent while 73% disagreed. Figure 4 shows that 44% of the respondents would not want to have online classes again if given the option. 36% would, maybe want to have online classes while just 20% would be willing.



**Figure. 5.** Pie chart of times of missing online classes due to poor internet connection



**Figure. 6.** Pie chart of overall rating of the experience of online classes

In figure 5 above, 9% of the respondents was always missing the online classes because of poor internet connection while 68% sometimes missed classes. Only 23% attended all the classes. Figure 6 shows that there is generally good rating for the online classes. 35% of the respondents rated the online classes as good. 6% rated them excellent while 15% rated them very good.

A two-sample t-test of hypothesis was used to test if there was any significant difference between male and female responses with respect to the good rating of the online classes. The results of the t-test are as follow:

**Table. 2.** Results of Two-sample T-test for Gender

Group	Observation	Mean (Standard Error)	95% Confidence Interval	
Female	330	2.673 (0.062)	2.551	2.795
Male	278	2.608 (0.067)	2.476	2.740
Difference	52	0.065(0.091)	-0.114	0.244

The results of the t-test show no evidence of statistically significant difference in the reported good rating of the online classes between male and female ( $p$ -value = 0.4777) at 5% significance level. Also, the mean difference of 0.065 (95% CI: -0.114, 0.244) shows that the female students have greater reported good rating of the online classes than the male students.

**Table. 3.** Results of Analysis of Variance for Academic Levels

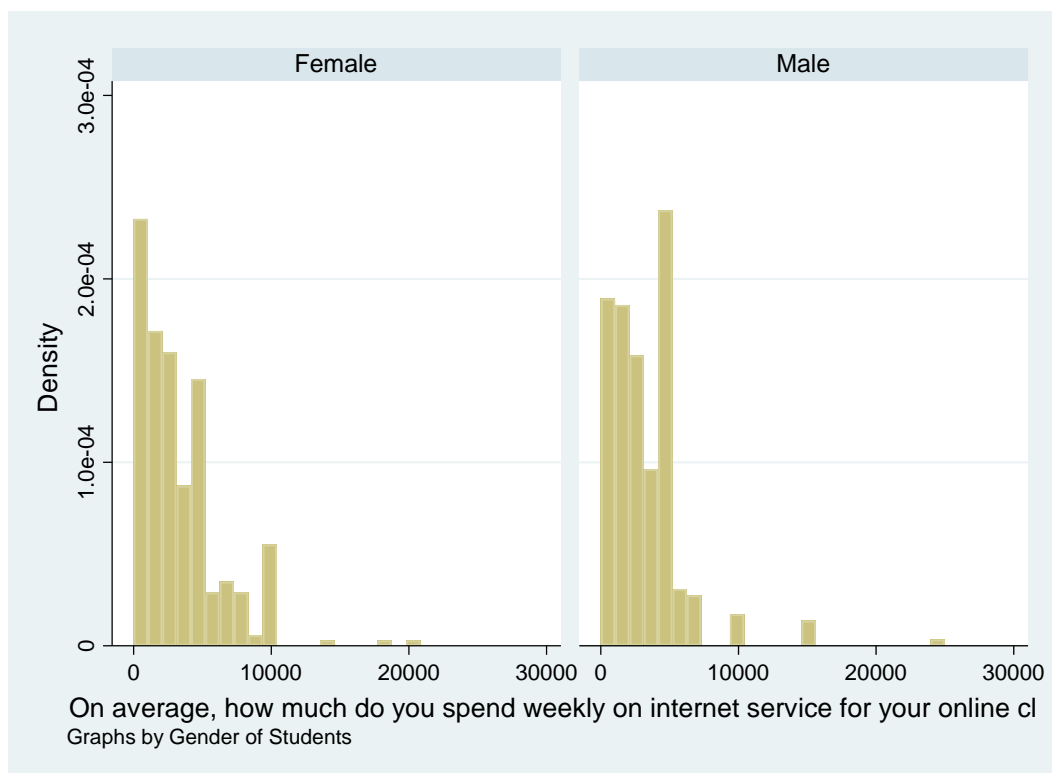
Source	Sum of Square	Degree of Freedom	Mean Square	Prob > F
Between Groups	20.317	4	5.079	0.0026
Within groups	741.234	603	1.229	
Total	761.551	607	1.255	

The results of the analysis of variance to investigate if there are significant differences among the academic levels in terms of the reported good rating of the online education are presented in table 3. It shows evidence of statistically significant difference of the reported good rating of the online education among the academic levels with  $p$ -value = 0.0026.

**Table. 4.** Results of Bonferroni Test

Row Mean - Column Mean	100	200	300	400
200	-0.400 (0.002)			
300	-0.271 (0.276)	0.130 (1.000)		
400	-0.230 (1.000)	0.170 (1.000)	0.040 (1.000)	
500	0.286 (1.000)	0.687 (0.575)	0.557 (1.000)	0.517 (1.000)
	Mean difference (p-value)			

The Bonferroni test to determine the differences among the levels is shown in the table 4. The results show the evidence of mean differences of the reported good rating of the online classes among the academic levels. There is a significant difference only between 100 and 200 levels with  $p$ -value = 0.002 at 5% significance level. The mean differences between each pair of the academic levels are the values above in each cell while the ones in the brackets are the  $p$ -values.



**Figure. 9.** Histograms of weekly amount (Naira) spent on internet subscription for gender

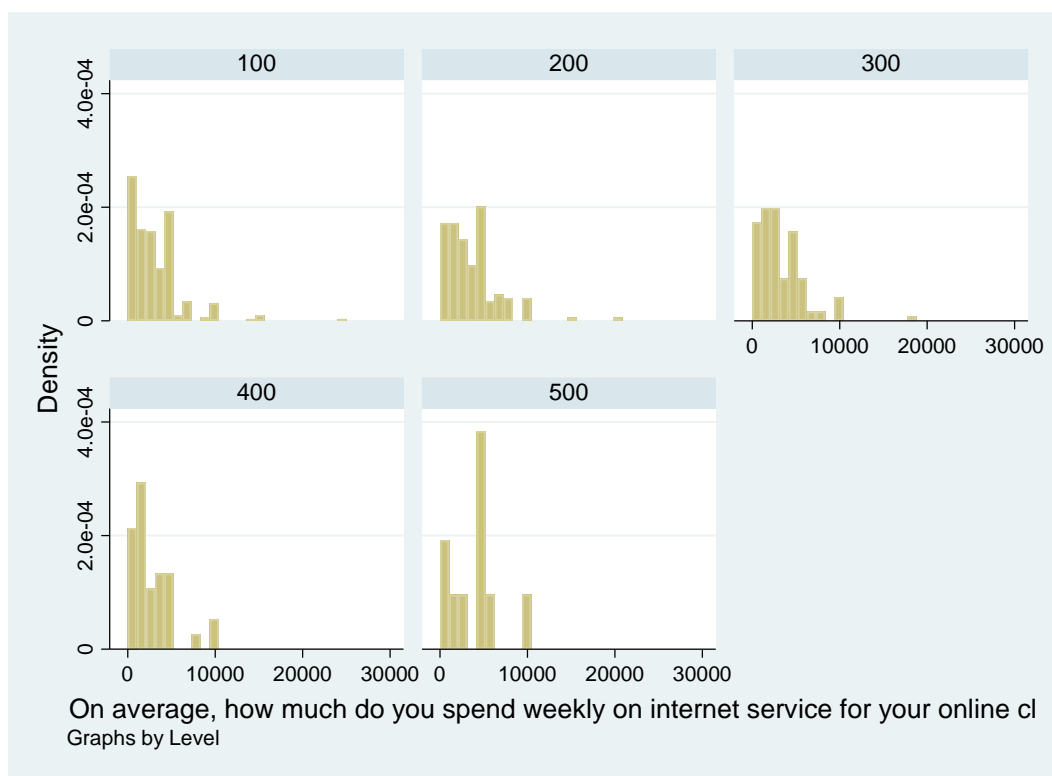
Figure 9 shows the histograms of weekly amount (Naira) spent on internet subscription for male and female. The figures show that the amounts are not normally distributed for both male and female. A two-sample Wilcoxon rank-sum test of hypothesis was used to test if there was any difference between gender on how much was spent on internet subscription per week.

**Table. 5.** Results of Two-sample Wilcoxon rank-sum test of hypothesis

Gender	Observation	Rank sum	Expected
Female	330	100052.5	100650
Male	279	85692.5	85095
Combined	609	185745	185745

The results of the Wilcoxon rank-sum test in table 5 show no evidence of statistically significant difference between male and female responses on how much they spend weekly on internet subscription (p-value = 0.7812) at 5% significance level.





**Figure. 10.** Histograms of weekly amount (Naira) spent on internet subscription for all levels

Figure 10 shows the histograms of weekly amount (Naira) spent on internet subscription for all the levels. None of the histograms is normally distributed.

Table. 6. Kruskal-Wallis Rank Test Across Academic Levels

Level	Observation	Rank sum
100	279	80368.00
200	167	55178.00
300	116	36253.00
400	36	9659.50
500	10	3677.50

The results of the Kruskal-Wallis rank test in table 6 show no evidence of statistically significant difference among academic levels' responses on how much they spend weekly on internet service for the online classes (p-value = 0.0576) at 5% significance level.

**8. Conclusion**

This research has been used to compare the effectiveness of the emergency online education during the first wave of COVID-19 pandemic to the face-to-face method of teaching. This study discovered the major challenges students of private universities faced during the online classes. These include high cost of internet subscription, poor internet connectivity, unstable electricity supply, lack of adequate computer skills for students and no proper orientation about the online classes. The outputs of the study showed that the online education was generally effective, even though the management of the universities never envisaged the emergency online education to happen at that time. The few setbacks of the education can be looked into by the managements and Ministry of Education of Nigeria.

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