



THE IMPACT OF CORONAVIRUS ON SCIENCE EDUCATION CURRICULUM IN NIGERIA: E-LEARNING A REMEDY

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ABSTRACT

The study examined the impact of coronavirus on the science education curriculum in Nigeria. The outbreak of coronavirus disease 2019 pandemic in the year 2020 disrupted normal activities in parts of the world as a result of the spread and contagious nature of the disease. The rate of transmission of the pandemic and the resultant effects in death causality made the whole world to experience an unavoidable lockdown. To Nigeria like other countries in Africa, coping with the surge of pandemic became a dilemma. The effect on education is all-inclusive as it affected the face-to-face quality of teaching and learning, schools' calendars, academic activities and students' achievement. Besides, assessing students' knowledge and skills stipulated in the school curriculum became an uphill task as a result of the non-passage of instructions from the teachers to students during the pandemic. The trends at which schools were closed down affected science education tremendously since everything around a man is science. This paper, therefore, addressed e-learning as a plausible and alternative means of implementing a science education curriculum during any circumstances that will prevent face-to-face teaching and learning. It was, therefore, noted that e-learning has advantages of increasing retention rates, achievement, skills and attitude among the learners and that some abstract concepts in science can be taught through simulation and animations for easy comprehension for students. The study concluded that e-learning provides means of achieving the objectives and goals of the science curriculum.

KEYWORDS: Impact, coronavirus, science education, curriculum, e-learning

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INTRODUCTION

The sudden crisis and chaotic events sometimes cause great destabilization to man and the society at large. So is the outbreak of the COVID-19 pandemic in December 2019. COVID-19 as the name implies was first discovered as a viral outbreak in 2019. The World Health Organisation (WHO) used the term 2019 novel coronavirus to refer to a coronavirus that affected the lower respiratory tract of patients with pneumonia which was first discovered in Wuhan, China on 29 December 2019 (Centre for Disease Control, CDC), 2019; WHO (2020); Li, Guan, Wu, Wang, Zhou & Tong, 2020). The tragedy affected the developed countries terribly and the African continent was not spared. This is not the first continental threat to human health in Africa, outbreaks of Ebola Hemorrhagic Fever (EHF) in 1976 in southern Sudan (June) and northwestern Zaire (now Democratic Republic of the Congo, DRC) (September), the outbreak of Ebola Virus Disease (EVD) of five different species that sprouted in Guinea and Liberia early 2014 (Muyembe-Tamfum, Mulangu, Masumu, Kayembe, Kemp, & Paweska, 2012).

In Nigeria emerging and re-emerging infectious diseases of zoonotic origin have remained a serious burden from time to time. These diseases include Lassa Fever, Ebola virus disease, yellow fever, monkey pox and the ongoing coronavirus are regarded as a threat not only to socio-economic, and political activities but are capable of affecting educational activities (Nigeria Centre for Disease Control, 2021). It was on record also that there was Severe Acute Respiratory Syndrome (SARS) which emerged in China in 2002-2003, rapidly causing a global epidemic involving humans (Balboni, Battani, & Prospero, 2012). The COVID-19 epidemic that vented in early December in Wuhan, China was obnoxious, contagious and deadly, it resulted in the death of thousands around the globe. In Nigeria, all the school programme was affected as a result of school closure. This affected all academic and non-academic activities that are put in place for the actualization of curriculum details. In science education knowledge acquisitions such as technology skills, critical thinking, and procedural skills are grossly affected since teaching and learning, terminal and national examinations, excursion, and academic competitions were put on hold. This is a stoppage to curriculum implementations. Curriculum in science cannot be fully implemented by neglecting the extra-class activities, academic engagement, and practical collaboration among the students and with their teachers.

The Effects of Pandemic on Education

The continuous transmission and severity of the COVID-19 virus prompted countries to declare lockdown to all activities in the year 2020. To this effect, the Federal Ministry of Education in Nigeria directed all educational institutions in the country to shut down and allow students to go home as cases of reported COVID-19 increased on daily basis. The Permanent Secretary in the Ministry of Education, Sonny Echono, told reporters on 19 March of the year 2020 that the directive was part of the country's overall strategy to curb the spread of the virus which made Nigeria join the growing list of countries in Africa which closed schools at all levels (Ogunode, 2020). Education is dynamic and continuous in life; any attempt to disrupt it or destroy its practices is a big attempt to disorganise the polity of the society. The outbreak of COVID 19 has made the whole world to be susceptible to education crises at primary, secondary and tertiary levels. This is because when there is an interruption in the educational system, the economy and the human development stand at the cross road bringing about confusion in the society.

Due to the widespread of the disease, countries all over the world locked down all activities that can converge people thereby schools were closed down during the ravage of the pandemic. At its peak, more than 188 countries, encompassing



around 91% of enrolled learners worldwide, closed their schools to try to check the spread of the virus in USA, Germany, France, Spain, Italy, India, Japan Nigeria, South Africa, Ghana, Senegal, China, just to mention but a few (Reimers & Schleicher, 2020). What is pathetic about the pandemic is that there was no vaccine for it and the death toll increased tremendously in advanced countries. As of middle of July 2020 it was confirmed that 12, 552,765 cases of the infections of COVID-19 and 561,617 death spreading across Africa, Americas, Europe, Eastern Mediterranean, South East Asia and Western Pacific (WHO, 2020).

This has resulted to closure of schools so that the spread of the pandemic could be curtailed. The closure of the schools is a colossal blow to education because learning was abridged after the lockdown was eased for students to write promotion and external examinations. The post event of the pandemic has affected the trends of education. It affected the quality of teaching and learning and academic achievement particularly for students with special needs or those with learning difficulties that often requires more physical attention and guidance from the teachers (Onyem, Eucheria, Obafemi, Sen, Atonye, Sharma, Alsayed, 2020). This implies that closure of the schools can make such students to loose trends of educational value diverting their attention to irrelevances. As of March 28th, 2020, the COVID-19 pandemic has caused more than 1.6 billion children and youth to be out of schools in 161 countries, this is close to 80 of the world's enrolled students (Saavedra , 2020).

In Nigeria the rate of learning at home was drastically unimpressive due to factors such as illiteracy of parents, unconducive environments and economic problems due to poverty. School closures have a very real impact on all students and the most vulnerable ones are more likely to face additional barriers especially children from low-income and those with special education needs (Organisation for Economic Cooperation and Development OECD, 2020). Many pupils or students were not having access to learning at home especially those from less advantaged family-background in the nation. Family background here refers to all the conditions and circumstances in the family which influence the child physically, intellectually and emotionally (Muola 2010). The resulting influence is that such long closure might definitely substituted interest of the learners for other engagements which might be difficult to break away from after the opening of the schools. Family background exerts a revolving powerful influence in the site changes of the young. Families affect children's learning behaviors (Li, & Qiu, 2018).

The Nature of Science Teaching

Science is a systematic study of the observed through organised methods for the benefits and sustenance of mankind (Adebisi, 2016). In reality, science is a broad discipline into inquiry processes of physical world involving observations, measurement, and manipulation and inferring. This implies that science should be under the guidance of a teacher who is trained in the process of science. This makes the teaching of science to be involving and cannot be taught without interactions. The teaching of science is not dogmatic passage of scientific laws, principles, and mathematical expressions but it involves active interactions among the teachers, students, scientific tools and the environment, therefore the teaching could not afford to be passive. It is an enterprise that should be continuous because it develops insight to solving daily and national problems. From assertion of Macedo (2006) learning science stands on:

- (i) Learning together: learning science goes along with practical activities which enable students to work together in small groups along with their teachers. This allows cooperation, interactions among the learners. Such interactions bring about ethical and social development for students to adjust to different views.



- (ii) Learning to be: School science has tendency to cultivate good moral lifestyles in students, such attributes include: observation skills, rationality, honesty, tolerance, looking for cause and effect. All these are imbibed through active engagement in science classes and within scientific domains in school environments.
- (iii) Learning to do: Science tasks the senses of students to think rationally and be objective through practical learning. This is achievable through data gathering, collecting information, through a range of sources, transforming data to make broader generalization and justifying through the outcomes (UNESCO, 2000)
- (iv) Learning to know: This allows the students to interpret the world around them using the concepts of science.

With all these, learning of science goes beyond the classroom and the benefits of it are ripened in the entire society. Schools cannot afford to be closed for long time without affecting science phenomena as well as the society.

Halt to School Science during Pandemic: Implications

It is obvious that education is “life” as no part of its processes goes without adding values to human existences. It is obvious that everything around a man has implication of science. The knowledge, application and usefulness of science go on and on. Any attempt to stop the processes of science in schools is to block the ‘breathing track’ to development of an individual and the society. The scenario of the global locked down experienced in the year 2020 rendered all social, education and economic activities inactive and many have not fully recovered from it. The implication is not far reaching as the inability to conserve scientific attitude among the students affect their continual critical thinking, rationality and objectivity. These forms of scientific attitude are essential to maintain serenity of the society. The framework at which scientific attitude embraces values and character development makes it dynamic to sustain the society from violence, terrorisms and environmental problems (Adebisi, 2019). Scientific attitude is learnt not only in science class but is learnt during school activities among students and teachers because the world we live in is scientific in nature. Schools closure is a controversial phenomenon as it affects teachers, students, income of some citizens and it has spillover effects on the society. Research in the past showed that school closures is an interruption to schools system resulted into significant learning loss (Alban Conto, Spogmai, Dreesen, Kamei, Suguru, Annika, 2020). Transitional breaks in schools can bring about on the average reduction to some essentials skills in learners (Slade, Piper, Kaund, King, & Ibrahim, 2017).

In science some essential skills that should not be interrupted are observation, manipulation, measurement and problem solving skills. These skills are primarily taught in the practical classes and during interaction with the environment which are needed in daily activities. Routine problem solving in science is halted during long closure of the schools and thereby affects students’ collaboration, exploration and discovery mentality. When science is taught in regular class students complained that it is difficult, mathematical and abstract but with closure of schools the students would be alien to it.

Curriculum Implementations during Pandemic

Curriculum is so central to achieving education goals. Pandemic that resulted into closure of schools disrupted academic calendar which affected the coverage of curriculum contents at the stipulated time. The effects are that experiences and education activities in the schools to support the learners are equally locked down. This made students to be vulnerable to all sorts of misconducts and unlawful engagement.

The curriculum defines what students ought to learn, the number of weeks on a given topic, the skills and knowledge to be acquired by the students but during lockdown all these could not be attained and assessed even with the few parents that could afford private teachers. Instructional materials and guides, pedagogical strategy, the recommended textbooks to



direct teachers' and students' activities could not be used during the lockdown. That implies that curriculum was not implemented. According to Marsh 1997, curriculum is "an interconnected set of plans and experiences which a student completes under the guidance of the school". This means that teachers could not set up any planned activities during the lockdown and series of activities to enhance students' experiences could not be done relatedly. To further complicate the scenario, the interactions among the teachers, learners, with instructional materials and the school environment were out of place. This was a crisis to implementation to schools' curriculum as a result of school closure

The cyclic nature of curriculum was made to cease forcefully as a result of pandemic. The nature and attribute of curriculum is seen as life wire of meaningful education. According to Shao-Wen (2012), curriculum is described analogically as follows:

1. set of objectives = goals or objectives
2. courses of study or content = content + goals
3. plans = content + goals+ teaching methods
4. documents = content + goals + methods + assessment
5. experiences = content + goals + methods + assessment + extracurricular activities and learning environment + hidden curriculum + cultures

This analogy represents the entire curricula that are to be achieved. Therefore, this reveals the importance of assessment in the curriculum. Assessment is the surface and inner beauty of curriculum. Assessment is vital to evaluating instruction delivery and to implementation of the curriculum. Assessment provides the way to measure individuals and institutional success, and so we can have a profound driving influence on the individuals and institutions they were deigned to serve (Jim & Sean, 2004). In science education the goal of curriculum implementation cannot be fully achieved if there exist incomplete or non- implementation of the assessment. Assessment in science is engrossed in collecting information on the acquired knowledge, attitude, and skills of the learners. During lock down, students' current knowledge, skills are difficult to be assessed and evaluated as a result of non-passage of instructions from the teachers on the activities of science. To this end, it is evident that teaching, assessments and extracurricular activities were not carried out. More specifically, assessment points the way teachers gather data about their teaching and their students' learning (Hanna & Dettmer, 2004). These therefore make testing, measuring and evaluating impracticable when students are not available. More so, continuous assessment is an essential factor in assessment. In science education, continuous assessment is very important because it is a process of finding out what the students have gained from problem solving, process skills, applied skills and scientific attitude as reflected in their knowledge thinking, reasoning, character development and industry. Kapanbwe (2010) describes continuous assessment as an on-going classroom based process that uses a variety of assessment tools to measure learners' performance.

Continuous assessment is defined as a mechanism whereby the final grading of students in the cognitive, affective and psychomotor domains of behaviour systematically takes account of all their performance during a given period of schooling (Osunde & Ughamadu, 2004). Such assessment involves the use of various means of evaluation for the purpose of guiding and improving the learning and performance of the students. Continuous assessment is an integral part of instruction that was equally lockdown during pandemic. Sintayehu (2016) affirms that every educational institution, irrespective of its level, has been using Continuous assessment as a key to determine students' learning achievement and identify their learning difficulties for special supports, to improve the teachers' pedagogical practices, and to improve quality of education in general. It is obvious that teachers use continuous assessment to achieve curricula goals at all levels of Education. Any



continuous closure of the schools as a result of insecurity, violence, and pandemic is an unsavory lost to attaining academic goals because teachers will not get feedback from the learners and this is the essence of assessment. During schools' closure assessment in science suffers the following setback:

- (i) diagnosing learning abilities of the students
- (ii) effective guidance of the students
- (iii) updating and good record keeping in the schools
- (iv) practical skills acquisitions
- (v) enhancing three domains of learning
- (vi) getting feedback from the students.

Sundry Solutions through Supportive E- Learning

No one ever thought that the whole world will ever be locked down, paralysing all activities. The ravaging epidemic of coronavirus forbade face-to-face classes in normal education setting. The unending closure of schools has changed the mode of interaction between the teachers and the learners in many countries of the world to e-learning. Institutions have benefitted from e-learning at one time or the other when faced with compulsory lockdown. It has helped some institutions to overcome hurdle to educational continuity during global crisis (Ayebi-Arthur, 2017). According to Mothibi (2015) e-learning involves the use and application of Information and Communication Technologies (ICT), personal computers, tablets, cell phones and other means to improving teaching and learning processes. Researches have showed the tremendous advantages of e-learning. Olojo, Adewumi and Ajisola (2012) posited that e-learning increased retention rates, achievement, skills and attitude in learning.

The assertion by the students that science is difficult is considerably mitigated through e-learning (Adebisi & Adebisi, 2016). Practical activities that are hardly conducted because of limited time to cover the syllabus and non-availability of resources can be readily responded to through animation or simulation at convenience for both teachers and the students. This will make students to follow the procedures and the concept more meaningful without being hurried. Besides, in Physics topics such as waves, sound, nuclear fission and fusion can be taught thoroughly enabling the students to follow the concepts through simulations. The stress of teaching the processes of digestive, excretory and circulatory systems in Biology are eliminated through animation and students' comprehension will be influentially enhanced. The pressure of finishing the contents in the curriculum will be minimal for teachers using e-learning technology as a result of time saving in the delivery of the instructions. The problem associated with having face-to-face teaching and learning has mandated countries to adopt e-learning. E-learning is flexible, adaptable, and innovative as compared to conventional physical classroom that is rigid for both teachers and the learners. In times of violence, insurgences, and pandemics that could obstruct physical interactions in the normal setting e-technology can considerably circumvent all hindrance to have classes done in different places at the same time.

Assessment of the students can be done without stress and examination malpractices can be considerably reduced using modern day technology. The traditional method of testing students in Nigeria is characterised by different forms of examination malpractice such as bringing in unauthorized materials, writing on currency notes and identity cards, spying of other candidates in examination hall, and change in examination scores. These could be eliminated through computerised testing. Computerised testing provide powerful tools to meet the new challenges of designing and implementing assessments method that go beyond the conventional practices which facilitates a broader repertoire of cognitive skills and



knowledge (Mubashrah, Tariq & Shami,2012).

Transcending the Challenges of School Closure through E-learning

Surmounting the long closure of schools as a result of the plague of Covid-19 has encouraged extensive use of technology in teaching and learning in many of advanced countries while the use is in dismal in Nigeria. This is so in Nigeria because the integration and adoption of E-technology into education particularly science education programme are barricaded with challenges of fund, laxity in teachers' interest due to lack of motivation by the government or the employers. More so, effective use of e- technology is largely dependent upon the availability and accessibility of the resources. This problem is further exacerbated by growing poverty, lack of funding and exponential rise of school attendees in the last two decades (National Universities Commission, 2005). Although these challenges are there they can be overcome through the co-operation of class teachers. It is onus on teachers to see it not as a burden but opportunity to explore the world of e-technology into classroom environment. Teachers are leaders and motivators at the pace of learning, so their enthusiasm in the use of e-technology in schools will arouse the interest of students. They should do well to passionately invest their energy to organise and instruct their students to buy necessary materials that are useful for e- learning. This can be easily achieved by instructing values of collaboration, learning together, rationality, cause and effect in this changing and present world to the students. This will motivate the students to see the need to acquire and share with themselves the gadgets that will be useful in e- learning environment. Teachers' motivation and skills is important here.

Successful integration of e-technology in teaching and learning solely depends on the passionate preparation of teachers (Singh & Chan, 2014). It is long time waiting for the government in many African countries while the learners are failing to receive modern skills and knowledge, there should be a strong bond between the teachers and the parents in providing e-technology environment in schools. This will be better done through awareness from the public media so that parents will have inner drive and supportive influence to accommodate the new drive towards e-technology. Non-Governmental Organisation (NGO) and alumni could be contacted for fund raising and supply of necessary e-learning facilities to schools. Researchers have found out that many of the teachers are illiterate in the use of E-technology for instructions in Nigeria and in other part of African countries. Mathipa and Mukhari (2014) reported that teachers failed to use computers where they are available in schools in South Africa. This depicted teachers' nonchalant attitude to the rising task of the moment. It is therefore necessary for collaboration among experts in Computer Science, Education and classroom teachers on easy usage of technology to facilitate e-learning.

CONCLUSION

This paper addressed the ordeal of COVID -19 in the year 2020 that brought about the closure of schools was an eye-opener to education experts and all concerned citizens, for the fact that schools cannot afford to be closed now and then without affecting the learners and the society at large. The lockdown greatly affected the implementations of curriculum and assessment that are germane to education processes. The effect on science education is consequent not only on the learners but also on the society. The shift in the use of technology in day- to-day activities as made it non-negotiable in teaching and learning for the fact that it now part of us. With advantages of e-learning used in many countries of the world it is therefore necessary to fully implement the usage in teaching and learning in schools. The study further addressed that while waiting on government there is need for teachers to dissipate their passion towards the use of e-learning in schools and parents are to be carried along to provide avoidable e-learning facilities. The paper suggested that contact and



partnership be made with Non-Governmental Group (NGO) for fund raising and supply of necessary E-technology facilities to schools. Researchers have found out that many of teachers are illiterate in the use of E-technology in Nigeria and in other part of African countries. Mathipa and Mukhari(2014) reported that teachers failed to use computers where there are available in schools in South Africa. This depicts that teachers are unconcerned on the usage of e- learning technology to advancing their teaching. The paper advocated collaboration between experts in the field of computer in tertiary institutions and teachers in the schools to organise seminars on effectiveness of computer and allied facilities to teach the students to achieve curriculum goals.

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