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Exploring the Educational Impact of COVID-19 Lockdown on Biology Teaching and Learning Outcomes

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ABSTRACT

This study examines the impact of the COVID-19-induced lockdown on the teaching and learning of Biology at the Federal College of Education, Zaria, Nigeria. Using a descriptive survey design, data were collected through a validated questionnaire administered to Biology students from both diploma and degree programs. The analysis revealed that the lockdown significantly disrupted instructional activities, limited student engagement, and posed numerous challenges for both teachers and learners. Students encountered difficulties accessing online resources, adapting to remote learning environments, and coping with emotional stress due to prolonged school closures. Although gender differences in academic outcomes were explored, no significant disparities were identified. The study underscores the urgent need for strengthening digital learning infrastructure, enhancing institutional preparedness, and providing targeted support to mitigate the adverse effects of future crises on science education. These findings contribute to the ongoing discourse on building resilient education systems aligned with global efforts to achieve quality education and health for all.

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1. INTRODUCTION

Globally, the COVID-19 pandemic, also known as the coronavirus pandemic, is an ongoing pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Coronavirus (COVID-19) is a disease that has been identified as the cause of an outbreak of respiratory illness. Coronavirus belongs to a family of viruses that may cause various symptoms such as pneumonia, fever, breathing difficulty, and lung infection. The COVID-19 pandemic and social distancing measures are expected to impact secondary education. Universities, polytechnics, colleges, education, secondary schools, primary schools, and other higher institutions have been affected by COVID-19. Mini-cities operate with diverse businesses. Locals generate income through personal hostels, restaurants, cafes, shops, transport services, and food sales (Oluwatosin, 2020).

The COVID-19 pandemic, commonly referred to as the coronavirus, is generally considered to be one of the most important global health crises of our time. The Second World War represents the most devastating challenge faced by the world. By the conclusion of March 2020, this pandemic, which originated in China in 2019, had spread to all continents except Antarctica (Rwigema, 2021). In May 2020, the African continent encountered the impact of this pandemic, with Nigeria being significantly affected. During this time, Nigeria confirmed an estimated 7,839 cases and reported 226 deaths related to COVID-19 (Etteh *et al*., 2020). In response to this alarming situation, the Federal and State authorities of Nigeria, along with other affected nations, implemented various measures to mitigate the spread of this lethal virus (Dan *et al*., 2020). These measures incorporated the interdiction of communal assemblies and inter-state journeys, the enforcement of evening curfews, the obligatory usage of face coverings in public, and the execution of a total lockdown, which entailed the cessation of enterprises and the imposition of constraints on individuals' mobility (Machmud & Minghat, 2020; Putra & Abidin, 2020; Anggaraeni *et al*., 2020).

The report shows that Kaduna state was one of the most affected states in the northern region, with an estimated figure of 1,457 confirmed cases and 21 related deaths. Consequently, the state government enforced a total lockdown for 75 days beginning from March 2020 to stem the rise in COVID-19 and prevent community transmission and closure of all public and private academic institutions (primary and secondary schools, polytechnics, colleges of education, universities, etc). During the second wave from December 2020 to February 2021. Federal College of Education, Zaria, located in Kaduna, was affected by the closure.

Despite the imposition of long and short-term periods of lockdown to contain the spread of COVID-19, the pandemic and restriction measures impacted the population's well-being, psychological, socioeconomic, and living conditions. All sectors of human existence were affected, leading to the collapse of the world economy and the loss of lives and jobs. The education sector was one of the worst-affected sectors because schools were closed, and measures for indoor teaching and learning were not implemented. Statistics from UNESCO indicated that the COVID-19 pandemic initiated the closure of schools in 188 countries, affecting more than 1.5 billion students, including 63 million primary and secondary teachers worldwide (Rwigema, 2021). Consequently, the need to assess the post-impact of the COVID-19 lockdown/movement restriction on teaching and learning becomes imperative. The study is significant because the Nigerian education system was caught unaware without prior preparation to face the consequences of the lockdown. It was observed that even the E-Learning chosen as the alternative to be used in reaching out to the learners during the period of lockdown has not successfully worked because of the lack of an expert to manage the IT

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section of the Nigerian Education system, and huge tariff charges from various network providers in Nigeria. Also with the move to reopen schools to the learners in terminal classes, there will be adequate time to prepare them for their respective semester examinations, but this can only be possible if the government and the college authorities make available preventive measures and facilities to prevent the spread of coronavirus in our institution of which Biology can be an effective tool to this issues. The paper seeks to investigate the effect of COVID-19-induced school lockdown on the teaching and learning of Biology in the Federal College of Education, Zaria (Burk, 2020).

Every student tends to graduate from school at the stated appropriate time. Due to the fast spread of COVID-19, tertiary institution students have been delayed in the pursuit of their academic achievements. COVID-19, being seen as a pandemic, has been an issue that threatens the well-being of individuals in our society today, and students are not left out. The lockdown and breakdown of the academic calendar might affect the mental, social, physical, and psychological well-being of students. This made some of the students unable to feed adequately. The COVID-19 pandemic has caused significant disruption in the lives of many students, particularly those with psychological challenges. It has led to a surge in stress, fear, anxiety, depression, and insomnia among students. The lack of conducive environments for teaching and learning has made it difficult for students to focus and concentrate, further exacerbating their mental health problems (Ogunode & Orjinmo, 2020).

Some Biology students in the Federal College of Education, Zaria, may have difficulties with access to computers and the internet at home. Additional challenges include concerns about their health, the health of family members, and worries about finances, particularly among those who support themselves by working in industries severely impacted by prolonged closures such as retail or the service industry (Muhammad *et al*., 2017).

Another problem on the side of the lecturers/teachers is that as governments around the world debate the conditions for school management and calendar in line with COVID-19 protocols, some regions have mandated that teachers and students wear masks to school. Concerns have been expressed about the loss of learning opportunities for linguistically diverse students and for children who read lips. Teaching students while masked may also present challenges, specifically related to students' social-emotional learning. Furthermore, the mouth and eyes are even more important than other facial features when interpreting expressions. In contrast to adults who get most non-verbal social information from speakers' eyes, students pay the most attention to speakers' mouths. This elevates the challenge of clearly communicating emotions to students while wearing a mask. The potential emotional and social losses for both students and teachers presented by masking are further exacerbated by potential physical injury to teachers. Vocal strain is a significant occupational hazard in teaching, and the increased volume necessary to be understood when wearing a mask may contribute to this risk (Onyema *et al.*, 2020).

The specific objectives of the research are to:

(i) Examine the effect of COVID-19 on teaching and learning Biology at the Federal College of Education, Zaria.
(ii) Examine the effect of COVID-19 on gender among Biology students in the study area.
(iii) To highlight the challenges faced by Biology students during COVID-19 in the study area.

Research questions are in the following:

(i) What is the effect of COVID-19 on teaching and learning of Biology in the Federal College of Education, Zaria?
(ii) What is the effect of COVID-19 on gender differences among Biology students in the Federal College of Education, Zaria?

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(iii) What are the challenges faced by Biology students during the period of COVID-19 in the Federal College of Education, Zaria?

The research hypotheses are in the following:

(i) H01: COVID-19 has no significant effect on teaching and learning Biology in the Federal College of Education, Zaria.

(ii) H02: There is no significant difference in the effect of COVID-19 on gender and academic performance among Biology students in the Federal College of Education, Zaria.

(iii) H03: Challenges of COVID-19 have no significant effect on Biology students in the period of the COVID-19 lockdown in Federal College of Education, Zaria.

2. METHODS

The paper adopted a descriptive survey design. A descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. The instrument for data collection in this study was the effect of Covid -19 Induced Lockdown Questionnaire (ECILOQ), ICILOQ is an 36 items questionnaire developed by the researcher, KILOQ is made up of three sections tagged sections A, B, and C. Section A is on the general information of the respondents, it seeks to find the background information of the respondents. Section B is on the perception of the respondent on the effect of the COVID-19 lockdown on the teaching and learning of biology, and finally, Section C is on the challenges faced by biology students during the lockdown period. The instrument was face-validated by a panel of experts that included two chief lecturers in the Department of Biology, Federal College of Education, Zaria (Burk, 2020). After the validation of the instrument, it was administered to the respondents. The sample size was determined using the Krejcie-Morgan Table of Determining Sample Size. According to the Table, for a population of 1100, the sample should be 285. A simple Random sampling method was used to select the respondents from NCE 3, 300L, and 400L B.Ed. Biology students. Out of the 285 questionnaires administered, only 281 questionnaires were returned and used for analysis.

3. RESULTS AND DISCUSSION

3.1. Demography

The findings of the study are presented in **Table 1**. **Table 1** shows the gender of the participants for the study, The result shows that sixty-six respondents, representing 23.5% of the respondents, are male, while two hundred and fifteen, representing 76.5% of the respondents female.

Table 1. Gender of the respondents.

Gender	Frequency	Percentage
Male	66	23.5
Female	215	76.5
Total	281	100.0

Table 2 indicates the age distribution of the respondents, in which one hundred and eight respondents, representing 38.4% of the respondents, are within the range of 18-20 years. One hundred and twenty-four respondents, representing 44.1% of the respondents, are 21-25 years old. Forty-one respondents, representing 14.6% of the respondents, are 26-30 years old, while eight respondents, representing 2.8% of the respondents more than 30 years old.

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Table 2. Age of the respondents.

Age	Frequency	Percentage
18-20years	108	38.4
21-25years	124	44.1
26-30years	41	14.6
30 years and above	8	2.8
Total	281	100.0

Table 3 indicates, the marital status of the respondents, forty-six respondents representing 16.4% of the respondents, are married. One hundred and ninety respondents, representing 67.6% of the respondents, are single. Thirty-nine respondents, representing 13.9% of the respondents, are widows/widowers, while six respondents, representing 2.1% of the respondents, are divorcees.

Table 3. Marital status.

Marital Status	Frequency	Percentage
Married	46	16.4
Single	190	67.6
Widowed	39	13.9
Divorced	6	2.1
Total	281	100.0

3.2. Research Question One: What is the effect of COVID-19 on the teaching and learning of Biology in the Federal College of Education, Zaria?

From **Table 4**, the respondents perceived that the COVID-19 school lockdown has an effect on the academic program of senior secondary schools, with a mean score of 3.1673. The COVID-19 school pandemic has effects on internal and external examinations, with an average of 3.5730. The COVID-19 lockdown has affected my institution with an average of 3.1601. Our institution was partially open, but there were major disruptions during the COVID-19 pandemic, with an average of 3.0961. Students felt lost educational opportunities during the COVID-19 pandemic, with an average of 2.8577. The COVID-19 pandemic has resulted in the cancellation or postponement of classroom lectures due to COVID-19, with an average rating of 3.2171.

It is expected that the enrollment numbers for the upcoming academic year will be impacted by the COVID-19 pandemic, with an average of 3.2705. It is unlikely that exams will be conducted as scheduled this semester, with an average of 3.2918. The COVID-19 lockdown has affected research at my institution, with an average of 3.4982.

Due to the COVID-19 pandemic, the completion of students' projects is at risk, with an average of 3.2847. The COVID-19 pandemic has had an effect on my learning performance in Biology, with an average of 3.6833. COVID-19 school lockdowns school extra-curricular activities in schools with an average of 3.2028.

The Ministry of Education did not provide support to higher institutions during the COVID-19 lockdown, with an average of 3.5907. In response to the current situation, the government has instructed universities to transition to online teaching and learning with an average of 3.6726. The COVID-19 pandemic affected my class projects with an average of 3.1601. Universities were not provided with ICT facilities by the government to assist with online

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education, with an average of 3.2705. The COVID-19 pandemic affects the quality of my learning with an average of 3.4982.

The government has not allocated sufficient funds towards research aimed at finding a cure for COVID-19, with an average of 3.6833. The COVID-19 pandemic has had an impact on my motives for learning Biology, with a mean score of 3.2171. The public universities did not implement the government's directive to switch to online learning, with an average of 3.2847. The COVID-19 pandemic has affected my future educational goals with an average of 3.1601.

The government did not provide any COVID-19 palliatives for students in the Federal College of Education, Zaria, with an average of 3.1673. During the COVID-19 lockdown, students were not provided with subsidized data to facilitate online education, with an average of 3.2918. During the COVID-19 lockdown, students were not taught how to use online applications for e-learning, with an average score of 3.5730. The COVID-19 pandemic impacted my subject knowledge in Biology with an average rating score of 3.2028.

Table 4. Analysis of the effect of COVID-19 on teaching and learning of Biology in Federal College of Education, Zaria.

Statement	SD	D	A	SA	Mean	Std.
COVID-19 school lockdown affects the academic program of senior secondary schools.	13	30	135	103	3.1673	0.79539
The COVID-19 pandemic has effects on internal and external examinations	16	23	26	216	3.5730	0.86758
Covid-19 lockdown has affected my institution	18	57	68	138	3.1601	0.96324
Our institution is partially open, but there are major disruptions during the COVID-19 pandemic	27	66	41	147	3.0961	1.06638
I feel I lost educational opportunities during the COVID-19 pandemic	25	73	100	83	2.8577	0.94549
The COVID-19 pandemic has resulted in the cancellation or postponement of classroom lectures	13	30	121	117	3.2171	0.81451
It is expected that the enrollment numbers for the upcoming academic year will be impacted by the COVID-19 pandemic	30	45	25	181	3.2705	1.07810
It is unlikely that exams will be conducted as scheduled this semester	26	41	39	175	3.2918	1.02830
The lockdown imposed due to COVID-19 has impacted the research activities carried out at my institution	23	26	20	212	3.4982	0.96409
Due to the COVID-19 pandemic, the completion of students' projects is at risk	13	38	86	144	3.2847	0.86855
The COVID-19 pandemic affects my learning performance in Biology	1	19	48	213	3.6833	0.61182
COVID-19 school lockdown: school extra-curricular activities in schools	16	29	118	118	3.2028	0.84397
The Ministry of Education did not provide support to higher institutions during the COVID-19 lockdown	17	13	15	236	3.5907	0.87410
In response to the current situation, the government has instructed universities to transition to online teaching and learning	18	42	109	112	3.6726	0.82349

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Table 4 (Continue). Analysis of the effect of COVID-19 on teaching and learning of biology in Federal College of Education, Zaria.

Statement	SD	D	A	SA	Mean	Std.
The COVID-19 pandemic affects my class projects	18	57	68	138	3.1601	0.96324
Universities were not provided with ICT facilities by the government to assist with online education	30	45	25	181	3.2705	1.07810
The COVID-19 pandemic affects the quality of my learning	23	26	20	212	3.4982	0.96409
The government has not allocated sufficient funds towards research aimed at finding a cure for COVID-19	1	19	48	213	3.6833	0.61182
The COVID-19 pandemic has had an effect on my motives for learning Biology	13	30	121	117	3.2171	0.81451
The public universities did not implement the government's directive to switch to online learning	13	38	86	144	3.2847	0.86855
The COVID-19 pandemic has affected my future educational goals	18	57	68	138	3.1601	0.96324

3.3. Research Question Two: What effect does COVID-19 have on Gender Differences among Biology students at the Federal College of Education in Zaria?

Table 5 shows the respondents perceived the effect of COVID-19 on gender differences among Biology students at the Federal College of Education, Zaria. The study shows that the mean rate of 3.1667 from male students strongly agreed with the negative effect of COVID-19 in the study area, also the female side has a mean rate of 3.367.

Table 5. Analysis of the effect of COVID-19 on gender among Biology students in Federal College of Education, Zaria.

Statement	Male						Female					
	SD	D	A	SA	Mean	Std.	SD	D	A	SA	Mean	Std.
COVID-19 school lockdown affects the academic program of senior secondary schools.	3	9	23	31	3.2424	0.86042	10	21	112	72	3.1442	0.77499
The COVID-19 pandemic has effects on internal and external examinations	4	11	8	43	3.3636	0.97091	12	12	18	173	3.6372	0.82514
COVID-19 lockdown has affected my institution	3	19	20	24	2.9848	0.91974	15	38	48	114	3.2140	0.97194
Our institution is partially open, but there are major disruptions during the COVID-19 pandemic	7	17	14	28	2.9545	1.05876	20	49	27	119	3.1395	1.06739
I feel I lost educational opportunities during the COVID-19 pandemic	6	22	12	26	2.8788	1.04536	19	51	88	57	2.8512	0.91518

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Table 5 (Continue). Analysis of the effect of COVID-19 on gender among Biology students in Federal College of Education, Zaria.

Statement	Male						Female					
	SD	D	A	SA	Mean	Std.	SD	D	A	SA	Mean	Std.
The COVID-19 pandemic has resulted in the cancellation or postponement of classroom lectures	6	6	25	29	3.1667	0.93781	7	24	96	88	3.2326	.77451
It is expected that the enrollment numbers for the upcoming academic year will be affected by the COVID-19 pandemic.	8	18	3	37	3.0455	1.15601	22	27	22	144	3.3395	1.04616
It is unlikely that exams will be conducted as scheduled this semester	4	18	12	32	3.0909	1.00349	22	23	27	143	3.3535	1.03023
The lockdown imposed due to COVID-19 has impacted the research activities being carried out at my institution.	7	13	3	43	3.2424	1.11024	16	13	17	169	3.5767	0.90296
Due to the COVID-19 pandemic, the completion of students' projects is at risk	5	14	18	29	3.0758	0.98153	8	24	68	115	3.3488	0.82268
The COVID-19 pandemic affects my learning performance in Biology.	1	6	13	46	3.5758	0.72453	0	13	25	167	3.7163	0.57067
COVID-19 school lockdown: school extra-curricular activities in schools	5	9	20	32	3.1970	0.94819	11	20	98	86	3.2047	0.81170
The Ministry of Education did not provide support to higher institutions during the COVID-19 lockdown	8	6	7	45	3.3485	1.07406	10	13	16	176	3.6651	0.79098
In response to the current situation, the government has instructed universities to transition to online teaching and learning.	8	14	18	26	3.4091	1.02247	10	28	91	86	3.7535	0.73604
The COVID-19 pandemic affects my class projects	3	19	20	24	2.9848	0.91974					3.1767	0.82960
Universities were not provided with ICT facilities by the government to assist with online education	6	22	12	26	2.8788	1.04536	19	51	88	57	2.8512	0.91518

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Table 5 (Continue). Analysis of the effect of COVID-19 on gender among Biology students in Federal College of Education, Zaria.

Statement	Male						Female					
	SD	D	A	SA	Mean	Std.	SD	D	A	SA	Mean	
The COVID-19 pandemic affected the quality of my learning.	6	6	25	29	3.1667	0.93781	7	24	96	88	3.2326	0.77451
The government has not allocated sufficient funds towards research aimed at finding a cure for COVID-19	8	18	3	37	3.0455	1.15601	22	27	22	144	3.3395	1.04616
The COVID-19 pandemic has had an effect on my motives for learning Biology.	4	18	12	32	3.0909	1.00349	22	23	27	143	3.3535	1.03023
The public universities did not implement the government's directive to switch to online learning	6	22	12	26	2.8788	1.04536	19	51	88	57	2.8512	0.91518
The COVID-19 pandemic has affected my future educational goals.	7	13	3	43	3.2424	1.11024	16	13	17	169	3.5767	0.90296
The government did not provide any COVID-19 palliatives for students in the Federal College of Education, Zaria	8	14	18	26	3.4091	1.02247	10	28	91	86	3.7535	0.73604
During the COVID-19 lockdown, students were not provided with subsidized data to facilitate online education.	5	14	18	29	3.0758	.98153	8	24	68	115	3.3488	0.82268
During the COVID-19 lockdown, students were not taught how to use online applications for e-learning	8	14	18	26	3.4091	1.02247	10	28	91	86	3.7535	0.73604
The COVID-19 pandemic affects my subject knowledge in Biology	8	14	18	26	3.4091	1.02247	10	28	91	86	3.7535	0.73604
Average Response Mean (ARM)	6	14	14	32	3.1667	1.0032	14	27	60	114	3.367	0.8590

Table 6 reveals that the mean rate of male students is 3.1667, with a standard deviation of 1.0032, while that of females is 3.367, with a standard deviation of 0.859, and the gender difference is 0.2003.

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Table 6. The respondents perceived the effect of COVID-19 on gender differences among Biology students at the Federal College of Education, Zaria.

Variable	N	Mean	Std	Mean difference
Male	66	3.1667	1.0032	
				0.2003
Female	215	3.367	0.859	

3.4. Research Question Three : What Are The Challenges Faced by Biology Students During The Period of COVID-19 in the Federal College of Education, Zaria?

Table 7 indicates the respondents' perceived challenges faced by Biology students during the period of COVID-19 in the Federal College of Education, Zaria. The result reveals that the COVID-19 lockdown brought about an insufficient period of study, thereby leading to a crash programme among Biology students in FCE, Zaria, with an average of 3.2171. The COVID-19 lockdown led to delays in the completion of many Biology programs in FCE, Zaria, with an average rating of 3.2918. COVID-19 lockdown brought about the challenge of offering voluntary self-help sensitization on observance of COVID-19 guidelines among Biology students in FCE, Zaria, with an average rating score of 3.1601. COVID-19 lockdown triggered high expectations from Biology students by complying with the COVID-19 protocols in FCE, Zaria, with a mean rate of 3.0961. There is an inadequate number of student-to-student relationships in an online class, especially during the period of the COVID-19 pandemic, with an average score of 3.2705. During the period of COVID-19, students of Biology found it difficult to carry out group tasks with an average rating score of 3.4982.

Table 7. Analysis of challenges faced by Biology students during the period of COVID-19 in Federal College of Education, Zaria.

Statement	SD	D	A	SA	Mean	Std.
The COVID-19 lockdown brought about an insufficient period of study, thereby leading to a crash program among Biology students in FCE, Zaria.	13	30	121	117	3.2171	0.81451
The COVID-19 lockdown led to a delay in the completion of many Biology courses in FCE, Zaria.	26	41	39	175	3.2918	1.02830
The COVID-19 lockdown brought about the challenge of offering voluntary self-help sensitization on the observance of COVID-19 guidelines among Biology students in FCE, Zaria.	18	57	68	138	3.1601	0.96324
The COVID-19 lockdown triggered high expectations from Biology students by complying with the COVID-19 protocols in FCE, Zaria.	27	66	41	147	3.0961	1.06638
There is an inadequate number of student-to-student relationships during online classes, especially during the period of the COVID-19 pandemic.	30	45	25	181	3.2705	1.07810
During the period of COVID-19, students of Biology find it difficult to carry out group tasks	23	26	20	212	3.4982	0.96409

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3.5. Research Hypothesis One: COVID-19 has no Significant Effect on The Teaching and Learning of Biology in the Federal College of Education, Zaria.

Table 8 reveals that the p-value (0.000) is less than the 0.05 level of confidence. That means the t-calculated (5.143) lies outside the range of +1.96 to -1.96, hence it is significant. The t-value from the table at a 95% confidence interval is 1.96. Since the p-value is 0.0000, this implies that the value is less than the p-value of 0.05. The study accepted that COVID-19 has a significant effect on the teaching and learning of Biology in the Federal College of Education, Zaria.

Table 8. T-test analysis of the significant effect of COVID-19 in teaching and learning of biology at Federal College of Education, Zaria.

Variable	n	Mean	Std.	Df	t-cal	t-crit	p-value	Remark
Agreed	226	3.323	0.894	280	5.143	1.96	0.000	Significant
Disagreed	55	0.677008	0.060					

3.6. Research Hypothesis Two: There is no significant difference effect of COVID-19 on gender and academic performance among Biology students in the Federal College of Education, Zaria.

Table 9 reveals that the p-value (0.051213) is greater than the 0.0500 level of confidence. Since the t-calculated (1.121) lies inside the range +1.96 to -1.96, it is not significant. The t-value from the table at a 95% confidence interval is 1.964. Since the p-value is 0.051213, this implies that the p-value is greater than the p-value of 0.05. The study accepted that there is a significant difference effect of COVID-19 on gender and academic performance among Biology students in the Federal College of Education, Zaria.

Table 9. T-test analysis of significant differences in the effect of COVID-19 on gender and academic performance among Biology students in Federal College of Education, Zaria.

Variable	N	Mean	Std.	Df	t-cal	t-crit	p-value	Remark
Agreed		3.1667	1.0032	226	1.121	1.96	0.05113	Not Significant
Disagreed	215	3.367	0.859					

3.7. Research Hypothesis Three: The challenges of COVID-19 have had no significant effect on Biology students during the period of COVID-19 in the Federal College of Education, Zaria.

Table 10 reveals that the p-value (0.0163) is less than the 0.05 level of confidence. Based on the calculated t-value (1.215), which is within the range of +1.96 to -1.96, it can be inferred that the observation is significant. The t-value presented in Table 10 at a 95% confidence interval is 1.964. Since the p-value is 0.0163, this implies that the value is greater than the p-value of 0.05. The study accepted that the challenges of COVID-19 have a significant effect on Biology students during the period of COVID-19 in the Federal College of Education, Zaria.

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Table 10. T-test analysis of the significant effect of challenges on biology students during the period of COVID-19 in Federal College of Education, Zaria.

Variable	N	Mean	Std.	Df	t-cal	t-crit	p-value	Remark
Agreed	214	3.422	0.832					
				280	1.215	1.96	0.0163	Not Significant
Disagreed	67	0.578	0.168					

The present study was found to be in alignment with the research conducted (Ogunode & Orjinmo, 2020). This previous research revealed that every single participant unanimously agreed that the closure of educational institutions as a result of the COVID-19 pandemic had a substantial influence on the research initiatives of higher education establishments in the Federal Capital Territory (FCT). Furthermore, all respondents agreed that the pandemic would have implications for the flow of international research grants into these institutions. Additionally, a significant majority of 92% of the respondents concurred that the pandemic would affect the government funding allocated to research in higher educational institutions in the FCT. Finally, all respondents were in disagreement that higher educational institutions have no obligation to their communities by raising awareness about the prevention of COVID-19.

Moreover, the outcomes of this study align with the discoveries, revealed that the COVID-19 pandemic has hurt the education industry. These effects include disruptions in learning (Onyema & Deborah, 2020). Due to the pandemic, there has been a decrease in the availability of educational and research resources, resulting in job loss and an increase in student loan debts. The research also indicated that many educators and students relied on technology to facilitate ongoing learning. The COVID-19 pandemic has forced educational institutions around the world to transition to online learning. This method of distance learning has become the norm for many students who are unable to attend in-person classes due to the current health crisis (Mustapha *et al.*, 2020). However, it is worth noting that online education faces various challenges, including insufficient infrastructure, such as network and power issues, as well as difficulties related to accessibility and availability, along with a lack of proficiency in digital skills.

Moreover, a study conducted found no statistically significant gender impact on social studies. The results of this investigation indicate that students who were exposed to audio-visual instructional materials displayed a greater level of academic achievement when compared to those who did not have access to such materials (Mishra & Yadav, 2014).

4. CONCLUSION

COVID-19 has a significant effect on the teaching and learning of Biology in the Federal College of Education, Zaria. The study accepted that there is no significant difference in the effect of COVID-19 on gender and academic performance among Biology students in the Federal College of Education, Zaria. The study also accepts that the challenges brought about by COVID-19 have a significant effect on Biology students' performance during the period of COVID-19 in the Federal College of Education, Zaria.

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5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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