

EDUCATIONAL REMODELING AND LIMITATIONS IN THE TEACHING AND LEARNING OF BIOLOGY PRACTICALS DURING THE COVID-19 PANDEMIC

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Abstract

An assessment of educational remodeling and limitations in the teaching and learning of Biology practical during the Covid-19 pandemic was carried out using one hundred and twenty respondents (120) from Rivers State University Port Harcourt and Ignatius Ajuru University of Education Port Harcourt, all in Rivers State, Nigeria. Descriptive survey design using e-learning strategies was adopted for the study. A 20-item instrument titled 'Impact of Covid-19 Pandemic in the Teaching and Learning of Biology Practical Questionnaire (ICOVIDPTLBPQ)' on a modified four point Likert scale was used to elicit information from the respondents and used to answer research question/hypothesis formulated for the study. Result showed a negative high significant impact of Covid-19 pandemic on the teaching and learning of Biology practical. Lack of IT skills, poor electricity supply and fluctuating network service were some of the limitations of educational remodeling during the pandemic. The study among others recommended the provision of constant electricity supply for both teachers and students by the state and federal government and school proprietors, an upswing in the services offered by the network providers was also recommended.

Key Words: *Biology Practical, Covid-19, Pandemic, Remodeling, Limitations*

Introduction

The invention and implementation of newly thought ideas, most often with oblivious variation from already established approaches, customs or rites into the educational system best describes educational remodeling. Remodeling entails making changes to an existing model by implementation of new methodology to proliferate a set of educational objectives and the introduction of new approaches and methods in teaching and learning for a change in behaviour (Allen, 1987). Availing students the opportunity of learning anywhere, anytime with diverse automation and technologies in education is a great milestone as stated by Suvin (2020). Electronic learning (e-learning) which entails a technological approach that involves the use of internet, television, radio, computer and smart phones with mobile applications such as YouTube, zoom, whatsapp, skype, facebook (Adams, 2018, Ajauraneh, 2020), was adopted as an educational tool in the teaching and learning of biology practical, amidst the challenges of school closure in other to achieve the desired learning objectives and national goals during the era of covid-19 pandemic. Digitalization as an educational remodeling tool, changed the traditional face to face learning approach to a technological base, where educational activities which involves teaching and learning such as online courses, online web-seminars and online examinations are done in a virtual environment through the aid of electronic platforms (Borisenkov et al., 2021).

A noticeable increase in the use of social media platforms such as linkedIn and open online courses have been observed and are upcoming with innovative ways for the dissemination of

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information through teaching and learning (Oke & Fernandes, 2020). E-learning is said to have so many advantages ranging from the ability to be done anywhere, at any time and any day with no commuting on crowded buses with great possibility of saving significant level of finance and time (Hisrich & Peter, 2012; Brown, 2013, Oke & Fernandes 2020). The emergence of covid-19 pandemic elicited the integration of these technologies in education globally through online learning as most of the higher education system is operating through e-learning (Azzi-Huck & Slimis, 2020). Assessment of the availability and utilization of e-learning in Biology study carried out by Eseroghene and Barisi reported that there was low presence and utilization of e-learning facilities by both teachers and learners. The adoption of online teaching and learning raised many dissatisfactions on the quality of education as reported by Sahu (2020). The poor learning outcome observed is attributed to lack of information and technology (IT) skills and knowledge on the use of e-facilities (Eze & Gbemisola, 2021). Awareness of the existence of a phenomenon is proportional to its relevance and significance in its utilization as stated by Folorunso and Taiwo, (2018). Despite the availability of e-learning facilities to mitigate the effects of COVID-19 and improve the quality of education during the pandemic, there utilization depends solely on the awareness level of relevance and utilization on the part of both teachers and learners. Over the years man has been faced with diverse emerging and re-emerging diseases that has plagued human race, but the Corona virus 2019 (Covid-19) pandemic has made the most global impact as the most part of the world remained lockdown (WHO, 2020). The coronavirus was first discovered in Wuhan a city in the Hubei province of China (WHO, 2021). The causative agent SARS-COV2 Virus responsible for Covid-19 pandemic was transmitted from civet cats to humans and can survive on surfaces including stainless steel, cardboards and plastics for days and in aerosols for hours according to world health organization (WHO, 2020). An exposure to the virus was basically through routes such as body contact with contaminated surfaces and inhalation of contaminated air borne particles or droplets thereby leading to rapid number of infected persons within a short while when the first Covid-19 cases were reported in China 2019 hence, it was declared a pandemic. The first case of covid -19 in Nigeria was confirmed on an Italian citizen who returned from Milan by a virology laboratory of Lagos state teaching hospital in February 2020. Considering the spontaneous spread of this virus through viable routes and the severity of health impairment which often lead to death, certain global restrictions were adopted and just as many other sectors were affected, the educational sector was affected and the shutdown of schools were inevitable. Covid -19 virus had symptomatic features such as cough, sore throat, fever, muscle aches, breathlessness and loss of taste or smell and may begin from the first day of exposure to fourteen days after. The advocate of the use of hand sanitizers and social distancing was initiated, since transmission of the virus was through close contact with infected persons or surfaces. This also resulted in travel bans (Amzat et al., 2020), disruption of teaching and learning through the compulsory closure of schools by the federal government (Adegboye et al., 2020; Mohammed, 2020) and the innovation of e-learning as the pandemic became very serious with records of new cases and deaths by the day so as to mitigate the spread of the Viral infection (Azubuike et al., 2021).

Laboratory and class room activities aids in the assimilation of personal and professional growth skills which are prerequisites for achievement of teaching and learning objectives (Goodman et al., 2015). Biology and its practical is one of the sciences that enables students acquire scientific skills and literacy. Practical's in biology inform and motivate learners as it unravels some basic issues of life (Ude, 2013). According to constructivism, knowledge can be obtained by active participation in learning (Ibe, 2004). Observing concepts in biology lessons on their own via practical activities in the laboratory will enhance comprehension as students tend to understand better with practical experiences (Walts, 2013). It is widely agreed that Covid-19 pandemic presents unique challenges to the existing fragile education system (Nicolas, 2020, Obiakor & Adeniran, 2020). It is on this premise that this study is carried out to examine the impact of educational remodeling and its limitations during the Covid-19 pandemic on the teaching and learning of biology practical as not much has been one in

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the assessment of the efficacy of remodeling teaching and learning of biology practical following the pandemic.

Objectives of the Study

This study is aimed at:

1. Enlightening students, teachers, curriculum planners, Rivers state government and the federal government of Nigeria on biology practical and its limitations via the remodeled teaching and learning processes during the COVID-19 Pandemic.
2. Enlightening the need for teach and re-teach as an educational skill to be emphasized where necessary.
3. Ascertaining the need for adequate time allocation for e-practical classes to improve awareness which in turn supports acceptance and maximum utilization of 21st century skills as an adopted means of learning.

Methodology

Research Design

The study adopted a descriptive survey where information about respondents' opinions on Covid-19 pandemic era: educational innovations and challenges in the teaching and learning of biology practical were obtained.

Study Population and Sample

The study population comprised of level 100-400 degree students and lecturers of biology department from the Rivers State University and Ignatius Ajuru University of Education, Port Harcourt, Rivers State, Nigeria. To constitute the study sample, one hundred and twenty (120) respondents from both schools, 60 respondents from each school were randomly selected.

Instrument for Data Collection and Administration

A quantifiable, consistent, relevant and clear 20-item structural questionnaire titled 'Impact of Covid-19 pandemic in the teaching and learning of Biology practical questionnaire (ICOVIDPTLBPQ)' on a four (4) point modified scale of strongly agree, agree, disagree and strongly disagree was used to elicit responses from respondents. A criterion mean of 2.5 was used in the study. The instrument was administered on the selected respondents and retrieved on the spot immediately after completion.

Reliability of Instrument

This was determined by test and retest method with a coefficient of 0.75, which was considered high for its suitability and administration.

Data Analysis

Frequencies of responses were computed as group data and analyzed by mean. Mean values < 2.5 were considered negative impact while mean \geq 2.5 were considered positive.

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Results

Research question 1: what is the impact of schools’ closure due to Covid-19 pandemic on the teaching and learning of biology practical?

S/N	ITEM	SA	A	D	SD	ΣFX	\bar{x}	IM
1	There was no effective biology practical teaching carried out by teachers	100	78	48	20	246	2.05	-ve
2	Practical interaction between students and teachers was limited	97	58	48	40	243	2.02	-ve
3	There was poor interpersonal skill among students	74	60	60	46	244	2.03	-ve
4	Practical lessons were incomprehensible	55	80	55	40	230	1.91	-ve
5	There was poor practical skills and knowledge acquisition	70	65	40	45	220	1.83	-ve

Key- SA= Strongly Agree, A=Agree, D=Disagree, IM=Impact, -ve=Negative, +ve=Positive

Results indicates a negative impact of schools’ closure due to Covid-19 pandemic on the teaching and learning of biology practical as mean values of all items are <2.5

Research Question 2: How does reduction in learning hours affect the teaching and learning of biology practical during Covid-19 pandemic Era?

S/N	ITEM	SA	A	D	SD	ΣFX	\bar{x}	IM
6	Difficulty in transmitting knowledge to students due to limited time	60	80	60	45	245	2.04	-ve
7	There was poor coverage of course outline	84	72	60	45	261	2.18	-ve
8	There was poor assimilation of content	108	90	68	29	295	2.46	-ve
9	There was poor mastery of subject matter	60	84	55	62	261	2.18	-ve
10	Students got tired during classes	18	56	105	156	335	2.79	+ve

The mean scores for item 6-9 are <2.5 implying that reduction in learning hours during the pandemic negatively affected biology practical lessons while, item 10 had mean value >2.5 implying positive impact.

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Research Question 3: how does the introduction of e-learning as a result of Covid-19 pandemic affect the teaching and learning of biology practical?

S/N	ITEM	SA	A	D	SD	$\sum FX$	\bar{x}	IM
11	E-learning helped in distance learning	200	132	24	14	370	3.08	+ve
12	It enlightened students on the subject matter been taught	160	102	48	22	332	2.77	+ve
13	It brought about collaboration among students from various schools	154	124	30	32	340	2.83	+ve
14	It fostered high level participation in practical classes	20	48	83	95	246	2.05	-ve
15	Students gained vast knowledge of subject	9	20	92	66	187	1.56	-ve

Results of item 11, 12 and 13 are >2.5 implying that e-learning impacted positively in the teaching and learning of biology practical during Covid-19 pandemic. However, item 14 and 15 had mean values <2.5 implying it also had a negative impact.

Research Question 4: how does the lack of technological skills and facilities by teachers and students affect teaching and learning during Covid-19 pandemic?

S/N	ITEM	SA	A	D	SD	$\sum FX$	\bar{x}	IM
16	Poor use of e-facilities due to lack of IT skills	78	80	76	36	270	2.25	-ve
17	Inefficient teaching and learning processes	90	60	45	50	245	2.04	-ve
18	There was low participation of students during practical sessions	85	93	40	32	250	2.08	-ve
19	Practical classes were frustrating due to fluctuating network and poor electricity supply	70	90	7	23	190	1.58	-ve
20	There was poor learning outcomes	125	62	20	26	233	1.94	-ve

All mean values for table 4 are <2.5 indicating negative impact of Covid-19 Pandemic resulting from lack of technological skills and facilities for the teaching and learning of biology practical online.

Discussion

Like every other new system, the remodeling of education which include e-learning came with its challenges having major emphasis on the inequity limited to non- availability of smartphones or computers and the poor internet services in most environments. The result of the study reviewed that educational remodeling as a result of the covid-19 pandemic had a negative impact on the teaching and learning of biology practical. This is in accordance with the findings of Adegboye et al., (2020)

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and Mohammed (2020) which stated that, the compulsory closure of educational institutions in Africa and other nations led to significant disruptions in learning modes. Some well-resourced schools with e-learning facilities lacked teachers with the appropriate digital skill, while some schools lacked required facilities due to financial deficiency. Thus, facilitating practical in Biological science courses that typically engage students through laboratory experiments were challenging. The study showed that there were very few schools that could afford, set up and maintain virtual science laboratories where students and the teacher could work to simulate experiment, which is in line with the study of (Brown, 2013; Abbey & Hoxley, 2020).

The teaching and learning of biology practical online was ineffective due to the enormous limitations affiliated to the system, such as poor acquisition of practical skills and knowledge; basically because learning was done remotely, within a limited time and were therefore incomprehensible. One essential benefit of the school environment is the improved learning that peer effects offer. However, public health measures to prevent spread of viral infection was implemented, which resulted to the closure of schools and initiation of remote learning environment which was implicated as being a leading factor for the observed decline in learning time. The decline in learning time yielded poor academic performance and this is in accordance with the report of Afful-Broni (2018) that time continues to influence and affect man's life and that of Hisrich et al., (2012) which stated that time is a unique quantity in practical learning. There was poor learning outcome due to inadequate information and technology (IT) skills and knowledge on the use of e-facilities (Eze et al., 2021). This comes as no surprise as most tertiary institutions are poorly equipped.

Conclusion

The remodeling of educational system following Covid-19 pandemic posed significant limitations on the teaching and learning of biology practical. The educational innovations during the pandemic were limited as students from the lower socio-economic status could not afford the e-learning facilities and some of the students of the higher socio-economic class were faced with the challenge of poor teaching and learning methods/processes due to lack of IT skills. E-learning helped to cushion the impacts of Covid-19, however, limitations such as difficulties faced by teachers in transmitting practical knowledge to students should not be over looked as its resultant effect (poor content mastery) cannot be over emphasized. At present, face to face laboratory teaching and learning remains the best method of teaching biology practical as learners assimilate better when they are actively involved in practical processes than listening or watching the teacher do it.

Recommendations

Based on the findings of this research; educational remodeling and limitations in the teaching and learning of biology practical during the covid-19 pandemic, the authors recommend that;

1. The federal government should ensure reliable electricity supply for her citizens.
2. Government at all levels and private school proprietors/proprietresses should make available and accessible strong network providers for both teachers and students to enable them cope with the transformations in education.
3. The state and federal government should make provision for modern ICT facilities in all government owned schools, proprietors and proprietresses in private schools.
4. Seminars on IT skills and e-learning facilities should be organized for both students and teachers to enhance their productivity on e-practical classes and improve academic performance on a regular basis.

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