

Comparative Analysis of Students Performance Using Virtual and Face-to-Face Teaching Approach in Yaba College of Technology, Lagos Nigeria

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ABSTRACT

This work is an extended version of a research work earlier conducted to evaluate engineering student's preference of eLearning and face-to-face method of learning delivery after COVID-19 lockdown in Nigeria where data was collected through the use of structure questionnaire were analyzed using frequency and percentage. It was opined from the results that engineering students preferred face-to-face compared to eLearning. This extended version of the research move a little bit further by collating the students' performance in examination during the use of eLearning compared to face-to-face. Descriptive analysis methods involving the use of appropriate tables and graphs were used in this version of the work for the preliminary data presentation followed by inferential analysis which includes the use of t-test, chi-square and logistic regression. Based on the primary data from questionnaire and the secondary data retrieved from student's transcripts, this study can conclude that success rate of students' academic performance is not dependent on the method of learning (face-2-face or eLearning), rather it can be attributed to factors relating to attitude; virtual mode of learning affect the grade of the students positively, but the difference is not significant. More students passed during the online lecture than face-2-face; the students are ready for online learning approach if the following conditions are improve when using eLearning approach: quality of teaching and learning, responsiveness of lecturers, support from school management during, meeting learning expectations, availability of course materials, and internet connectivity. According to the students, the advantages online method has over face-2-face is that assessment is made easier and better, and unholy interactions between the students and lecturers would reduce.

Keywords:

COVID-19, e-Learning, Face-to-Face, Engineering Students.

INTRODUCTION

Nigeria online education is growing progressively. World Wide Web and related Internet resources (e.g., email, chat, and news groups) have become an increasing viable component since 1994 in higher education teaching approach (Schutte, 1997). Some of the latest ones that is thriving recently are WhatsApp, Zoom, Google Classroom, Microsoft Teams and so on. This has led to substantial interest in the execution of Internet based virtual teaching around the globe. In United State of America (Seaman et al., 2018) reported that more than 30% of all U.S. higher education students took distance courses in 2016 having more enrolled in distance and no distance courses simultaneously with more than three million students enrolled in distance courses considerably and exclusively.

Comparing classroom studies instruction to other computer-assisted learning have varying results (Salcedo, 2010). Virtual vs. on-campus groups in the measurement of initial learning or follow-up performance shows no significant differences (Caywood & Duckett, 2003). Courses held by face-to-face students yielded more positive results perceptions due to the instructor and overall course quality, though the learning outcomes in the formats of the two-courses shows no difference (Johnson et al., 1999; Schutte, 1997). Yaba College of Technology, Yaba, Lagos Nigeria is not left out in demonstrating the effects of virtual format during the advent of coronavirus (COVID 19) pandemic and also traditional class format on student performance.

Our fundamental daily activities have been swirled by the unprecedented global pandemic, COVID-19, thereby minimizing and eliminating direct human contacts but creating the new normal such as social distancing, self/mandatory quarantine, virtual and contactless services and virtual hospitality activities and so on (Sigala, 2020). Preventing and controlling the COVID-19 epidemic is very important in which schools postponed the start of 2020 academic section in order to avert the spreading of the contagious disease amongst students thereby limiting school activities during normal school hours (Zhou et al., 2020)

The entire educational landscape has been severely affected by this phenomenon, instructing remote online learning from traditional face-to-face teaching in Yaba College of Technology was introduced (Zapata-Cuervo et al., 2021). Many higher institutions around the globe have already implemented online instructions for their students before the advent of COVID-19. This comes as a supplement to face-to-face learning in order to offer diverse learning options for the students as well as an additional source of revenue for tertiary institutions. This has led to significant interest in the application of Internet based virtual teaching (Schutte, 1997).

In India a total of 320 million learners have been adversely affected by the COVID-19 pandemic and have transitioned to e-learning; this transition has not been possible for all students and educators with huge regional and household disparities in access to the internet and technology. The rapid shift to e-learning prompted by the pandemic has resurfaced long-standing issues of inequality and a digital divide

in India that must be addressed by future economic, education and digitalization policies (Modi & Postaria, 2020)

Global economy and educational activities have been badly affected by COVID-19 which affects human and social well-being of all nation (Duan et al., 2020; Qiu et al., 2018). Numerous policies to control the situation have been implemented in many countries including border control and public health policies in which Nigeria is not left-out. The educational sector is also affected by these measures forcing the closure of schools in many countries (Bureau, 2020; Tang et al., 2021; W. Zhang et al., 2020). Yaba College of Technology launched an emergency initiative policy called “Suspending Classes Without Stopping Learning” as directed by the Ministry of Education informing all educational sectors to switch teaching activities into large-scale online teaching while schools were shut down (W. Zhang et al., 2020).

Ministry of Education of the People’s Republic of China institutionalize “Suspending Classes Without Stopping Learning” policy with the purpose of integrating national and local school teaching resources by supporting teachers’ online teaching and children’s online learning by providing rich, selectable, diverse and high-quality online resources for all students across the country (W. Zhang et al., 2020). Educational activities through the Internet are been carried out by many teachers and students for a period of more than two months, which is a great initiative of online education in the world (Zhou et al., 2020). However, implementation and reactions towards the policy are under severe debate such as whether online education can adequately replace the traditional offline education, to what extent students and teachers have access to the Internet, whether the home is a desirable learning environment, whether teachers and students may experience work overload and whether the “epidemic” should be one of the educational topics (W. Zhang et al., 2020).

Prior to the advent of COVID 19 Yaba College of Technology created a department in 2016 called flexible skill development center. This department is saddle with the responsibilities of promoting skill acquisition and learning using modern technology. The department is also fortified to work with various institutions by applying information technology to solve multidimensional problems, producing resources package for teachers that covers online teaching strategies, school epidemic prevention cases, local teacher training cases and so on (Net, 2020). An establishment of online teaching feedback system inspiring teachers to actively recap in sharing their experiences and thoughts, and to discuss with their peers, was introduced.

All of the resources were made free and publicly available. Additionally, an online teaching feedback system to encourage teachers to actively summarize and share their experiences and thoughts, and to discuss with their peers, was established. Schools also appointed online teaching technology consultants to support online teaching and also admonish the junior lecturers on how to make use of online education learning techniques.

What has appeared through experimental evidence of demonstrating the effects of virtual versus traditional class format on student performance is largely qualitative or devoid of empirical analysis altogether and simply argued that online teaching as a remedy or antidote to the deficiencies of the traditional classroom (Schutte, 1997). There is experimental comparison, or self-selected samples of two or more classes i.e., Civil and Computer Engineering classes in Yaba College of Technology which this study is based on. There is no experimental comparison if the data tend to be based on a single class.

This study is aimed in looking at the comparative results of using virtual and face-to-face systems of learning in which the gains and losses in the implementation process of the policy can be determined. Experimental evidences have been generated to demonstrate the effects of virtual versus traditional class format for Civil and Computer Engineering students of Yaba College of Technology performances during this continuous COVID-19 imbroglio. This limitation is observed due to the arms of classes involved in both National Diploma (ND) and Higher National Diploma (HND). Virtual classes were considered for 2019/20 session while face-to-face classes were considered for 2020/21 session respectively. A combination of probabilistic sampling approach of stratified random and purposive sampling method is adopted for this study. The purposive is used in selecting the classes involved while the stratified random is used for the numbers of student affected.

An experimental design in which students from Civil and Computer Engineering classes results were compared to either virtual or traditional classroom periods. These circumstances were used to test the effects of face-to-face vs. virtual Lecturer student interaction, on the test and exam performance of students (Schutte, 1997). The research hypothesis is to determine the students' performances during virtual and face-to-face interaction. Specifically, there is an argument that students suffer without face-to-face interaction with Lecturers during the learning process. It was of another opinion that a lack of face-to-face interaction with the lecturer leads to greater interaction between students and that this collaboration results in higher student performance.

The present study examines the performance of students in Civil and Computer Engineering Department specifically investigating eventual differences in students' performance when the curriculum is delivered through virtual technology as against face-to-face classroom format between the academic sessions 2018/19-2019/20.

Precisely, this study engrossed on some major research question:

- What are the underlying factors that contributed to the success rate of student performance?
- Did the virtual mode of learning affect the grade of the students positively?
- Are the students ready for online learning approach or prefer the earliest face-to-face methods?

LITERATURE REVIEW

The ways in which classes/lectures functions had changed from the traditional ways to modern traditions with the help of technology (Lei & So, 2021). The deficiency of online teaching has been gradually improved due to the development of modern education technology. Guiding students to learn online course resources has many more ways of communication such as online voice living, online video live, online video, virtual simulation experiment, online discussion, hybrid teaching and so on. Though online learning is not new, since the outbreak of COVID-19, usage of and investment on education technology have skyrocketed as many institutions decided to offer online courses irrespective of short advertisement notification (Li & Lalani, 2020). It is possible that the unpredictable aftermath of COVID-19 may replace land-based learning by online learning due to the demand for online learning which has the tendency of growth in the nearest future (I Koksall -, 2020).

Efficiency, flexibility and convenience are some of the advantages that has been demonstrated using virtual learning in higher education (Dumford & Miller, 2018; Singh et al., 2020b). Perception of students toward virtual learning would be a bit different from the pre-pandemic era when students had different methods of choosing instructions. Teachers are faced with problems whether traditional/face-to-face or online teaching, level of students' target knowledge, learning tasks, learning time and so on might be difficult to apprehend (Jinying Hao, 2020). Remote learning seems to be the only solution for the educational sector during the outbreak of COVID 19. The feasibility of virtual learning was revisited by the tertiary institution during the stationary time of face-to-face classes in order to minimize the impact on the academic progression of students (Hart et al., 2019; Shah & L Barkas, 2018). Distance learning of overseas students who cannot leave their countries to attend face-to-face classes across borders benefited from the online teaching despite several challenges such as electricity, network copy, lead students' autonomous learning to depth and so on (Jinying Hao, 2020; Salcedo, 2010; Singh et al., 2020b)

On the students' side, slow internet connection at home make large numbers of students not having internet access leaving the virtual teaching miserable (C. Zhang, 2020). On the teachers' side, the infrastructure's readiness such as software, hardware, electricity, internet access are major concerns. Therefore, virtual and face-to-face learning techniques can be altered due to the non-traditional teaching approach (Mohamad et al., 2015). Similarly, many students are not familiar with the online learning platforms for study. The practices in providing effective online teaching and learning for students have be reviewed in various ways (C. Zhang, 2020). The key factors to enhance student satisfaction and retention in online learning are based on technology and communication competencies while motivation and online learning presence are the key issues for student participation (Law et al., 2019)

Learning online has advantages and challenges compared to face-to-face education (Stanchevici & Siczek, n.d.). High cost of living on campus or near the campus can

be avoided by students/lecturer using virtual approach methods of study. As a learning experience, students are allowed to work through the course materials and assignments at their own pace which is one of the strengths of online courses offering plentiful prospects to practice written communication (Warnok, 2009); collaborative problem solving and promoting social construction of knowledge (Garrison, 2016); and developing reflective and critical thinking of students. Insufficient administrative, pedagogical, and technical support are the challenges of virtual education which includes slow uptake of educational technology by faculty members (Lawrence G et al., 2014; Shebansky, 2018); lack of motivation from students because of unclear or delayed instructions and feedback (TM Karkar-Esperat, 2018); and dropout rates in fully online classes are higher than those in face-to-face classes (Harker & Koutsantoni, 2005)

Various issues have been raised by researchers (such as Stell, 2021; Weissova et al., 2020) about the quality of virtual learning and courses in lieu of students' learning engagement and outcomes, compared to face-to-face ones where virtual learning success is strongly affected by engagement and motivation from the students perspectives (Linjawi & Alfadda, 2018; Singh et al., 2020a; Sun, 2014; Surani et al., 2020; Weissova et al., 2020). Academic success of students can be measured by their learning result (Lee et al., 2020; Wigfield et al., 2000)

The online Students learning outcome can be described as the “measure of the effectiveness of a learning platform” in which students achievement is compared to their desired outcomes (Panigrahi et al., 2018). Comparison between online and face-to-face learning outcome as been measured based on the students performances and comments (Eom et al., 2006). It is better to identify potential problems, address the issue, and thereby provide consistent quality of education services by comparing both virtual and face-to-face learning engagement in higher institution. Moreover, suggestions from previous research have shown that relationship between students' learning outcome and motivation can be mediated by learning engagement (Pecore et al., 2017)

3. METHODOLOGY AND MATERIALS

3.1 Data Description

The data used for this research is from the examination results for all courses offered by students in Yaba College of Technology for two sessions which are the pre covid-19 and after lockdown periods, namely; 2018/2019 and 2019/2020 sessions respectively. The examination results consist of students average cumulative progressive grade, students carry over (co) which include 1,2 to >6, students on pass, students on probation, students withdrawn, students to repeat and others. The results used are from the National Diploma (ND) and Higher National Diploma (HND) students in the Department of Civil Engineering and Computer Engineering.

3.2 Methods of Estimation

Descriptive analysis involving the use of appropriate tables and graphs were used in this work for the preliminary data presentation. Inferential analysis which includes the use of t-test, chi-square and logistic regression was also adopted.

3.2.1 Independent sample t-test

The independent samples t-test also known as the unpaired samples t-test is mostly used to compare the means of two different sets of data in an independent, separate samples. The Independent Samples t-test compares the means of two independent groups in order to determine if there exist statistical evidence that the associated population means are significantly different.

$$t = \frac{\mu_A - \mu_B}{\sqrt{\left[\frac{\left(\sum A^2 - \frac{(\sum A)^2}{n_A} \right) + \left(\sum B^2 - \frac{(\sum B)^2}{n_B} \right)}{n_A + n_B - 2} \right] \cdot \left[\frac{1}{n_A} + \frac{1}{n_B} \right]}}$$

(1)

Where $\sum A$ is the sum of data set A, $\sum B$ is the sum of data set B, μ_A is the mean of data set A, μ_B is the mean of data set B, $\sum A^2$ is the sum of the squares of data set A, $\sum B^2$ is the sum of squares of data set B, n_A is the number of items in data set A and n_B number of items in data set B.

3.2.2 Binomial test for proportion

The binomial test or test of one proportion, is used to determine if the proportion of cases in one of only two possible groups is equal to a pre-specified proportion. The pre-specified proportion can be selected for theoretical reasons i.e., a hypothesized value or based on present information such as a known value. A corresponding 95% confidence interval (CI) can be calculated for the binomial test.

$$P(B = K) = \binom{n}{k} P^k (1 - P)^{n-k}$$

(2)

Where

- n is the number of trials (sample size);
- k is the number of successes;
- p is the probability of success for a single trial or the (hypothesized) population proportion.

Note that $\binom{n}{k}$ is a shorthand for $\frac{n!}{k!(n-k)!}$ Where! indicates a factorial.

3.2.3 Chi-Square test

The Chi-Square is mostly used to test the relationships or association between categorical variables and also evaluate the tests of independence among these variables. In practice, the Chi-square is computed as

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^n \frac{(O_{ij}-E_{ij})^2}{E_{ij}} \quad (3)$$

Where O_{ij} is the observed frequency at row i and column j from a contingency table or cross tabulation of variables X and Y . E_{ij} is the expected frequency at row i and column j .

RESULTS AND DISCUSSION

Binomial test and t -test

Table 1: Participant distribution according to Sex, Device Use for Online learning and Internet Connection using One-sample proportions test with continuity correction

Parameters	Female (%)	Male (%)	Statistic (P†)
<i>Sex (n %)</i>	91 (23.0)	304 (77.0)	0.2304 (0.0000)
DEVIC USE FOR ONLINE LEARNING (n %)			
<i>Smartphone</i>	87 (95.6)	219 (72.0)	0.5714 (0.0757)
<i>Desktop Computer</i>	0 (0.0)	4 (1.3)	0.0000 (1.0000)
<i>Laptop Computer</i>	4 (4.4)	81 (26.7)	0.1290 (0.0000)
	91 (100)	304 (100)	
T-Test (p-value)	-0.0291 (0.3845)		
INTERNET CONNECTION, n (%)			
<i>Satisfactory</i>	41 (45.0)	197 (64.8)	0.4091 (0.0696)
<i>Neither satisfactory nor dissatisfactory</i>	13 (14.3)	47 (15.5)	0.667 (0.8555)
<i>Dissatisfactory</i>	37 (40.7)	60 (19.7)	0.6721 (0.0099)
	91 (100)	304 (100)	
Statistic (P*)	-0.0180 (0.9866)		

*Statistically significant P value of unpaired t -test between female and male,

†statistically significant P value of Binomial test between female and male.

Table 1 shows that 23% of the respondents are female students, while 77% are male students. The binomial test for proportion shows that the proportion of male students is significantly more than the proportion of female students in civil and computer engineering at 5% level of significance. This shows that there are more male students in engineering than female students.

The analysis of the device use for online learning shows that 95.6% of the female students use smart phones, 0% use desktop computer while 4.4% use laptop computer for online learning. On the other hand, 72% of the male students use smart phones, 1.3% use desktop computer while 26.7% use laptop computer for online learning. The binomial test for proportion shows that there is no significant difference in the proportion of male and female students who use smart phone and desktop for online learning at 5% level of significance and any observed difference in the proportion can be attributed to chance. However, the proportion of male who use laptop for online learning are significantly greater than that of female proportion at 5% level of significance. Overall, the t -test shows that there is no significant difference in the device use for online learning between male and female students.

The analysis from Table 1 on internet connection shows that 45.1% of the female students are satisfied with the internet connection, 40.7% are not satisfied while 14.3% are neither satisfied nor dissatisfied with the internet connection used for online learning. Among the male students, 64.8% are satisfied with the internet connection, 19.7% are not satisfied while 15.5% are neither satisfied nor dissatisfied with the internet connection used for online learning. The binomial test for proportion shows that there is no significant difference in the proportion of male and female students who are satisfied with the internet connection used for online learning at 5% level of significance and any observed difference in the proportion can be attributed to chance. Also, there is no significant difference in the proportion of male and female students who are neither satisfied nor dissatisfied with the internet connection used for online learning at 5% level of significance and any observed difference in the proportion can be attributed to chance. However, the proportion of female students who are dissatisfied with the internet connection used for online learning are significantly greater than the male proportion at 5% level of significance. Overall, the t -test shows that there is no significant difference in the average satisfactory level between male and female students concerning the internet connection used for online learning.

Table 2: Students' preference on different types of learning methods

Item	Face-2-Face Method	Online Method	Statistic (P†)
Quality of teaching and learning	301 (77%)	90 (23%)	0.7698 (0.0000)

Responsiveness of lecturers	297 (75.2%)	98 (24.8%)	0.7519 (0.0000)
School management is supportive	308 (78%)	87 (22%)	0.7797 (0.0000)
Learning expectations met	249 (63%)	146 (37%)	0.6304 (0.0000)
Unholy interaction between the students and lecturers	277 (70.1%)	118 (29.9%)	0.7013 (0.0000)
Availability of course materials	267 (67.6%)	128 (32.4%)	0.6759 (0.0000)
Assessment is easy and better	141 (35.7%)	254 (64.3%)	0.3570 (0.0000)
Statistic (P*)	4.5567 (0.0006)		

*Statistically significant *P* value of independent t-test.

†statistically significant *P* value of Binomial test between female and male.

Table 2 shows that 77% of the students prefer face-2-face method of learning in terms of quality of teaching and learning while 23% prefer the online method. The test shows that the proportion that prefer the face-2-face method based on the quality of teaching and learning is significantly greater than the proportion that prefer online method at 5% level of significance. This implies that the quality of teaching and learning during face-2-face method is significantly better than online method. This is also true for responsiveness of lecturers, supportiveness of school management, meeting learning expectation, unholy interaction between the students and lecturers, and availability of course materials. However, assessment is easy and better using online method. The analysis shows that 35.7% prefer face-2-face in terms of assessment, while 64.3% prefer online method. The test shows that the proportion of students who prefer the online method based on assessment is significantly greater than the proportion who prefer face-2-face. Overall, the t-test shows that students' preference for face-2-face method of teaching is significantly different from their preference for online method at 5% level of significance.

From the analysis on Table 2, it can be deduced that students prefer the face-2-face method in terms of quality of teaching and learning, responsiveness of lecturers, support from school management, meeting learning expectations, and availability of course materials. However, in terms of unholy interaction between the students and lecturers, and in terms of easy and better assessment, the students prefer the online method. Thus, with the online method, unholy interaction between students and lecturers will reduce. Also, result will be faster assessed easily and faster.

Table 3: Results for two consecutive semester Civil Engineering (face2face)

SEMESTERS	AVERAGE CGPA	C O 1	C O 2	C O 3	C O 4	C O 5	C O > 5	PAS S	FA IL	WITHDR AWN	OTHE RS
1 st Semester 2018/2019	2.41	26	9	1	6	2	8	35	0	1	1
2 nd Semester 2018/2019	2.36	13	3	0	0	0	2	65	1	0	9
Session Aggregate	2.38	39	12	1	6	2	10	100	1	1	10

OTHERS = PROBATION AND REPEAT, CO = CARRY OVER

Table 4: Results for two consecutive semester Civil Engineering (Online)

SEMESTERS	AVERAGE CGPA	C O 1	C O 2	C O 3	C O 4	C O 5	CO > 5	PA SS	FA IL	WITHDR AWN	OTHE RS
1 st Semester 2019/2020	2.41	11	5	4	6	2	4	54	2	2	0
2 nd Semester 2019/2020	2.35	14	4	3	1	0	1	48	0	0	10
Session Average	2.38	25	9	7	7	2	5	102	2	2	10

OTHERS = PROBATION AND REPEAT

Table 3 shows that the average CGPA for Civil Engineering Department for 2018/2019 academic session (face-2-face) is 2.38. There were 39 students with 1 carry over, 12 students with 2 carry over, 1 student with 3 carry over, 6 students with 4 carry over, 2 students with 5 carry over and 10 students with more than 5 carry over. A total of 100 students passed in that session, 1 student failed, 1 student was withdrawn while 10 students were either on probation or repeat. Table 4 shows that the average CGPA for Civil Engineering Department for 2019/2020 academic session (online) is 2.38. There were 25 students with 1 carry over, 9 students with 2 carry over, 7 students with 3 carry over, 7 students with 4 carry over, 2 students with 5 carry over and 5 students with more than 5 carry over. A total of 102 students passed in that session, 2 students failed, 2 students were withdrawn while 10 students were either on probation or repeat.

Table 5: Results for two consecutive semester Computer Engineering (face2face)

SEMESTERS	AVERAGE CGPA	C O1	C O2	C O3	C O4	C O5	CO >5	PASS	FAIL	WITHDRAWN	OTHERS
1 st Semester 2018/2019	2.46	22	7	2	4	5	6	38	0	0	2
2 nd Semester 2018/2019	2.56	12	3	0	0	1	1	48	0	0	8
Session Average	2.51	34	10	2	4	6	7	86	0	0	10

OTHERS = PROBATION AND REPEAT

Table 6: Results for two consecutive semester Computer Engineering (online)

SEMESTERS	AVERAGE CGPA	C O1	C O2	C O3	C O4	C O5	CO >5	PASS	FAIL	WITHDRAWN	OTHERS
1 st Semester 2019/2020	2.35	12	10	2	2	3	6	41	0	1	3
2 nd Semester 2019/2020	2.51	11	5	4	1	0	1	37	0	0	6
Session Average	2.43	23	15	6	3	3	7	78	0	1	9

OTHERS = PROBATION AND REPEAT

Table 5 shows that the average CGPA for Computer Engineering Department for 2018/2019 academic session (face-2-face) is 2.51. There were 34 students with 1 carry over, 10 students with 2 carry over, 2 students with 3 carry over, 4 students with 4 carry over, 6 students with 5 carry over and 7 students with more than 5 carry over. A total of 86 students passed in that session, no student failed, no student was withdrawn while 10 students were either on probation or repeat. Table 6 shows that the average CGPA for Computer Engineering Department for 2019/2020 academic session (online) is 2.43. There were 23 students with 1 carry over, 15 students with 2 carry over, 6 students with 3 carry over, 3 students with 4 carry over, 3 students with 5 carry over and 7 students with more than 5 carry over. A total of 78 students passed in that session, no student failed, 1 student was withdrawn while 9 students were either on probation or repeat

Table 7: Contingency Table: Student's Remark by Session

		Session		Total
		2018/2019	2019/2020	
Remark	CO1	75	46	121
	CO2	25	21	46
	CO3	4	12	16
	CO4	10	10	20
	CO5	8	5	13
	CO5>	17	12	29
	Pass	181	185	366
	Fail	1	2	3
	Withdrawn	1	3	4
	Others	20	19	39
Total		342	315	657

Table 7 shows that out of the total 657 students involved in the study, 342 were selected from face-2-face lecture while 315 were from online lecture. Out of the 342 students that received face-2-face lecture, 181 passed, while the remaining 161 had issues. Out of the 315 students that received online lecture, 185 passed, while the remaining 130 had issues.

Table 8: Chi-Square Tests

	Value	df	P-value
Pearson Chi-Square	13.168 ^a	9	0.155
Likelihood Ratio	13.464	9	0.143
N of Valid Cases	657		

Table 7 shows that the proportion of students who had issues in 2019/2020 (online) is more than that in 2018/2019 (face-2-face). However, the Chi-square test in Table 8 shows that there is no significant association between the method of learning and students' performance at 5% level of significance. This implies that students' academic performance in school does not depend on the method of learning, and any observed association/relationship might be due to chance. This also implies that students that failed or had one issue or the other cannot be related to the method of learning.

However, Figure 1 shows that more students passed during the online class than during the face-2-face class but the difference is not significant a 5% level. The figure shows the variation in students' performance between face-2-face method and online method of learning.

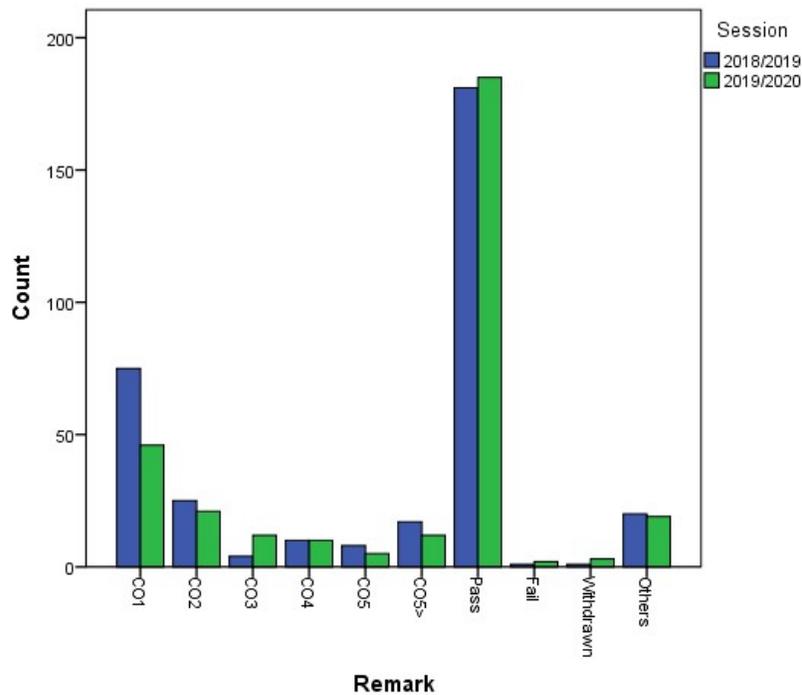


Figure 1: Students' Performance by method of learning

Table 9: Contingency Table: Students' Remark by Session by Department

Department			Session		Total
			2018/2019	2019/2020	
Civil Engineering	Remark	CO1	39	25	64
		CO2	12	9	21
		CO3	1	7	8
		CO4	6	7	13
		CO5	2	2	4
		CO5>	10	5	15
		Pass	100	102	202
		Fail	1	2	3
		Withdrawn	1	2	3
		Others	10	10	20
	Total		182	171	353
Computer Engineering	Remark	CO1	36	21	57
		CO2	13	12	25
		CO3	3	5	8
		CO4	4	3	7
		CO5	6	3	9
		CO5>	7	7	14
		Pass	81	83	164
		Withdrawn	0	1	1
		Others	10	9	19
	Total		160	144	304

Table 9 shows that out of the total 353 Civil Engineering students involved in the study, 182 were selected from face-2-face lecture while 171 were from online lecture. Out of the 182 students that received face-2-face lecture, 100 passed, while the remaining 82 had issues. Out of the 171 students that received online lecture, 102 passed, while the remaining 69 had issues.

Table 9 also shows that out of the total 304 Computer Engineering students involved in the study, 160 were selected from face-2-face lecture while 144 were from online lecture. Out of the 160 students that received face-2-face lecture, 81 passed, while the remaining 79 had issues. Out of the 144 students that received online lecture, 83 passed, while the remaining 61 had issues.

Table 10: Chi-Square Tests

Department		Value	df	P-Value
Civil Engineering	Pearson Chi-Square	10.088 ^b	9	0.343
	Likelihood Ratio	10.712	9	0.296
	N of Valid Cases	353		
Computer Engineering	Pearson Chi-Square	5.881 ^c	8	0.661
	Likelihood Ratio	6.323	8	0.611
	N of Valid Cases	304		
Total	Pearson Chi-Square	13.168 ^a	9	0.155
	Likelihood Ratio	13.464	9	0.143
	N of Valid Cases	657		

Table 9 shows that the proportion of students who had issues in 2019/2020 (online) is more than that in 2018/2019 (face-2-face). However, the Chi-square test shows that there is no significant association between method of learning and students' academic performance in both Civil and Computer Engineering Departments at 5% level of significance. This implies that students' performance in the schools does not depend on the method of learning, and any observed association might be due to chance.

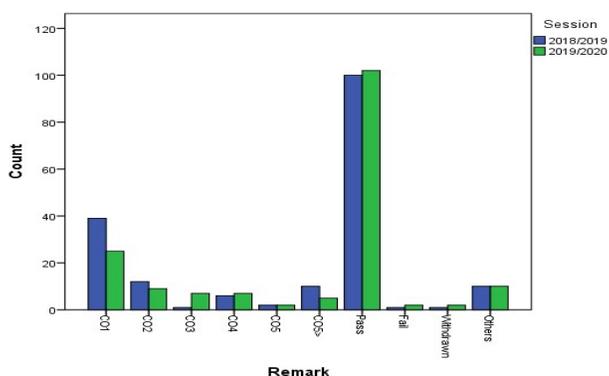


Figure 2: Civil Engineering Students' Performance by method of learning

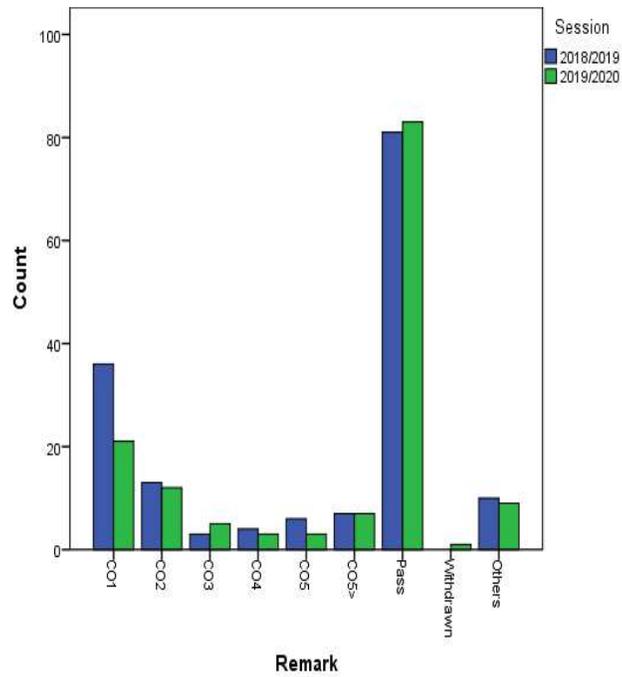


Figure 3: Computer Engineering Students' Performance by method of learning

Table 11: Group Descriptive Statistics

	Session	Mean	Std. Deviation	Std. Error Mean
Pass	2018/2019 (Face-2-face)	91	15.381	6.279
	2019/2020 (Online)	93	13.522	4.781
Average CGPA	2018/2019 (Face-2-face)	2.41	0.4458	0.0241
	2019/2020 (Online)	2.37	0.5936	0.0335

Table 11 shows that on the average, 91 students passed during face-2-face class with an average CGPA of 2.41, while 93 students passed during online class with an average CGPA of 2.37.

Independent Sample t-test

Table 12: Independent Samples T-Test: Equal Variances Assumed

	t-test for Equality of Means					
	t	Df	P-value	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
Pass	1.142	655	0.276	8.833	7.737	-8.024
Average CGPA	-0.462	655	0.644	-0.0188	0.0412	-0.0998

Table 12 shows that there is no significant difference between the average CGPA of 2018/2019 session and 2019/2020 session at 5% level of significance. Any observed difference in the average CGPA for the two sessions might be due to chance (Table 13). However, Table 12 shows that the average CGPA in 2019/2020 session is higher than that of 2018/2019 session, but the difference is not significant.

There is no significant difference between the average number of students that passed in 2018/2019 session and 2019/2020 session at 5% level of significance. Any observed difference in the number of students that passed for the two sessions might be due to chance (Table 13). However, Table 12 shows that the average number of students that passed in 2018/2019 session is higher than that of 2019/2020 session, but the difference is not significant.

CONCLUSION

Recently, Nigeria online education is growing progressively as a result of the COVID-19 pandemic. World Wide Web and related Internet resources (e.g., email, chat, and news groups) have become an increasing viable component since 1994 in higher education teaching approach, it is just of recent, it started gaining much interest in Nigeria. Some of the latest ones that are thriving recently are WhatsApp, Zoom, Google Classroom, Microsoft Teams and so on. This has led to substantial interest in the execution of Internet based virtual teaching around the globe.

This research have been able to come up with the following conclusions, based on the primary data via online questionnaire and the secondary data retrieved from students transcripts. Precisely, this study can conclude that

- The success rate of students' academic performance is not dependent on the method of learning (face-2-face or online), rather it can be attributed to factors relating to attitude.
- The virtual mode of learning affect the grade of the students positively, but the difference is not significant. More students passed during the online lecture than face-2-face.
- The students are ready for online learning approach if the following conditions are met
 - Improve quality of teaching and learning online
 - Improve the responsiveness of lecturers online
 - Improve support from school management during online learning
 - Improve meeting learning expectations
 - Improve availability of course materials
 - Improve internet connectivity.
- According to the students, the advantages online method has over face-2-face is that assessment is made easier and better, and unholy interactions between the students and lecturers would reduc

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