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Impact of Covid-19 Pandemic on Academic Achievement of Students of Science Colleges in Minna Metropolis of Niger State, Nigeria

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Abstract:

The decision of Niger State Government to enforce a total lockdown in the State as a response to the Covid-19 Pandemic had deleterious effects on all walks of life including the educational sector. Schools were completely shut down for about eight months and students were out of school for this long. This study investigated the impact of Covid-19 pandemic on academic achievement of Students of Science Colleges in Minna metropolis of Niger State, Nigeria. Ex-post facto research design was adopted for the study. Structured questionnaires were issued to 380 students drawn from the six (6) Science Colleges in Minna metropolis and their scores in Biology, Chemistry and Physics in two terminal exams were also obtained. The study showed that the Covid-19 lockdown caused a major interruption on students' learning process which resulted in very poor academic achievement in Biology, Chemistry and Physics after the lockdown. However, the poor achievements in these subjects were neither associated with differences in gender and/or parents' employment status nor variation in subjects. This therefore shows the need for parents/guardians to encourage their children/wards to be emotionally and psychologically ready and not be overwhelmed by the academic task ahead. Teachers should also plan and deliver their lessons using the most simple and understandable methods since most of these students are still trying to recover from the shock of the pandemic. As a very useful preparatory step for future cases of school's lockdown, e-learning should be integrated into the school system in the state.

Keywords: Academic achievement, covid-19 pandemic, impact, Science College, students

1. Introduction

Certainly, academic achievement is a very important tool with which the success, ability and capability of a student to contribute to the development of a society are measured. The implication of this is that a student that achieves beyond average of the standard set by the society is not only seen as brilliant but as well probable to contribute meaningfully to the sustenance, growth and development of such society, especially, in the future. As a result of this, every society constantly observes the academic achievement of its students at all levels of educational institutions.

In Nigeria, researches have shown that students' academic achievement is declining at a disturbing rate (Adeyemi, 2018; Love, 2018; Gwarjiko, 2015; Tenibaje, 2009) and some of the reasons that have been advanced for such decline are personal factors such as individual's intelligence, knowledge, study habit, motivation, anxiety, self-esteem, age, gender and locus of control (Fathi-Ashtiani, Ejei, Khodapanahi & Tarkhorani, 2007; Cizek & Burg, 2006; Akinleke, 2012; Gwarjiko, 2015); school factors in terms of student-teacher relationship, the school's background characteristics, the environment and classroom conditions (Ushie, Emeka, Ononga & Owolabi, 2012) and certain family factors of the students such as family structure (broken or intact), family size (small or large), family type (monogamous, polygynous or single-parenting) and socio-economic status of parents (Ajila & Olutola, 2000; Yakubu, 2017; Love, 2018; Adeyemi, 2018; Igbinsosa, 2014; Akinleke, 2017).

The untimely closure of schools in Niger State and Nigeria at large on 23rd March, 2020 was a positive response by governments at both levels to protect students from possible risk of contracting Covid-19 because school environments are places where a very large number of people (both students and teachers) meet, and this makes them dangerous places where diseases can rapidly spread. Many low- and middle-income countries have however lamented the devastating economic effects that will come with Covid-19 as many economic drivers will be run down (Sintema, 2020) but little has actually been said about the effects (short-term and long-term) of this lockdown on education, particularly its effects on the academic achievement of secondary school students who by virtue of the lockdown lost almost a whole academic year. It is highly likely that the Covid-19 pandemic will have a dramatic long-term impact on students' competencies and

increase existing education inequalities despite emergency efforts put in place by Niger State Government to cushion these impacts.

This concern is justified by the existence of documented researches revealing the adverse effect of the lockdown on the educational sector as a whole. For instance, Ahmad (2021) investigated the effects of Covid-19 on students' academic performance in senior secondary schools Chemistry in Gashua-Bade Local Government Area of Yobe State, Nigeria among two hundred and eighty-nine (289) students. Both descriptive and inferential (student t-test) statistics were employed. The study used a methodology very similar to the one adopted in this current study – use of students' scores before and during the Covid-19 pandemic. The study revealed that there is significant difference in mean scores of students before and during Covid-19 in senior secondary school Chemistry. Similarly, Edeh, *et al.*, in 2020, sampled opinions among 200 respondents comprising of educators and students from various tertiary institutions to investigate the impact of the Coronavirus pandemic on education in Nigeria and India. Data was collected using structured questionnaire. It was found that Coronavirus pandemic has adverse effects on school characteristics like research, academic programmes, staff professional development and jobs in the academic sector. These effects were felt by educational institutions, educators, students, parents and other stakeholders in education.

This study was anchored on two theories; the Bronfenbrenner's Ecological Systems Theory (EST) and the Martin Ford's Motivational Systems Theory (MST). Both theories hold that environment is an indispensable factor in determining the academic achievement of a learner (Bronfenbrenner, 1977; Ford, 1992). The Covid-19 pandemic has no doubt affected the learning environment of students worldwide. The environmental changes due to Covid-19 may increase students' stresses regarding their academic achievement. In addition, students encounter many stresses concerning high academic expectations, such as through parents who put an immense amount of pressure on children for high educational attainment and performance or raised expectations of the society. This study therefore analysed the impact of Covid-19 pandemic on academic achievement of Students of Science Colleges in Minna metropolis of Niger State, Nigeria.

1.1. Objectives of the Study

- To compare the mean academic achievement of Students of Science Colleges in Minna metropolis before and after the Covid-19 lockdown.
- To compare the mean academic achievement of male and female Students of Science Colleges in Minna metropolis due to Covid-19 pandemic.
- To determine how the Covid-19 pandemic affected the studies of Students of Science Colleges in Minna metropolis.
- To determine the methods employed to learn during the Covid-19 lockdown by Students of Science Colleges in Minna metropolis.
- To find out how Students of Science Colleges in Minna metropolis perceive learning after Covid-19 lockdown?

1.2. Research Questions

- Is there any difference in the mean academic achievement of Students of Science Colleges in Minna metropolis before and after the Covid-19 lockdown?
- Is there any difference in the mean academic achievement of male and female Students Science Colleges in Minna metropolis due to Covid-19 pandemic?
- In what ways did the Covid-19 pandemic affect the studies of Students of Science Colleges in Minna metropolis?
- Did Students of Science Colleges in Minna metropolis employ any methods of learning during the Covid-19 lockdown?
- How do Students of Science Colleges in Minna metropolis perceive learning after Covid-19 lockdown?

1.3. Research Hypotheses

The following null hypotheses were tested in this study (at $p < 0.05$ significance level):

- H_{01} : There is no statistically significant difference in mean academic achievement of Students of Science Colleges in Minna metropolis before and after the Covid-19 Lockdown.
- H_{02} : There is no statistically significant difference in mean academic achievement of male and female Students of Science Colleges in Minna metropolis due to Covid-19 pandemic.

1.4. Significance of the Study

As widely described, a child's environment plays an important role in the acquisition of knowledge, skills, values and ideas. Unfortunately, the pattern of schooling lately had been distorted due to the emergence of Covid-19 pandemic, affecting the child's upbringing in and out of school. The findings anticipated in this study shall therefore assist all stakeholders (parents, students, school managements, curriculum planners, policy makers and the government) to be better aware of the roles expected of them in trying to alleviate the effect of the Covid-19 pandemic on the educational sector of Niger State in particular and Nigeria in general.

2. Methodology

The study employed Ex-post facto design or causal comparative design. The total population for this study was 7,330 students drawn from all the six (6) public science colleges in Minna metropolis of Niger State. The schools included (1) Model Science College, Tudun Fulani, Minna; (2) Father O'Connell Science College, Minna; (3) Government Girls' Day

Science College, Bosso Road, Minna; (4) Government Day Science College, Tunga, Minna; (5) Maryam Babangida Science College, Bosso, Minna; (6) Government Science College, Chanchaga, Minna.

In order to arrive at a representative sample from this population, both the non-probability (purposive) and probability (stratified) sampling techniques were adopted. The Yaro-Yamane Statistical Formula was used to arrive at a sample size of 380. The formula is:

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = the sample size

N = the finite population = 7,330

e = the significance level = 0.05

1 = constant

2.1. Data Collection and Analysis

Two different instruments were used for collection of data in this study. The first was a structured questionnaire designed to collect students' biodata (like name, school and gender) and opinions on how the Covid-19 lockdown affected their studies and on how they were able to learn during this period.

The second instrument was students' scores and grades which were obtained from Exams and Records Department of each school. The average scores of the students in each of Biology, Chemistry and Physics for two terms (one term before the lockdown and one term after the lockdown) matched with their responses on the questionnaires. They were used to measure academic achievement. A score of 50% and above was regarded as "Pass" while score below 50% was considered "Fail".

Both descriptive and inferential statistics were used to analyse the data collected. For descriptive statistics, tabulated frequencies, percentages, means and standard errors of means were calculated. Meanwhile, one-way analysis of variance (ANOVA) was used to test the hypotheses at 0.05 level of significance.

3. Discussion of Results

3.1. Descriptive Statistics

Table 1 below contains the distribution of respondents by gender. It shows that 40.53% of them are males while the remaining 59.47% are females.

Gender	Frequency	Percentage (%)
Male	154	40.53
Female	226	59.47
Total	380	100.00

Table 1: Distribution of Respondents by Gender

A summary of the records of the academic achievements of the students obtained from the Schools' Exams and Records Departments are presented in table 2 below. It reveals that an average of 75.79% scored above 50% in Biology, Chemistry and Physics before the Covid-19 lockdown while an average of only 38.95% passed the exams after the Covid-19 pandemic thus translating into a huge rate of failure (61.05%) during this period.

Subject	Scores BCL				Scores ACL			
	Pass		Fail		Pass		Fail	
	F	%	F	%	F	%	F	%
Biology	310	81.58	70	18.42	178	46.84	202	53.16
Chemistry	298	78.42	82	21.58	121	31.84	259	68.16
Physics	256	67.37	124	32.63	145	38.16	235	61.84
Averages	288	75.79	92	24.21	148	38.95	232	61.05

Table 2: Academic Achievement of Students in Biology, Chemistry and Physics Before and After Covid-19 Lockdown
BCL = Before Covid-19 Lockdown; ACL = After Covid-19 Lockdown

In Table 3 below, the academic achievement of male and female Students of Science Colleges in Minna Metropolis is presented. It shows that an average of 51.95% of male passed the three subjects as against a very low 30.09% of the female students. Meanwhile a worrisome 69.91% of the female students obtained an average score in the three subjects lower than 50% as against 48.05% of the male students.

Although the female students performed higher than their male counterparts in Biology, a larger percentage of the male students performed better in both Chemistry and Physics.

Subject	Male				Female			
	Pass		Fail		Pass		Fail	
	F	%	F	%	F	%	F	%
Biology	61	39.61	93	60.39	117	51.77	109	48.23
Chemistry	86	55.84	68	44.16	35	15.49	191	84.51
Physics	94	61.04	60	38.96	51	22.57	175	77.43
Averages	80	51.95	74	48.05	68	30.09	158	69.91

Table 3: Academic Achievement of Male and Female Students of Science Colleges in Mina Metropolis Due to Covid-19 Pandemic

Table 4 contains how Covid-19 pandemic affected the studies of the respondents. All the students agreed that the lockdown prolonged the academic session they were on. Similarly, 83.42% said they had difficulty in remembering knowledge acquired before the lockdown while 16.58% said they didn't. Meanwhile, 48.68% said they felt stressed by the Covid-19 protocols for resumption of schools such as wearing of face masks, social distancing and frequent washing of hands with soap and water and using hand sanitizers. But a larger proportion of them (51.32%) disagreed with this. In addition, 97.11% of the respondents opined that they faced economic meltdown while 2.89% said they didn't. The students that agreed to have faced economic meltdown due to the Covid-19 pandemic may not have directly witnessed it, but indirectly from their parents/guardians. For instance, some parents/guardians may have lost their jobs or businesses, some may no longer be able to provide transport fares or break stipends for their wards again, some may find it difficult to buy learning materials for their wards, etc.

Effect	Response	Frequency	Percentage (%)
Prolonged academic session	Yes	380	100.00
	No	0	0.00
Difficulty in remembering knowledge acquired before the lockdown	Yes	317	83.42
	No	63	16.58
Stress of Covid-19 protocol (e.g., face masks, social distancing etc.)	Yes	185	48.68
	No	195	51.32
Economic meltdown	Yes	369	97.11
	No	11	2.89

Table 4: Effect of Covid-19 Lockdown on Studies of Students of Science Colleges in Minna Metropolis

Table 5 below contains result on how the respondents learned during the Covid-19 pandemic. It revealed that majority of them (64.21%) did not learn during the whole stay-at-home period. This is very disturbing since these students spent about eight (8) good months at home without learning anything. No wonder the mass failure in their Biology, Chemistry and Physics tests and examinations after the lockdown. They were academically dormant for too long hence the huge impact on their academic achievements.

Nonetheless, 3.42% of them learnt by studying on their own, 2.11% had private tutors hired for them by their parents/guardians, 2.89% of them were taught by their siblings and parents/guardians, 6.84% learnt via online classes while the remaining 20.58% learnt via radio/television programmes.

Mode of Learning	Frequency	Percentage (%)
Private study	13	3.42
Private tutor	8	2.11
Parent/sibling tutor	11	2.89
Online classes	26	6.84
Radio/television classes	78	20.53
None	244	64.21
Total	380	100.00

Table 5: Methods Employed by Students of Science Colleges in Minna Metropolis to Learn During the Covid-19 Lockdown

Table 6 expresses how the students perceived learning after the Covid-19 pandemic compare to the period before it. A vast majority (85.79%) agreed that learning became more difficult. 6.5% of them however, opined that learner has become easier while 7.63% saw no difference in learning between the two periods.

Participation	Frequency	Percentage (%)
Easier	25	6.58
More Difficult	326	85.79
The Same	29	7.63
Total	380	100.00

Table 6: Perception of Respondents about Learning after the Covid-19 Lockdown

3.2. Test of Hypotheses

Each research hypothesis was tested using one-way analysis of variance (ANOVA) at 0.05 level of significance and the hypothesis was either accepted or rejected.

3.2.1. Research Hypothesis One

- H_{01} : There is no statistically significant difference in mean academic achievements in Biology, Chemistry and Physics of Students of Science Colleges in Minna metropolis before and after the Covid-19 Lockdown.

Subject	Period	N	Mean Score (\bar{x})	S.E.M.	D.F.	Sig.
Biology	BCL	380	67.40	1.00	758	0.00
	ACL	380	22.02			
Chemistry	BCL	380	63.16	1.07	758	0.00
	ACL	380	21.59			
Physics	BCL	380	55.70	0.98	758	0.00
	ACL	380	22.03			

Table 7: Relationship between Mean Academic Achievements in Biology, Chemistry and Physics of Students of Science Colleges in Minna Metropolis before and after the Covid-19 Lockdown

BCL = Before Covid-19 Lockdown; ACL = After Covid-19 Lockdown; S.E.M. = Standard Error of Mean; D.F. = Degree of Freedom

- Decision: The null hypothesis is rejected since $p > 0.05$ ($p = 0.00$). Therefore, there is statistically significant difference in mean academic achievements in Biology, Chemistry and Physics of Students of Science Colleges in metropolis before and after the Covid-19 lockdown.

3.2.2. Research Hypothesis Two

- H_{02} : There is no statistically significant difference in mean academic achievement in Biology, Chemistry and Physics of male and female Students of Science Colleges in Minna metropolis due to Covid-19 pandemic.

Gender	N	Mean Score (\bar{x})	S.E.M.	D.F.	Sig.
Male	462	21.83	0.54	1138	0.75
Female	678	21.61	0.45		

Table 8: Relationship between Mean Academic Achievements in Biology, Chemistry and Physics of Male and Female Students of Science Colleges in Minna Metropolis due to Covid-19 Pandemic
S.E.M. = Standard Error of Mean; D.F. = Degree of Freedom

- Decision: The null hypothesis is accepted since $p > 0.05$ ($p = 0.75$). Therefore, there is no statistically significant difference in mean academic achievements in Biology, Chemistry and Physics of male and female Students of Science Colleges in Minna metropolis due to Covid-19 pandemic.

3.3. Major Findings

- This study has revealed that the Covid-19 pandemic has affected Students of Science Colleges in Minna metropolis mainly through prolonged academic session, creating difficulty in remembering knowledge acquired before the lockdown for the students, causing many of them to stay academically inactive for a very long period of time, increased stress because of Covid-19 protocol (e.g. face masks, social distancing etc.) for resumption of schools and creating difficulty in learning because of academic dormancy.
- The study also indicated that majority of the Students in Science Colleges in Minna metropolis did not learn during the Covid-19 pandemic while only a handful of them learnt through private study, private tutors, parent/sibling tutors, online classes and radio/television classes.
- This study further revealed that the Covid-19 lockdown had a negative impact on the academic achievement of students of science colleges in Minna metropolis. This is evident in the low marks recorded by them in Biology, Chemistry and Physics tests and examinations taken immediately after the lockdown. This is also backed by the significant statistical difference that was found when mean academic achievements of these students in the three subjects before and after the lockdown were compared.
- The study however demonstrated that there is no statistically significant difference between mean academic achievements in Biology, Chemistry and Physics of male and female Students of Science Colleges in Minna metropolis due to Covid-19 pandemic.

4. Conclusion

The national lockdown of educational institutions in Niger State and across Nigeria at large have caused a major interruption in students learning; disruptions in academic sessions, suspension of terminal examinations, creating a gap in teaching and learning, difficulty in remembering knowledge acquired before the lockdown and even in learning new knowledge, academic dormancy and probably caused manpower shortage in schools as a result of death from Covid-19. These disruptions due to Covid-19 pandemic consequently have resulted into very poor academic achievements in Biology, Chemistry and Physics of students in science colleges in Minna metropolis after the lockdown. However, the poor achievement in these subjects was not associated with gender differences, subject variations and differences in employment status of parents.

5. Recommendations

Based on the findings of this study, the following recommendations are proffered:

- Parents/Guardians must come up with ways of encouraging their children/wards to be emotionally and psychologically ready and not overwhelmed by the academic task ahead.
- Teachers should also take into cognizance the fact that many of the students are still trying to recover from the shock of the pandemic. They should therefore plan and deliver their lessons using the most simple and understandable methods.
- Guidance and counseling departments of schools need to be more proactive in their schedule of duties because students are currently faced with many issues arising from the Covid-19 pandemic which could negatively affect their studies. For instance, some students now trek to school or come to school without stipends for feeding because their parents can no longer provide the monetary support again since they lost their jobs or businesses.
- Further studies should be conducted to include students in other disciplines such as arts, social sciences and technical studies, pupils in the primary schools, students in higher levels of learning and students in other parts of the state.

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