COMPARATIVE STUDY OF STUDENTS' ACADEMIC ACHIEVEMENT IN CLASSROOM AND ONLINE TEACHING IN SELECTED PUBLIC SECONDARY SCHOOLS IN DELTA STATE

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Abstract

The study compared Students' academic Achievement when taught in classroom and on-line. The design for the study is quasi-experimental design. The population for the study was 77,458 SSI students in Delta State in 2019/2020 academic session. 180 students in six intact classes from six secondary schools were drawn as the sample. The three senatorial districts of the state were represented. The students were taught four topics in Mathematics in classroom and four other topics online. Two sets of questions of 30 items each based on classroom and on-line teaching were set. Pre-testing was carried out before the teaching. At the end of teaching, post-test was conducted to the students for the classroom and online topic questions. Data were collected and analysed using mean standard deviation and t-test. The result showed that there was disparity in the overall academic achievement of students when taught in classroom and on-line. It also showed difference in academic achievement for male and female students for classroom and on-line teaching. The study also investigated academic achievement for urban and rural students under online teaching. But the result showed no significant difference. Hence it was concluded that location does not affect online teaching. Conclusions were drawn and recommendations made.

Introduction

Teaching can be described as a science as well as an art. It is service rendered by a professional or non-professional, geared towards guiding and directing the activities of an individual or learner. Its aim is to bring about a change in behavior of the individual or learner. The teaching and learning can take place in the classroom, field, laboratory, on-line, etc. Majority of teaching and learning in Nigeria at primary and secondary school levels take place in classroom, laboratory, field and so on. On-line teaching in primary and secondary school is relatively new. The outbreak of Covid-19 pandemic prompted the Nigeria government to opt for On-line teaching at the primary and secondary school levels. During this period, there was lockdown of education and economic activities. This was occasioned by the fear of contacting the disease through physical contact and the alternative option by the government was to introduce on-line teaching.

On-line teaching is a process of teaching students or individuals through the internet. The mode of teaching can be by one-on-one, video calls, group video calls and webinars.

Nwajei (2016) see On-line teaching as "a means of passing information from one-person to another using technology such as electronic or verbal". Eke (2006)

define on-line teaching as "a type of technology that links the computer to the global communication networks to make it possible for user to acquire, process, store and disseminate oral, printed and pictorial information".

Etebe (2010) opined that on-line teaching is "a part and parcel of any institution and providing learning resources to students and teaching aid to teachers". Iroriteraye-Adjekpovu (2013), explained that online teaching has offered unlimited access to knowledge and information which has led to the reduction of the earth to a global village and emergence of virtual classroom as an alternative classroom environment.

Nwosu (2005) pointed out that online teaching through internet is a practical application of science phenomena in creating of devices or instrument for making man's environment more enjoyable or satisfactory. Khadijah, Kainat and Ahsan (2020) pointed out that to combat the spread of covid-19 many institution have become interested on how best to deliver course content, teach and evaluate students. They explain that though covid-19 is a hazard to humanity but has evolved institution to invest in online teaching and learning.

With the increase in the use of online teaching and learning during covid-19, it is necessary to assess their effectiveness with regard to teaching, learning and how students have benefited or achieved from the programme. The study will also find out effects of gender and location under classroom and online teaching.

From the above, online teaching is a teaching technique in which the teachers impact knowledge to the students through virtual classroom to replace the traditional classroom without physical contact.

The on-line teaching provides students access to various learning tools, expert opinion and alternative viewpoints. On-line teaching helps to improve memory retention, increase motivation and reach large number of students at the same time. On-line teaching is of a great importance to the students, the teachers and others in the education industry. It possesses great potentials for capacity building in education. However, on-line teaching in Nigeria has suffered both human and material factors. These include:

i. Lack of fund: online teaching is expensive and many students and teachers cannot afford it.
ii. Online teaching requires electricity and other infrastructures. These infrastructures are lacking.
iii. Lack of manpower. Trained manpower for its operation is lacking.
iv. Governments are not showing enough commitment to the ICT sector which has affected online teaching in Nigeria.
v. Lukewarm attitude of some teachers and students has also affected online teaching in Nigeria.

Statement of the problem

Outbreak of Covid-19 pandemic has exposed a lot of loopholes in different area of life in Nigeria, education inclusive. The extent to which on-line teaching was successful in both primary and secondary school in Nigeria was not known. Okonta (2015) pointed out that the changes emanating from the digitally connected global society and economy indicate that academic business realities of online education can no longer be ignored. The capabilities and opportunities of internet based education (online teaching would not be possible without provision of the technological features that allow interaction of students, teachers and content on the web. The extent to which students achieved through online teaching is not known. There is need to provide research evidence to know how and to what extent students can benefit from online teaching. Therefor the purpose of this research work is to find out the extent to which students have benefitted from online teaching and to compare the level of students' academic achievement from classroom and online teaching. The research work will also provide solutions to problems of online teaching and to make information available to determine to what extent students and other stakeholders in education can benefit from online teaching.

Research Questions

The following research questions were raised to direct the study;

I. Is there difference in the achievement of students when taught in classroom and online?
ii. Is there difference in the achievement of male students taught in classroom and online?
iii. Is there difference in the achievement of female students taught in classroom and online?
iv. Is there difference in the achievement of male and female students when taught online?
v. Is there difference in the achievement of rural and urban students when taught online?

Hypotheses

i. There is no significant difference in academic achievement of students taught in classroom setting and online teaching
ii. There is no significant difference in male students' academic achievement under classroom teaching and online teaching
iii. There is no significant difference in female students' academic achievement when taught in classroom setting and online.
iv. There is no significant difference in academic achievement of male and female students when taught online.
v. There is no significant difference in achievement of students from urban and rural area when taught online.

The main purpose of this study is to compare academic achievement of students when taught under classroom setting and online. Specifically, the study will;

i. Compare male students' academic achievement under classroom and online teaching.
ii. Compare female students' academic achievement under classroom and online teaching.
iii. Compare male and female students' academic achievement through online teaching.
iv. Compare urban and rural students' academic achievements through online teaching.

Research Methodology

The quasi-experimental design was used. The quasi experiment design was used because it was not possible to randomly sample students from classroom without disrupting the activities of the school. Since the study was a quasi-experimental design, it follow Creswell's (2003) and Isaac and Micheal (1997) recommendation that selection of the participants not be random selection but intact class should be used. Six Intact classrooms were used from different schools. There was pretest before the teaching, Eight different topics in Mathematics were taught, four topics in the classroom while the other four were taught on-line for four weeks. At the end of the teaching, two set of questions were drawn. Thirty questions each based on topics taught in the classroom and online. The pre-test questions served as control while the other two sets of questions were used for the experiment. The instruments for the research are two sets of questions.

The psychometric properties of the tests were established. The validity of the two instruments was established using expert judgment. The instruments were presented to experienced Mathematics teachers and Measurement and Evaluation experts who certified their validity. The reliability of the instrument was obtained using Kuder-Richarson formula 20. For the purpose of reliability, the instruments were administered to thirty (30) SS 1 students who are not involved in the experiment. Irighweferhe (2013) pointed out that used of Kudar-Richadson formular 20 (K-R 20) approach is necessary because the instruments are multiple choice objective test with expected response of either pass (1) or fail (0). The method also ensured internal consistence of the items in the instruments. The coeficients of 0.73 and 0.76 for the instrument of those taught in the classroom setting and on-line respectively. The population for the study was 77,458 SSI students in 2019/2020 session in Delta State.

Two classes of thirty two and twenty eight students from Delta Central Senatorial Districts, two classes of thirty five and twenty five students from Delta South Senatorial Districts, and two classes of twenty two and thirty eight students from Delta North Senatorial Districts. One of the classes from urban area and one from rural area. The one hundred and eighty students were the sample for the study.

Presentation

The data obtained were analysed by answering the research questions and analyzing the hypotheses. The experimental statistics of one group Pretest – Posttest was used to carry out the experiment. The experiment involved the study of single group of the same students under two conditions of classroom and online teaching as suggested by Setex and Gallow, 2002). The pretest was first administered before the experiment was conducted. The posttest was later administered.

Research Question One: Is there difference in the achievement of students when taught in classroom and online?

Table 1: Mean and Standard Deviation of the control and experimental group of students taught in the classroom and online.

Statistics	Control	Experimental	
	Pre test	Classroom	On-line
Mean $\bar{x}$	10.50	14.59	9.20
Standard Deviation (SD)	3.16	4.29	2.98

From table1, the pre-test mean is 10.50 while the post-test mean of academic achievement of teaching in the classroom is 14. 59. There is 4.09 increase in points which represent 38.95% improvement. The means of the on-line teaching is 9.20 which indicates a decrease of 1.3 points in achievement.

The standard deviation of pre-test is 3.15. This shows that there is a deviation from the mean scores of the pre-test with 3.16. The classroom achievement standard deviation is 4.09 which indicate that there is deviation of 4.09 points in academic achievement when the students are taught in the classroom setting. However the standard deviation of academic achievement of online teaching is 2.48. This shows that the achievement under On-line teaching is homogeneous or similar while achievement in the classroom teaching is heterogeneous.

Research Question Two: Is there difference in the achievement of male students taught in classroom and online?

Table 2: Mean and standard deviation of the control and experimental of classroom teaching and online teaching for male students

Statistics	Control	Experimental	
	Pre test	Classroom	On-line
Mean $\bar{x}$	10.65	15.25	10.31
Standard Deviation (SD)	3.05	4.25	2.41

From table 2, the pre-test has a mean of 10.65 for classroom teaching has a mean of 15.25. There is improvement of 4.6 (43.20%) points in mean of achievement for classroom teaching while on-line teaching has mean of 10.31 which represents decrease of 0.34 points (3.20%) in mean of academic achievement. The pre-test has standard deviation of 3.05, classroom 4.25 and online 2.41.

Research Question Three: Is there difference in the achievement of female students taught in classroom and online?

Table 3: Mean and Standard Deviation of female students' achievement under classroom and online teaching

Statistics	Control	Experimental	
	Pre test	Classroom	On- line
Mean $\bar{x}$	10.35	13.53	8.09
Standard deviation (SD)	3.15	3.01	2.01

Table 3 shows that mean for pre-test is 10.35, classroom teaching 13.53 and on-line teaching 8.09. There is improvement of achievement with 3.18 points representing (30.7%), while achievement dropped by 2.26 points representing (21.8%) for classroom and on-line teaching respectively.

Research question Four: Is there difference in the achievement of male and female students when taught online?

Table 4: Mean and Standard Deviation of female and male students academic achievement under online teaching

	Pretest		Posttest	
Sex	Mean ($\bar{}$)	SD	Mean ($\bar{}$)	SD
Male	10.65	3.05	10.31	2.41
Female	10.35	3.15	8.09	2.01

Table 4 shows that the pretest score for male students under on-line teaching is 10.65. Post-test is 10.31 while pre-test for female is 10.35 and post- test 8.09. This shows a general low academic achievement for both male and female students. The standard

deviation is low which indicates that the level of achievement in the on-line teaching is similar for both male and female.

Research Question Five: Is there difference in the achievement of rural and urban students when taught online?

Table 5: Mean and Standard Deviation of students' achievement through online teaching in rural and urban area.

	Pretest		Posttest	
Location	Mean ($\bar{}$)	SD	Mean ($\bar{}$)	SD
Urban	10.26	2.04	9.46	2.06
Rural	10.33	2.05	9.72	2.07

In table 5 both students from rural and urban area recorded a decrease in academic achievement after online teaching The posttest mean has a decrease of 0.8 points representing (7.80%) and 0.61(5.90%) for urban and rural students respectively.

Hypothesis One: There is no significance difference in academic achievement of students taught in classroom and online.

Table 6: Summary table of t-test (from single source) analysis of students taught in classroom and online from

N	Mode of teaching	Mean ($\bar{}$)	SD	D2	DF	T-cal	T-cal	Level of Sig	Remark
	Classroom	14.59	862	6434	179	20.11	1.96	0.05	
	On-line	9.20							

From table 6 t-calculated is 20.11 while t-critical is 1.96. Therefore, Ho is rejected since t-calculated is greater than t-critical. Hence there is significant difference in students' academic achievement when taught in classroom and on-line.

Hypothesis 2: There is no significant difference in male students' achievement when taught under classroom and online.

Table 7: Summary table of t-test (from single source) analysis of male students taught under classroom and online

N	Mode of teaching	$\bar{x}$	D	D2	DF	T-cal	T-cal	Level of Sig	Remark
	Classroom	15.25	435	3527	94	11.90	1.98	0.05	Reject Ho
	Online	10.31							

From table 7, t-calculated is greater than t-critical hence will reject the null hypothesis. Therefore, there is significant difference in academic achievement when male students are taught in classroom and on-line.

Hypothesis 3: There is no significant difference in female students' achievement when taught in classroom setting and on-line.

Table 8: summary table of t-test (from single source) analysis of female students' academic achievement when taught in classroom and Online.

N	Mode of teaching	X	D	D2	DF	T-cal	T-cal	Level of Sig	Remark
	Classroom	13.53	427	2907	84	16.65	1.98	0.05	Reject Ho
	On-line	8.09							

Result from table 8 shows that t-calculated is greater than t-critical hence the null hypothesis is rejected. Therefore, there is significant difference in academic achievement when female students are taught in classroom and online.

Hypothesis 4: There is no significant difference between male and female students academic achievement when taught online.

Table 9: Summary table of t-test (from two sources) of male and female students when taught online.

Sex	N	$\bar{X}$	SD	SD^2	DF	T-cal	T-cal	Level of Sig	Remark
Male	95	10.31	2.41	5.81	178	6.63	1.96	0.05	Reject Ho
Female	85	8.09	2.01	4.04					
Total	180								

Table 9 shows that t-calculated is greater than t-critical hence Ho is rejected. Therefore, there is significant difference when male and female students are taught online.

Hypothesis 5: There is no significant difference between rural and urban students' academic achievement when taught online.

Table 10: Summary table of t-test (from two sources) urban and rural academic achievement through Online teaching

Location	N	$\bar{X}$	SD	SD^2	DF	T-cal	T-cal	Level of Sig	Remark
Urban	100	9.46	2.06	4.24	178	0.835	1.98	0.05	Accept Ho
Rural	80	9.72	2.07	4.26					
Total	180								

From table 10, t-calculated is less than t-critical hence the null hypothesis is accepted. Therefore, there is no significant difference in academic achievement of students taught online either in rural or urban area.

Discussion of findings

The findings show that there is difference in overall student academic achievement when the student are taught in classroom and on- line. There is also difference when male, and female students are taught in classroom and online. The study equally revealed that there are differences in male and female achievement when taught online. This finding is line with Nwankwor (2001) and Orthemata (1990) who stated that there are difference in performance of male and female students in sciences and mathematics. They attributed this difference to teaching environment, teaching methodology, study habit and so on. However, Oji (2010) and Edward (2010) stated that there are no difference in performance of male and female students. This contradictions explain why there is need to investigate performance of male and female students in further research.

However, the study pointed out that student's achievement in rural and urban area when taught online has no significant difference. The study equally revealed that there is consistence in academic achievement of students when taught online. This study is in agreement with Haller (1992) he stated that rural students perform equivalent with urban students. This study is at variance with Akpochafo (2001) and Babatunde (2012) they stated that urban students perform better in social science and science subject. They attribute this to likely due to availability of facilities such as library, multimedia learning and infrastructure found in urban areas. It is among this contradiction among scholars that there is still need to investigate the role of location in students' performance in educational research.

Conclusion

Based on the study, the following conclusions are drawn:

i. That both classroom and online teaching are inevitable in the present day educational system.

ii. There are differences in academic achievement of students when taught in classroom and online.

iii. There is similarity in the level of achievement when students are taught online.
iv. There is general low academic achievement when students are taught online.
v. Location do not affects level of academic achievement when taught online.

Recommendation

Based on the findings, the following recommendations are made

i. Both classroom and on-line teaching should be encouraged in the present day educational system.
ii. Government should provide IT facilities and resources necessary for promotion of quality online teaching, science and technology education in Nigeria schools.
iii. Both teachers and students should show more interest in on-line teaching and learning.
iv. All stakeholders concerned with classroom and online teaching should work very hard to encourage quality and functional education in Nigeria educational system.
v. Organizations and individuals in Nigeria should be patriotic and active towards provision of modern teaching and learning both in the classroom teaching and online teaching.

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