INVESTIGATING THE INFLUENCE OF COVID-19 ETHICS ON STUDENTS' INTEREST IN LEARNING CHEMISTRY

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Abstract: *This study discusses the influence of COVID-19 ethics on students' interest in learning chemistry. Five research questions and one null hypothesis guided the study. A descriptive survey research design was used to carry out this study. The population for this study consists of 2,644 chemistry Students in the 19 public secondary schools in Awka South Local Government Area of Anambra state. A sample size of 80 chemistry students was used for the study. The simple random sampling method was used to select eight (8) public secondary schools in Awka South Local Government Area. Therefore, 10 chemistry students were selected from each of the eight secondary schools. Twenty (20) item structured questionnaires on a four-point rating scale developed by the researchers were used for data collection. The instrument was validated by two experts. To determine the internal consistency of the instrument, the Cronbach alpha formula was used and a reliability coefficient of 0.87 was obtained. After the administration of the instrument to the respondents, the data obtained were analyzed using mean and standard deviation to answer the research question and z-test to test the null hypothesis at the significance level of 0.05. The findings of the study revealed that social distancing, use of face masks, regular washing of hands, use of hand sanitizers and restriction of movement are common COVID-19 ethics. Also, COVID-19 negatively affected students' chemistry learning and influences students' interest to a high extent. It was shown that COVID-19 ethics influenced more of male students'*

interest than their female counterparts as there was a significant difference between the male and female chemistry students on COVID-19 ethics on student interest in favour of the males. Thus, providing enough lesson time and provision of ICT and e-learning facilities are possible ways to improve students' interest in learning chemistry during the COVID-19 era.

Keyword: *chemistry; learning; covid-19; ethics; influence; students; interest*.

Introduction

Chemistry is a physical science related to the study of various atoms, molecules, crystals and other aggregates of matter whether in isolation or combination which incorporates the concept of energy and entropy in relation to spontaneity of chemistry process (Nnoli, 2022). Chemistry deals with the investigation of the properties of matter and the ways in which they interact, combine, change and uses to form new substances. Chemistry is equally very necessary for the management of our natural resource, provision of health facilities, adequate food supply and favorable living environment, therefore a country without chemistry knowledge cannot develop technologically (Nkwoma, 2020). Chemistry is concerned with the utilization of natural substances and the creation of artificial ones. As a practical subject chemistry requires various kinds of techniques by teachers in their lesson to enhance student's instructional gain (Oriahi, (2019). Hence, there is need for chemistry teachers irrespective of any pandemic or emergency to improvise the needed materials to avoid problems like scarcity of standardized materials. Thus, there is no excuse not to effectively teach chemistry due to non-availability of funds or insufficient standard equipment (Federal Ministry of Education 2017).

Covid-19 is the pandemic that attached the whole world in the year 2019. COVID-19 pandemic presents serious ethical challenges in the areas of resource allocation and priority-setting, physical and social distancing, public health surveillance, health-care worker's rights and obligations to conduct of clinical trials and these posed some problems in educational system (Nnoli, 2021). The era of covid-19 in turn are complicated by the diverse health systems and unique cultural and socio-economic contexts of countries. Consequently, there is a great need for guidance to ensure ethical conduct of research, decision making in clinical care, education, and public health policymaking at every level of the global covid-19 response (Kelley, 2021). Covid-19 is

an acute respiratory illness in humans caused by a corona virus, capable of producing severe symptoms and in some cases death, especially in older people and those with underlying health conditions. Covid-19 is the pandemic that attached the whole world in the year 2019. COVID-19 pandemic presents serious ethical challenges in the areas of resource allocation and priority-setting, physical and social distancing, public health surveillance, health-care worker's rights and obligations to conduct of clinical trials and these posed some problems in educational system (Shidiq et al, 2020). The era of covid-19 in turn are complicated by the diverse health systems and unique cultural and socio-economic contexts of countries. Consequently, there is a great need for guidance to ensure ethical conduct of research, decision making in clinical care, education, and public health policymaking at every level of the global covid-19 response.

In anticipating the spread of this virus, many countries impose a lockdown status. The enforcement of the lockdown status significantly affects not only the economy but also education sector. United Nations Education, Scientific and Cultural Organization (UNESCO) estimate that 107 countries have implemented school closures due to the COVID-19 virus, which affects 862 million children and adolescents or half of the global student's population (Shidiq, 2020). Children have milder symptoms of COVID-19, and their role in transmitting the disease remains unclear. However, the government proactively close schools to slow the transmission, reduce the burden of health care, or protect populations at risk. The COVID-19 pandemic adversely impacts the progress some governments were making about increasing the education budget. This is because education is an essential right for children, young and adults in emergencies and must be a priority from the very beginning of any and all emergency responses (Philani, 2020). Therefore, this is a crisis that requires urgent attention and collective action by all governments, stakeholders and communities. The outbreak of COVID-19 has compounded the plight of learners in countries affected and or emerging from conflict and disaster.

Despite the vital role and importance of chemistry, the interest rate in study in the recent COVID-19 era has reduces. Various factors may contribute to students' low interest in chemistry, such as students' background, poor performance, unqualified teachers and absenteeism from school (Almahdawi, 2021). On the other hand, ethics is defined as a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong behavior (Paul & Elder, 2021). The field of ethics concerns matters of value. Ethics seeks to

resolve questions of human morality by defining concepts such as good and evil, right and wrong, virtue and vice, justice and crime (Singer, 2017).

Statement of the Problem

Students' interest towards chemistry which has been considered an important part of learning has been affected and changed in the previous days due to various unhealthy factors such as COVID-19 ethics. Due to restriction of movement to reduce the spread of covid-19, some students deviate their attention from the learning of chemistry and hence their interest in chemistry hindered. Declining interest in science has been causing problems in learning because it affects the focus of students in learning chemistry. The outbreak of COVID-19 has compounded the plight of learners in countries affected and or emerging from conflict and disaster. Despite the vital role and importance of chemistry, the interest rate in study in the recent COVID-19 era has reduces. Various factors may contribute to students' low interest in chemistry, such as students' background, poor performance, unqualified teachers and absenteeism from school (Almahdawi, 2021).

There is need to harness these challenges of students' interest in chemistry due to covid-19 pandemic by making chemistry education in Nigeria more functional and meaningful to both youths and society at large. One of the best ways to achieve this is to engage in E-learning ability in such a way that chemistry teachers shall use the opportunity to inculcate to them all they missed during the lock down. This would help to maintain the curriculum standard.

Hinged on these, this study tends to investigate the influence of covid-19 ethics on student interest in learning chemistry in Awka South Local Government Area. Therefore, this study sought to ascertain the following: The;

1. COVID-19 ethics.
2. COVID-19 ethics influence students learning of chemistry.
3. extent to which COVID-19 ethics influence students interest in chemistry.
4. gender difference in COVID-19 ethics on student interest in chemistry.
5. Possible remedies to improve students interest in studying chemistryduring COVID-19.

Research Questions

The following research questions guided this study:

1. What are COVID-19 ethics?
2. How do COVID-19 ethics influence students learning of chemistry?
3. To what extent has COVID-19 ethics influence students interest in chemistry?
4. What are the gender differences in COVID-19 ethics on student interest in learning chemistry?
5. What are the possible remedies to improve students' interest in study chemistry?

Hypothesis

There is no significant difference between male and female students' interest in learning chemistry.

Methodology

A descriptive survey design was used for the study. The study was carried out in secondary schools in Awka South Local Government Area in Anambra State. The population comprised of all chemistry students (numbering 2,644 students) in 19 public secondary schools Anambra State. The sample consists of 80 chemistry students drawn from 8 out of 19 public secondary schools in Anambra State. Therefore, 10 chemistry students were selected from each of the eight secondary schools. The instrument for data collection was 20 items structured questionnaire developed by the researcher on a four-point scale of strongly agreed, agreed, disagreed and strongly disagreed. The reliability was found to be 0.87. Validation of the instrument was done by the two lecturers from the Department of Science Education, Nnamdi Azikiwe University, Awka.

The questionnaire has two sections: Section A sought information on the bio-data of the respondents. Awka South Local Government Area in Anambra state. Section B questionnaire was intended to elicit the opinions of the respondents on the influence of COVID-19 ethics on students' interest in learning chemistry. It was further divided into sections containing item questions in accordance to the specific purpose of the study and research questions developed from the study. After the administration of the instrument to the respondents, the data obtained were analyzed using mean and standard deviation to answer the research questions while z-test was used to test the null hypothesis at the significance level of 0.05. A mean of 2.50 and above indicated that the respondents agreed with items on the questionnaire while a

mean below 2.50 indicated that the respondents disagreed with the items.

Results

To answer the research questions and test the hypothesis the collected data were analysed and presented as below:

Research Question One: What are COVID-19 ethics?

Table 1: Mean of responses on the COVID-19 ethics

S/N	ITEMS	N	SA	A	D	SD	$\bar{x}$	REMARK
1.	Social distancing is a way of preventing covid-19	80	57	13	4	6	3.51	Accepted
2.	The use of face masks is to prevent the spread of covid-19	80	44	16	15	5	3.24	Accepted
3.	Regular washing of hands to reduce the spread of covid-19	80	52	18	4	6	3.45	Accepted
4.	Using of hand sanitizers minimizes the spread of covid-19	80	46	23	10	1	3.43	Accepted
5.	Restriction of movement to reduce the spread of covid-19	80	40	13	17	10	3.04	Accepted
	TOTAL						**3.33**	

The data presented in Table 1 shows the responses on the COVID-19 ethics as shown in items 1-5 which are all having above 2.5 which is the acceptance point. This indicates that social distancing, use of face masks, regular washing of hands, use of hand sanitizers and restriction of movement are common COVID-19 ethics.

Research Question Two: How do COVID-19 ethics influence students learning of chemistry?

Table 2: Mean of responses on how COVID-19 ethics influence students learning of chemistry.

S/N	ITEMS	N	SA	A	D	SD	$\bar{x}$	REMARK
6.	I don't have freedom to meet my teachers during free periods in	80	13	44	13	10	2.75	Accepted

	schools							
7.	I do not have sufficient time to learn chemistry during covid-19	80	35	35	6	4	3.26	Accepted
8.	Our teachers did not cover the syllabus due to covid-19	80	64	7	5	4	3.64	Accepted
9.	Not attending classes for a long time makes me not to be serious	80	58	10	4	8	3.48	Accepted
10.	I don't have access to computer for the e-learning during covid-19	80	20	33	17	10	2.79	Accepted
	TOTAL						**3.18**	

The data presented in Table 2 shows the responses on how COVID-19 ethics influence students learning of chemistry as shown in items 6-10 which are all having above 2.5 which is the acceptance point. This indicates that COVID-19 negatively affected the students learning as they do not have freedom to meet their teachers during free periods in schools, do not have access to computer for e-learning, lacks time to learn chemistry, and make the teachers not to cover the syllabus.

Research Question Three: To what extent has COVID-19 ethics influence students' interest in chemistry?

Table 3: Mean of responses on the extent COVID-19 ethics has influenced students' interest in chemistry

S/N	ITEMS	N	SA	A	D	SD	$\bar{x}$	REMARK
11.	Due to the lockdown, I could no longer study by myself	80	32	28	14	6	3.08	Accepted
12.	I don't take	80	47	13	3	17	3.13	Accepted

	classes seriously anymore after the lockdown							
13.	I have forgotten a lot which I was taught	80	50	16	4	10	3.33	Accepted
14.	Some of my classmates have abandon school after the covid-19 pandemic	80	58	12	7	3	3.56	Accepted
15.	Series of lockdown in covid-19 makes me lost my interest in chemistry	80	43	26	5	6	3.33	Accepted
	TOTAL						**3.29**	

The data presented in Table 3 shows the responses on the extent in which COVID-19 ethics has influenced students' interest in chemistry is high as shown in items 11-15 which are all having 2.50 above points which is the acceptance point.

Research Question Four: What are the gender differences in COVID-19 ethics on student interest in learning chemistry?

Table 4: Mean Response of Covid-19 ethics Among Male and Female Chemistry Students on Students' Interest in Chemistry.

S/N	GENDER	N	Mean

1.	MALE	32	2.40
2.	FEMALE	48	1.80
	TOTAL	**80**	**2.10**

The data presented in Table 4 shows that COVID-19 ethics indicates more of male interest in chemistry than female in respect to COVID-19 ethics.

Hypothesis

There is no significant difference between male and female students' interest in learning chemistry.

Table 5: Z-test of the mean ratings among male and female students on the Covid-19 ethics on Students' Interest in Chemistry. (P< 0.05)

	Gender	N	Mean	Std Dev	Std Error	df	t	P	Remark
Students' interest in learning chemistry	Male	32	2.40	.78	.44604	78	1.345	.0009	S
	Female	48	1.80	.73					

S = Significant (p <0.05)

Table 5 reveals that the p-value is lesser than the level of significance (0.05) which then means that the null hypothesis will be rejected. Therefore, there is a significant difference between male and female students' interest in learning chemistry in favour of the males with respect to COVID-19 ethics.

Research Question Five: What are the possible remedies to improve students' interest in study chemistry?

Table 6: Mean of responses on the possible remedies to improve students' interest in studying chemistry during COVID-19

S/N	ITEMS	N	SA	A	D	SD	$\bar{x}$	REMARK
16.	Enough time should be given to teachers to cover-up the syllabus	80	54	15	9	2	3.51	Accepted
17.	By increasing teachers' remuneration	80	23	41	7	9	2.98	Accepted
18.	Ensuring the provision of computers by the government	80	14	21	32	12	2.44	Rejected

19.	Engaging the students in practical work in all classes were necessary	80	44	26	5	5	3.36	Accepted
20.	E-learning and ICT should be encouraged in school	80	62	7	8	3	3.60	Accepted
	TOTAL						**3.18**	

The data presented in Table 6 shows the responses on the possible remedies to improve students' interest in studying chemistry during COVID-19 as shown in items 16-20 which are all having 2.50 above were accepted, except item 18 which is having below 2.50 which is rejected.

Discussion

The findings of this study revealed that social distancing, use of face masks, regular washing of hands, use of hand sanitizers and restriction of movement are common COVID-19 ethics. This is in line with Shidiq (2020) who asserted that due to the COVID-19 virus, over 107 countries closed down their schools and restricted movements.

Also, the study revealed that COVID-19 negatively affected the students learning as they do not have freedom to meet their teachers during free periods in schools, do not have access to computer for e-learning, lacks time to learn chemistry, and make the teachers not to cover the syllabus. The findings agree with Almahdawi (2021) who averred that during the COVID-19 era, students found it difficult to learn in their various schools.

Moreover, the finding of the study showed that the extent to which COVID-19 ethics has influenced students' interest in chemistry is high. As the chemistry students used in this study agreed that they have challenges on covid-19 ethics in learning chemistry and due to lockdown, some students lose interest in chemistry. For teachers not being able to cover the syllabus due to covid-19 ethics and lockdown, it will surely influence students learning and interest in chemistry.

Results also revealed that due to the lockdown, students could no more study by themselves, they have forgotten all they were taught, and some of the students have abandon school. It was empirically concluded that COVID-19 ethics influence on student's interest influence more of male students' interest than their female counterparts as there was a significant difference between the male and female chemistry students' interest with result to COVID-19 ethics on student interest.

Finally, it was revealed that providing enough lesson time, increasing teacher's remuneration, engaging the students in online practical works and provision of ICT and e-learning facilities are possible ways to improve students' interest in learning chemistry during COVID-19 era. This is in line with Shidiq et al (2020) who recommended the need for on-lining learning during and after COVID-19.

Conclusion

The covid-19 pandemic has negatively and profoundly impacted our global system leading to the disruption of educational system and causing students to lose interest in chemistry, hinder production of goods, loss of business and employment. Also, financial distress is becoming economic landmarks of the pandemic and the near-term challenges are never-ending. The COVID-19 pandemic with the novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has resulted in a major global health crisis. This has put tremendous strain on healthcare systems around the world and naturally raises issues concerning the allocation of scarce resources. Addressing this need around the world raises practical and ethical issues for the scientific research community internationally, more especially to be more concern on harnessing the challenges of the ethics of this pandemic in interest of students in learning chemistry education.

Recommendations

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

1. Teachers should be given enough time to teach and finish the syllabus
2. E-learning should be implemented in schools
3. Government should provide adequate materials for school teachers to use in order to aid learning.
4. E-learning and ICT should be encouraged in schools.
5. The global ethics community should work together to address the ethical implications of the covid-19 pandemic on educational system.
6. Global Health Ethics team should works to strengthen educational environments communication, collaboration and cooperation in these endeavors.

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