



## IMPACT OF COVID-19 PANDEMIC ON ACADEMIC PERFORMANCE OF SENIOR SECONDARY SCHOOL BIOLOGY STUDENTS' IN EKITI STATE NIGERIA

BY

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### Abstract

*This paper examined impact of COVID-19 pandemic on academic performance of senior secondary school students in Biology in Ekiti State. The study adapted descriptive research of the ex-post facto designs. The population for the study comprised all the senior secondary school students in all the 599 secondary schools spread across the 16 local government Areas of Ekiti State. The sample consisted of 4021 SSS III students selected through multistage sampling procedure from 12 secondary schools across the state. A self-developed proforma was used as the instrument for data collection. The instrument was validated by experts and tested for reliability. The reliability coefficient of 0.79 was obtained using the test re-test method. Four questions were raised and four hypotheses formulated. The data collected through the proforma were analyzed using descriptive and inferential statistics. Findings of the study revealed that there is significant impact of COVID-19 pandemic on secondary school students' academic performance in Biology, there is no significant difference in the impact of COVID-19 pandemic on male and female students' performance in Biology. Based on these findings, it was recommended that educational institutions should consider implementing targeted support programs.*

**Keyword:** COVID-19 pandemic, academic performance, Biology, students, learning environment

### Introduction

The arrival of 2020 comes with the proclamation of COVID-19 as a pandemic, a disease caused by a coronavirus that had spread across the globe. At this time, most developed nations were thrown into confusion as the rate of infection and consequential death keep increasing on daily basis. The COVID-19 pandemic stands out not only as the most several global health crisis in recent memory but also represents the most substantial global security threat faced in a considerable span of time. The virus has spread through every continent of the world since its first appearance. Various opinions were raised as to how to protect individual from contacting the deadly virus since it will take a lengthy time and process to

develop the vaccine or drug to cure the disease. In December 2019, the disease first appeared in Wuhan, China, and never stopped there but spread through the nations of the world. As a result, over one million citizens of both developed and developing countries were murdered by this deadly virus (Velavan & Meyer 2020). It would be recorded COVID is a virus that spreads by droplets in the air and by contacting infected surfaces. Aside from being a health disaster, the pandemic is also a historically unprecedented socio-economic problem. The potential for disastrous social, economic, and political consequences in each every country it affects is momentous, and the consequences will be felt for a long time.

COVID-19, a novel coronavirus disease, made its entry into Ekiti State, Nigeria in line with the global outbreak that began in late 2019. In early 2020, the first cases were reported in Nigeria, and subsequently, Ekiti State recorded its first confirmed case of COVID-19 in March 2020. As the pandemic rapidly spread across the nation. Ekiti State, like other regions, took swift action to contain its transmission. The state government implemented a series of preventive measures, including lockdowns, travel restrictions, closure of public places, and the enforcement of social distancing protocols. Testing centers were established to diagnose cases and contact tracing efforts were intensified to identify and isolate individuals who came into contact with confirmed cases. Health facilities in Ekiti State were mobilised to provide treatment for COVID-19 patients, and public awareness campaigns were launched to educate the populace about the virus and the importance of preventive measures. Ekiti State, like other parts of the world, faced challenges stemming from the pandemic, including disruptions to daily life, economic difficulties, and strain on healthcare resources. Throughout the pandemic, the government collaborated with health agencies, local communities, and other stakeholders to mitigate the impact of COVID-19 and safeguard the well-being of its residents.

Non-pharmaceutical therapies were encouraged to be used in order to avoid some of the symptoms of the resulting disease (Bao, 2020; Velavan & Meyer, 2020). Separation policies reduced social and economic activities. In an environment where not all carriers of the virus display symptoms and testing for the virus are difficult, it is necessary to engage people at risk of harboring virus rather than those who are ill to achieve separation. The government of countries worldwide, notably Nigeria, were forced to proclaim lockdown that range from partial to total lockdown.

This lockdown birthed school closure ranging from primary schools to tertiary institutions in the entirety of Nigeria with

effect from March 23, 2020. The timing was particularly critical as numerous Nigerian schools had just completed their second continuous assessment tests and were gearing up for the second-term examinations. Students who enrolled in certificate classes were also in the midst of preparations for external examinations at that time. Due to the sudden closure of schools, both learners and educators were left without enough time to prepare for the upcoming change. Relevant stakeholders in the education system could not find a quick solution to the problem which lasted for over 24 weeks. This period that separated the teachers and students from physical gathering to interact in the school posed a prodigious challenge to learning generally, science inclusive.

Education has been shown to be a powerful tool for bringing about constructive social change. It has been widely regarded as a means of promoting natural growth in developed and developing countries across the globe. Educational goals are to produce sound and effective members of the society who can live as functional, sensible, and acceptable human beings by developing their heads, heart and hands (3Hs), including both male and female children, to realise their own goals and society as a whole (Adu and Oshati, 2014). For sustainable development, science and technology education serve as the basis for social and economic advancement globally. It is also regarded as one of the most potent instruments for society members to confront and execute their tasks as productive members of the society in the face of ever-changing obstacles and circumstances (Eila, et al., 2017). Science Education in schools help students develop a through comprehension of the subject matter to apply their knowledge in real-world situations (Ayeni, 2016). Science education aims to produce a science-minded populace capable of adapting to a rapidly changing technological and scientific world.

## Purpose of the Study

The purpose of the study was to examine the impact of the COVID-19 pandemic on the academic performance of Senior Secondary School Students in Biology in Ekiti State, Specifically, the study:

1. examined secondary school students' performance in Biology before and after the covid-19 pandemic.
2. investigated the impact of COVID-19 pandemic on male and female students' performance in Biology in Ekiti State.
3. determined the impact of COVID-19 pandemic on public and private school students' performance in Biology in Ekiti.
4. investigated the impact of COVID-19 pandemic on school students' performance in urban and rural areas in Biology in Ekiti State.

## Research Questions

In an attempt to address the research problem, the following research questions were raised and provided answers to:

1. What is the performance of secondary school students in Biology before and after the COVID-19 pandemic?
2. What is the performance of male and female students in Biology before and after the COVID-19 pandemic?
3. What is the performance of public and private school students' in Biology before and after the COVID-19 pandemic?
4. What is the performance of students in rural and urban school in Biology before and after the COVID-19 pandemic?

## Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant impact of COVID-19 pandemic on secondary school students' performance in Biology.
2. There is no significant difference in the impact of COVID-19

pandemic on male and female students' performance in Biology.

3. There is no significant difference in the impact of COVID-19 pandemic on students' performance in Biology in public and private school.
4. There is no significant difference in the impact of COVID-19 pandemic on students' performance in Biology in urban and rural school.

## Research Design

The study adopted descriptive research of the ex post facto design. The survey design examined the impact of the COVID-19 pandemic on the academic performance of Senior Secondary School Students in Biology in Ekiti State, Nigeria. The researcher has no direct control over the cause, and thus infer the possibilities of the causes based on the existing effect.

## Population

The population for the study was made up of all the senior secondary school Biology students in all the 599 secondary schools spread across the 16 local Government Areas of Ekiti State. The number of public secondary schools was 219 and private schools was 380 in Ekiti State (Ekiti State Ministry of Education, 2024). The students' in senior secondary school three (SSS 3) were preferred for the study.

## Sample and Sampling Techniques

The study sample encompassed 4,021 senior secondary school (SSS3) Biology students drawn from 12 secondary schools located across Ekiti State. Employing a multi-stage sampling procedure, schools were meticulously chosen from the three senatorial districts. In the initial stage, one local government area was randomly selected from each of the three senatorial districts. The second stage involved the selection of four secondary schools from each of the selected local government areas, using stratified sampling technique, which comprised two public schools (one urban

and one rural) and two private schools (one urban and one rural), considering both the type and location of the schools. The final step involved purposive selection of Biology students who had registered for the West African Examinations Council (WAEC) in the years 2017, 2018, 2019 (pre-COVID-19 pandemic) and 2020, 2021, 2022, (post-COVID-19 pandemic) and had obtained results.

### Research Instrument

The instrument used for the study was tagged the Biology Performance Pro-forma (BPP) designed by the researcher. The pro-forma was employed to collect

**Table 1:** Percentage of students' performance in Biology before and after the COVID-19 pandemic

Category	Performance	Frequency	Percentage
Before COVID - 19	Good	263	6.54
	Average	1,356	33.72
	Poor	534	13.28
After COVID-19	Good	1,239	30.81
	Average	476	11.84
	Poor	153	3.81
<b>TOTAL</b>		<b>4,021</b>	<b>100.00</b>

Table 1 showed the performance of students in Biology before and after the COVID -19 pandemic. Before the pandemic, 263 (6.54%) had good performance, 1,356 (33.72%) had average performance, and 534 (13.28%) had poor performance. After the pandemic, 1,239 (30.81%) had good performance, 476 (11.84%) had average

data on students' WAEC Biology results, gender, school type, and school location from the selected secondary schools in Ekiti State. The grade were then assigned numerical values to derive the Biology Grade point (BGP). A1 was assigned 9 points, B2 as 8 points, B3 as 7 points, C4 as 6 points, C5 as 5 points, C6 as 4 points, D7 as 3 points, E8 as 2 points, and F9 as 1 point.

### Results

**Research Question 1:** What is the performance of secondary school students in Biology before and after the COVID-19 pandemic?

performance and 153 (3.81%) had poor performance. This is an indication that students had better performance after the pandemic than before the pandemic.

**Research Question 2:** What is the performance of male and female students in Biology before and after the COVID -19 pandemic?

**Table 2:** Percentage of male and female students' performance in Biology before and after the COVID -19 pandemic

Performance		Male		Female	
		N	%	N	%
Before COVID -19	Good	118	2.93	145	3.61
	Average	617	15.34	739	18.38
	Poor	243	6.04	291	7.24
After COVID -19	Good	564	14.03	675	16.79
	Average	212	5.27	264	6.57
	Poor	74	1.84	79	1.96
<b>TOTAL</b>		1828	45.46	2193	54.45

Table 2 showed the performance of male and female students before and after the pandemic. Before the pandemic, the table shows that among students with good performance, 118 males constituted 2.93%, whereas females accounted for 145, representing 3.61%. In the category of average performance, 617 males comprised 15.34%, and 739 females constituted 18.38%. Additionally, for students with poor performance, 243 males constituted 6.04%, while 291 females made up 7.24%. For post-pandemic, the table revealed that male

students with good performance increased to 564, constituting 14.03%, with female reaching 675, representing 16.79%. In the average performance category, 212 males comprised 5.27%, and 264 females constituted 6.57%. Furthermore, students with poor performance were 74 males (1.84%) and 79 females (1.96%).

**Research Question3:** What is the performance of public and private school students in Biology before and after the COVID -19 pandemic?

**Table 3:** Percentage of public and private school students' performance in biology before and after the COVID -19 pandemic

Public	Performance		Private		
	%	N	%	N	
Before COVID-19	Good	147	3.66	116	2.88
	Average	512	12.73	844	20.99
	Poor	81	2.01	453	11.27
After COVID-19	Good	659	16.39	580	14.42
	Average	37	0.92	439	10.92

	Poor	22	0.55	131	3.26
1458	<b>TOTAL</b>		36.26	2563	63.74

Table 3 showed the performance of private and public students before and after the pandemic. Prior to the pandemic, students with good academic comprised 147 (3.66%) from private schools and 116 (2.88%) from public schools. Likewise, in the category of average performance, 512 (12.73%) students were from private schools, contrasting with 844 (20.99%) from public schools. Furthermore, for students with poor performance, 81 (2.01%) attended private schools, while 453 (11.27%) were from public schools. For post-pandemic, there was a notable shift, with private school students exhibiting good performance totaling 659 (16.39%),

and public-school counterparts amounting to 580 (14.42%). For the average performance, 37 (0.92%) students were from private schools, while 439 (10.92%) were from public schools. Additionally, students with poor performance comprised 22 (0.55%) from private schools and 131 (3.26%) from public schools. This is an indication that private schools had better BGP mean score than the public schools.

**Research Question 4:** What is the performance of students in rural and urban school in Biology before and after the COVID-19 pandemic?

**Table 4:** Percentage of performance of urban and rural school students in Biology before and after the COVID-19 Pandemic

Performance		Urban		Rural	
		%	N	%	N
Before COVID-19	Good	3.18	135	3.18	128
	Average	16.96	674	16.96	682
	Poor	6.86	258	6.86	276
After COVID-19	Good	15.89	600	15.89	639
	Average	6.24	225	6.24	251
	Poor	1.91	76	1.91	77
<b>TOTAL</b>		51.06	1968	51.06	2053

Table 4 revealed the performance of urban and rural schools' students' before and after the pandemic. It showed that

before the pandemic, students with good performance were 128 (3.18%) from urban schools while those from rural

schools were 135 (3.36%). Also, for the average performance, 682 (16.96%) were from urban schools and 674 (16.76%) from rural schools. In addition, students with poor performance were 276 (6.86%) from urban schools and 258 (6.42%) from rural schools. After the pandemic, urban school students with good performance were 639 (15.89%) while those from rural schools were 600 (14.92%). Also, for the average performance, 251 (6.24%) were from urban schools and 225 (5.60%) were from rural schools. In addition, students

with poor performance were 77 (1.91%) from urban schools and 761 (1.89%) from rural schools. Comparing the differences, there is no substantial difference between urban and rural students' performance before and after the pandemic.

**Hypotheses Testing**

**Hypothesis 1:** There is no significant impact of COVID-19 pandemic on secondary school students' performance in Biology.

**Table 5: ANCOVA of Students' Performance before and after COVID-19 pandemic**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5084.945 <sup>a</sup>	1	5084.945	1282.318	.000
Intercept	122680.319	1	122680.319	30937.433	.000
<b>Group</b>	<b>5084.945</b>	<b>1</b>	<b>5084.945</b>	<b>1282.318</b>	<b>.000</b>
Error	15937.076	4019	3.965		
Total	140789.000	4021			
Corrected Total	21022.020	4020			

a. R Squared= .242 (Adjusted R Squared = .242)

It is evident from Table 5 that there is a significant impact of COVID-19 on secondary school students' performance

in Biology. A significant difference was observed between the performance of students in Biology before and after the COVID-19 pandemic ( $F_{1,4019} = 1282.318$ ,  $p < 0.05$ ).

**Table 6: Pair wise Comparisons of the performance before and after COVID-19 pandemic**

(1)	(J) Conventional	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
Collaborative					Lower Bound	Upper Bound
Before covid-19	After covid-19	-2.255*	.063	.000	-2.378	-2.131
After covid-19	Before covid-19	-2.255*	.063	.000	-2.131	-2.378

Based on estimated marginal means

\*The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 6 showed that the BGP mean score before the pandemic is lower than the BGP mean score after the pandemic. The BGP mean difference between them is 2.225 which also shows that this

difference is significant ( $p < 0.05$ ) at 0.05 level of significance. This is an indication that the students' performance in Biology after the covid-19 pandemic is better than before the pandemic.

**Hypothesis 2:** There is no significant difference in the impact of COVID-19 pandemic on male and female students' performance in Biology.

**Table 7: ANCOVA of male and female students' performance before and after COVID-19 pandemic**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5086.128 <sup>a</sup>	3	1695.376	427.358	.000
Intercept	121643.099	1	121643.099	30662.879	.000
GROUP	5054.980	1	5054.980	1274.221	.000
GENDER	.116	1	.116	.029	.864
GROUP *GENDER	1.112	1	1.112	.280	.596
Error	15935.892	4017	3.967		
Total	140789.000	4021			
Corrected Total	21022.020	4020			

1. R Squared = .242 (Adjusted R Squared = .241)

Table 7 showed that there is no significant difference between the performance of male and female students in Biology ( $F_{1,4017} = 0.29$ ,  $p > 0.05$ ) at 0.05 level of significance. There was no significant difference in the impact of COVID-19 pandemic on male and female students' performance in Biology. ( $F_{1,4017}$

= .280,  $p > 0.05$ ) at 0.05 level of significance. The null hypothesis was not rejected. Hence, there was no significant difference in the impact of COVID-19 pandemic on male and female students' performance in Biology.

**Hypothesis 3:** There is no significant difference in the impact of COVID-19 pandemic on students' performance in Biology in public and private school.

**Table 8:** ANCOVA of private and public school students' performance before and after COVID-19 Pandemic

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6219.247 <sup>a</sup>	3	2073.082	562.082	.000
Intercept	119228.567	1	119228.567	32354.825	.000
GROUP	4401.901	1	4401.901	1194.535	.000
SCHL TYPE	1102.472	1	1102.472	299.176	.000
GROUP* SCHL TYPE	14.754	1	14.754	4.004	.045
Error	14802.774	4017	3.685		
Total	10789.000	4021			
Corrected Total	21022.020	4020			

a. R Squared = .296 (Adjusted R Squared = .295)

Table 8 revealed that there is significant difference between the performance of public and private school students in Biology ( $F_{1,4017} = .299.176$ ,  $p < 0.05$ ) at 0.05 level of significance. Also indicated is that there is significant difference in the impact of COVID-19 pandemic on public and private school

students' performance in Biology.  $F_{1,4017} = 4.004$ ,  $p < 0.05$ ) at 0.05 level of significance. The null hypothesis was rejected. Hence, there was significant difference in the impact of COVID-19 pandemic on students' performance in Biology in public and private school. This implies that the COVID-19 pandemic impact on the performance of secondary school students' in Biology favoured one particular school type than the other.

**Table 9:** Pairwise Comparisons of the performance of private and public schools

(I) Collaboration	(J) Conventional	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
Private	Public	1.095*	.063	.000	.971	1.220
Public	Private	-1.095*	.063	.000	-1.220	-.971

Based on estimated marginal means

\* The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 9 showed that the BGP means score of private school is higher than that of the public school. The BGP mean difference between them was 1.095 which also shows that this

difference is significant ( $p < 0.05$ ). This is an indication that the students' performance in Biology private school is better than the public school.

**Hypothesis 4:** There is no significant difference in the impact of COVID-19 pandemic on students' performance in Biology in urban and rural school.

**Table 10:** ANCOVA of urban and rural school students' performance before and after COVID-19 Pandemic

Source	Type III Sum of Square	df	Mean Square	F	Sig.
Corrected Model	5103.204	3	1170.068	429.22	.000
Intercept	122556.865	1	122556.865	30926.354	.000
GROUP	5081.795	1	5081.795	1282.355	.000
SCHL LOCATION	2.867	1	2.867	.724	.395
GROUP* SCHL LOCATION	14.371	1	14.371	3.626	0.57
Error	15918.816	4017	3.963		
Total	140789.000	4021			
Correction Total	21022.020	4020			

a. R Squared = .243 (Adjusted R Squared = .242)

Table 10 shows that there is no significant difference between the

performance of urban and rural school students in biology ( $F_{1,4017} = .724$ ,  $p > 0.05$ ) at 0.05 level of significance. There is no significant difference in the impact of COVID -19 pandemic on urban and

rural school students' performance in Biology. ( $F_{1,4017} = 3.626$ ,  $p > 0.05$ ) at 0.05 level of significance. The null hypothesis was not rejected. Hence, there was no significant difference in the impact of COVID-19 pandemic on students' performance in Biology in urban and rural school.

## Discussion

The finding of the study indicated that there was a significant impact of COVID-19 pandemic on secondary school students' performance in Biology. The observed significant impact of the COVID-19 pandemic on secondary school students' performance in Biology aligns with the broader challenges faced that gave rise to pedagogical approaches adopted by educational systems worldwide during this unprecedented health crisis. The closure of schools, disruptions in regular classroom activities, and the transition to remote or hybrid learning models likely contributed to the academic performance of students'. This finding supports Hebecci, Bertiz and Alan (2020) submission that COVID-19 pandemic had a favourable impact on students' academic performance. Conversely, the finding of the study contradicts Oyinloye (2020) and Abiona and Falebita (2020) who concluded that the long break and school closure had a detrimental impact on students' performance. Through the performance considered by the scholars in the sampled schools and region were from the internal examination conducted immediately schools resumed from the long break.

The findings of the study also revealed that there was no significant difference in impact of COVID-19 pandemic on male and female students' performance in Biology. Notably, the significant difference in the impact of the pandemic not found on male and female students' performance in Biology suggests that, at least in the context of Biology education, both genders experienced a similar level of disruption and adaptation challenges. This finding underscores the importance of gender-neutral educational strategies and the need for inclusive support measure during periods of upheaval.

Also, the finding of the study revealed that there was significant difference in the impact of COVID-19 pandemic on students' performance in Biology in public and private school. by Harry (2016) who argued that private schools have resources and are funded, have parents and guardians with higher socio-economic class than their counterparts in the public, and are more involved in their children's education welfare while he pointed out that public schools have more professionally trained and qualified teachers than private schools. On the contrary, Alimi, Ehinola and Alabi (2012) reported that though there is a significant difference in facilities available in public and private schools, and despite this, no significant difference in academic performance of students existed in the two types of secondary schools.

## Conclusion

The study underscores the substantial impact of the COVID-19 pandemic on the academic performance of secondary school students' specifically in the field of Biology. It was concluded that a significant overall improved performance, indicating that the disruptions caused by the pandemic have had a notable and consistent influence on students' performance in Biology. Also, it was concluded that gender does not bring any difference in the impact of the pandemic on students' performance in Biology. This suggests that both genders have experienced a similar level of challenge and disruption in adapting to the new learning environment shaped by the pandemic.

## Recommendations

Based on the findings of the study, the following recommendations were made:

1. Educational institutions should consider implementing targeted support programs. These programs could include additional tutoring and innovative teaching methods to address the specific challenges students face in adapting to the new learning environment shaped by the pandemic.
2. Policymakers and educational authorities should design and



- implement interventions that specifically addressed the challenges faced by students in public schools. This may involve additional resources, professional development for educators, and strategies to bridge the gap in performance between public and private institutions.
3. Teachers and school authority should continually promote gender-neutral educational strategies. Ensuring that both male and female students' have equal access to resources, support, and opportunities will contribute to a more inclusive and equitable educational environment.

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