

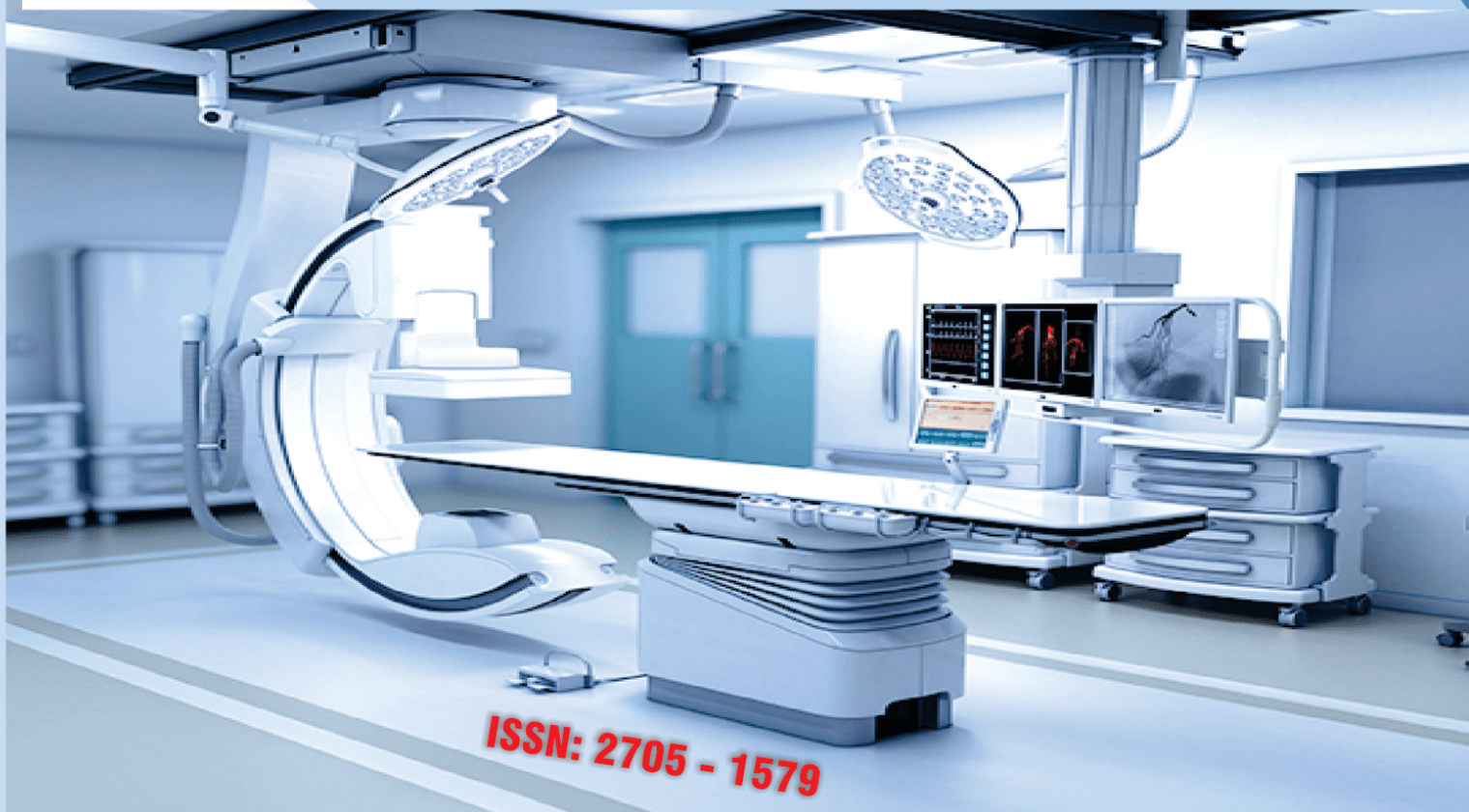
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EDITOR-IN-CHIEF: PROF. RITA N. NNOROM



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EDITORIAL

The task of effectively applying Science, Technology, Engineering and Mathematics (STEM) education research of utmost importance to STEM educators and other stakeholders, even the survival of any nation depends on the sustainability of its STEM education programme.

Currently, we are facing the challenges of COVID-19 pandemic. Our country Nigeria did not anticipate such disease and as such caught up with the pandemic. Hence the un-preparedness of our nation led to the closure of public places including schools.

Therefore, Science Teachers' Association of Nigeria (STAN) Anambra State Chapter dedicated this 2nd Biennial State conference hold on decencies 8th-9th, 2021 at Federal Science and Technical College, Awka, Anambra State, Nigeria to COVID-19 and Emerging issues in STEM Education.

The editorial board had welcomed our members whose papers - articles were extracted from conference.

Happy Reading.

Prof. Rita N. Nnorom

Editor-In-Chief



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CHALLENGES OF COVID-19 IN SCIENCE EDUCATION IN NIGERIA

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Abstract

This paper examined challenges of COVID 19 in Science education in Nigeria. The need for this paper arose as a result of COVID 19 pandemic. The paper examined the concept of science, science education and aim of science education in Nigeria. COVID 19 and its symptoms were highlighted. Challenges of COVID 19 in science education were discussed: School closure during COVID 19, how to make the transition from classroom to online and learning at-home, increase in crime rate and prostitution due to poor financial support from parents due to worsening economy, increase in school dropouts which make some students unable to complete their formal education, increase in emotional challenges which mount pressure on students and teachers were discussed. Strategies for tackling challenges of COVID 19 pandemic in science education in schools in Nigeria were also discussed. Sensitizing, motivating and molding students for entrepreneurship: Entrepreneurial opportunities in science education programme in era of COVID19 were discussed. E- teaching and learning were discussed. Recommendations were made that government should fund science education adequately in and out of pandemic, among other things.

Keywords: COVID-19, Science education



Introduction

Education is all the learning experiences a child gets from birth till death. It is vital in order to bring about desirable change in the attitude, thought, behavior, skills values and interest of individuals and society. It is generally an important instrument for national development. It is vital for social change, national reconstruction and sustainable development. Education according to Okonta I.L., Nwanokor C., Iwezu N.C., (2021), education is the bedrock of socio-economic, cultural and political emancipation. Schools play a vital role in the education of the child. School is an institution where teaching and learning takes place.

There have been increase in the rate of criminal activities resulting from poverty and lack of vocational skills among graduates in Nigeria (Unegbu, 2016). The relevance of Nigerian teacher education to both the recipient and the nation at large has been put to question because most of these graduates are jobless and move about the streets and is worst during COVID 19 insecurity and shutdown of schools.

In the process of providing solution to job creation and unemployment challenges, the Federal Government of Nigeria launched National Economic Empowerment and Development Strategies (NEEDS) in 2008 for citizen's empowerment. National (NEEDS) was launched in 2008 with the expectation to improve learning skills in science and technology. The Federal Government of Nigeria also, introduced entrepreneurship education studies for universities, polytechnics and colleges of education through their regulatory agencies but still many graduate youths are not self-reliant. The level at which graduates engage in unwholesome activities, have been attributed to youth's unemployment, shutdown of schools and poverty in the country. But the graduates of science are supposed to trigger economic growth in their country. It is therefore a vital to reduce the problem of youth unemployment and poverty more especially during the challenges of COVID 19 in our country. It is against this background that this study focused.

Concept of science

Science may be defined as activities culminating into testable, falsifiable and verifiable facts, principles and knowledge. Science includes biology, integrated science, chemistry, physics, mathematics and others. Hornby, (2012) defines science as knowledge about the structure and behavior of the natural and physical world. According to Igwe, (2013) Science is knowledge attained through the study of the



operation of general laws on nature especially that knowledge which is obtained, tested, approved and accepted through a scientific method. Science can also be seen as a systematic study of natural knowledge obtained by observation and testing of facts and are arranged in an orderly manner. From his view, scientific method, makes science a peculiar subject and distinguishes it from other types study. Science comprises of the disciplines such as chemistry, physics, biology and mathematics. Science is a systematic knowledge of physical or material world gained through observation and experimentation, an integral part of human society. Importance of science is evident in agriculture, medicine, genetic engineering, cloning and many others and this is confirmed by Igwe (2013) who noted that science is very vital, that its impact is felt in every sphere.

Science involves both process and products. Processes of science are those activities/process skills of science. Examples are: observing, measuring, classifying, sorting, predicting, and communicating among others. The products of science are conclusions of science. Examples are: facts, concepts, definitions, laws, principles, assumptions and theories.

Teaching and learning of science is an exciting intellectual adventure that contributes to the technological advancements and improves our quality of life. Unfortunately, students have persistent poor achievement in sciences. There is an urgent need to improve the quality of science education to prevent the issue of poor achievement in sciences as well as reducing /bridging the gap between developed and developing countries/ nations.

Science Education

Science education emphasizes the teaching and learning of science process and principles. This leads to fundamental and applied research in the sciences at all levels of education. The government popularize the study of the sciences and the production of adequate number of scientists to inspire and support national development

Curriculum is seen as the means by which education institutions seeks to translate the society into concrete reality. Curriculum is an organized set of experiences created for the benefit of the learners under the auspices of a school, to enable them to grow and fit into society, both on a personal and social level. The science education curriculum is an instructional design that seeks to educate and engage students in critical and



innovative thinking and skills that will help them face the challenges of the ever changing society.

Aim of science education in Nigeria

The aim of science education in Nigeria are:

- a. To produce scientifically literate citizenry
- b. To produce a potentially scientific and technology manpower for national development
- c. To service studies in technology and the cause of technological development.
- d. To provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life (FRN 2014 & Igwe, 2013).

COVID 19

Outbreak of Corona Virus disease originated in Wuhan China in 2019. COVID-19 got its name from a virus named “Corona”. Corona virus was nicknamed COVID-19 because the outbreak was in 2019. The virus started spreading in 2019. The COVID-19 pandemic took the world by surprise because globally everything stopped functioning. The disease is usually more harmful to old people and people with chronic disease like diabetes, hypertension, asthma cancer and others. Projects have been delayed, workplaces closed, schools and churches shut down. The world seems to have ground to a halt because of the novel corona virus (a type of virus known to cause respiratory infections in humans). It started in Wuhan city in China in December, 2019 amid outbreak of pneumonia (influenza). Corona virus got its name from the way it looks under a microscope. The virus consists of a core of genetic material surrounded by an envelope with protein spikes. This gives it the appearance of a crown. The word corona means “crown” in latin. It is zoonotic because the virus is transmitted between animals and humans (i.e from dromedary camels to humans or from civet cats to humans). According to NCDC (2020) in their various sensitization programmes.



Symptoms of Corona virus infection

The symptoms include: Fever, cough, shortness of breath, respiratory symptoms (pneumonia), breathing difficulties, fatigue, sore throat. More difficult and severe cases that need immediate medical attention include:

- Difficulty in breathing and shortness of breath
- Persistent pain or pressure in the chest
- New confusion or inability to arouse and
- Bluish lips or face
- Fatigue
- Fever
- Cough
- Sore throat

World health organization listed some measures to help minimize the spread of COVID 19 which are:

- wearing of face mask
- maintaining social distance
- no hand shake and embracing
- use of sanitizers
- washing of hands
- avoid touching your mouth, nose and eyes

This disease has become a major challenge to countries all over the world the pandemic led to a total lockdown of most of the human activities as well as teaching and learning. There is more reason to use e- teaching and learning now that the world is experiencing a pandemic disease COVID 19. Due to total lockdown, of schools, colleges and universities of most countries, online teaching and learning becomes the other of the day in science education. The corona virus infection has become a global crisis which has posed danger to education and humanity.

Crisis: The word crisis is from Greek word krisis meaning turning point in a disease. Hornby (2012), defined crisis as a time of great danger. The crisis of education in Nigeria must be considered a cause for serious concern because of great value attached to education worldwide. It is widely acknowledged that education has social, economic, political and security benefit for an individual, for a society and for a country. Education is considered as the key to economic prosperity and a vital



instrument for tackling poverty, combating disease, and encouraging sustainable development.

Problems associated with science education programme in Nigeria in COVID 19 era.

Increase in child labour: school closures increases the rate of child labour. Child labour constituted street hawking, farm work and domestic chores such as taking care of babies, fetching water and firewood, preparing and cooking food, individual cleanliness and washing by children.

It leads to early marriage: school closures may also increase risks of child marriage. Thousands of teenage girls who are still in secondary schools; aged 13 to 19 become pregnant during school closure and when this happens, they become a burden to themselves, their parents and the society; may end up getting married. Thus, early marriages have become disturbing public problem that can pose a serious adolescent reproductive and development challenges

The standard of Education is affected: the corona virus outbreak has forced millions of students to study from home. This is not a new phenomenon because the home has long been epicenters of learning particularly as regards informal education.

School closure during COVID 19 posed the following challenges

How to make the transition from classroom to online and learning at-home, how to cater for those who rely on school for feeding and accommodation. The education partnership (TEP) centre (2020) opined that school closure has posed many challenges like:

It increases burden on parents: School closure increases the burden on parents to not struggle to provide for the home, but also to perform the supervision task of ensuring that their children learn from home.

Increase in crime rate: school closure can increase the rate of crime. This is because an idle man is a devils' workshop. Idleness contributes to negative peer influences and youth involvement in crimes.

Increase in emotional challenges: school closure can increase pressure on students, teachers and parents. Students experience stress, anxiety, isolation and depression, (Uchunor & Uchunor, 2021).



Prostitution: it can lead to prostitution. Some students receive poor financial support from their parents due to worsening economy and because of that, many of the female students resort to prostitution.

Increase in school dropouts: many students may be unable to complete their formal education. These dropouts pose great challenge for the schools, colleges, universities and the society in Nigeria. Challenges such as inadequate infrastructure, outdated / changing curricula, poor human and financial resources, lack of access to necessary information resources for what is more disturbing is the lack of well-equipped ICT laboratory by a majority of science schools for teaching, research and learning by both staff and students. The conclusion on this is that there is a gap between what the schools, colleges and Universities are doing and what is going on in the workplace and the global world.

In this digital age, where virtually every sector of human endeavour is ICT driven, it goes to mean that lack of ICT skill is a limiting factor to effective teaching and learning of science education in a COVID 19 prone society. The practical approach to book publishing in traditional and electronic environment is not possible without basic ICT skills.

Strategies for tackling challenges of COVID 19 pandemic in science education in schools in Nigeria.

There should be proper and careful planning of course content by the curriculum planners. This is necessary so that valuable practical that can be taught through direct contact and e- teaching and learning should be included in the curriculum. The content delivery of such curriculum should be with concrete materials. Salmanulfarisi (2014) is of the view that those to teach entrepreneurial skills must have entrepreneurial skills, this will assist them in bringing their own experiences to share with the students and at the same time will allow the students to copy and imitate from their lecturers. Lecturers teaching science education programme must have entrepreneurial skills and literate in using ICT tools like interactive white boards.

E – teaching and learning during COVID 19 era. E-teaching and learning is a scheduled delivery of content Each learner is expected to be in his/her computer at the same time. E-teaching and learning is also called electronic teaching and learning/



online teaching and learning. It is the numerous technological methods and techniques through which teaching and learning can be facilitated using electronic media. e-learning is the process that use information and communication technologies(ICT) to facilitate learning anytime (Osuafor and Ezeji 2015). This implies that e-teaching and learning can be through the internet, internet browsing, or offline through CD- ROM, voicemail, motion picture micro film, video conferencing, power point presentation and radio.

Interaction between learner and instructor is direct with hands on learning. They learn through various electronic media like Internet, electronic white board, audio & video conferencing among others for Alu (2011), e- teaching is called scheduled delivery because all the learners are expected to be at his/ her computer at the same time.

E-teaching and learning can help to prevent face to face activities of content delivery during COVID 19. One can stay at his/ her comfort zone to deliver / receive lectures from any location. The use of information communication technology to enhance acquisition and development of human competency in learning has become very useful during COVID 19 era. In a COVID 19 prone society, e – teaching and learning is the ultimate as the alternative way for science education to be taught and learnt by lecturers and students. This will also reduce spreading of the virus. E-teaching makes learners feel completely part of the learning as interaction between them and instructors are direct. E – teaching and learning provide training and development to the learners and students through various electronic media such as the internet, audio and video. The facilitator and the students discuss E – learning has helped to prevent face to face activities of educational instructions in the immediate past in order to prevent the spread of COVID 19. various types of electronic gadgets are useful in e- learning of entrepreneurial skills in COVID 19 prone society, like computers, projectors, printers, interactive white boards among others. Through e- teaching and learning, students can be sensitized for entrepreneurship

Entrepreneurship: Entrepreneurship is the art science and act of generating business ideas developing them and managing them successfully. An entrepreneur is a person or organization or group that drives entrepreneurship. Is that agent of change that has the characteristic of innovativeness, ability to organize and manage recourses, the staying power, readiness to take risks and the profit drive Unegbu (2016) argues that the lack of framework for entrepreneurship awareness and education in Nigerian universities is responsible for the unending debate as to “how will the old curriculum



be changed to integrate entrepreneurship? More especially at the COVID 19 pandemic era

Sensitizing, motivating and molding students for entrepreneurship during COVID 19 era:

The task of sensitizing, motivating and molding students for entrepreneurship requires the active involvement and participation of lecturers and the university administration, private sector organizations, financial institutions, NGOs and youth orientated individuals (Uzoechi 2010) This could be done through creation of education and skill acquisition training program in their various capacities for students to gain knowledge and skills capable of spurring them to start up and manage an enterprise of their own and this must be done observing COVID 19 protocols.

Entrepreneurial Opportunities in Science education Programme during COVID 19 era

List of entrepreneurial opportunities available for science students and graduates are as follows:

1. Operation of Business Centres and Cyber café business: this can help to students and teachers of science education to take the option of running a business centre where computer related activities such as typesetting, computer training, graphic designs browsing and photocopying services amongst others can be carried out. The option of running a cyber café business will help to keep students and teachers busy and will make students not to indulge in committing crimes because an idle man is a devils workshop.
2. Establishment of fishery farms. Science education students and teachers can establish fishery farms during corona virus era. This can be learnt online through facilitators.
3. Establishment of poultry farms: science education students can produce fowls, turkey, duck, pigs and others. It can be learnt through online programs. They can produce for online and offline sales, for food or for laboratory experiments.
4. Publishing: with proper science education, the students and teachers of science education will be better disposed to undertake ventures in publishing. They can stay at their comfort zone, format and publish articles and books. They can publish online papers and books



5. Production and Sale of science Equipment and materials. Students of science education can be involved in the production of, metal or wooden shelves, bookstands electrical sockets, test tuberclocks, soap making, perfumes, detergents, sanitizers etc
6. Computer Maintenance: this is one of the options available to students of science education. Instead of roaming the streets they should keep themselves busy repairing computers. Knowledge of computer maintenance puts the learner in a position to be self-employed.
7. Development of Computer Software: students of science education can take the option of developing computer software that will be used specifically for specific tasks in science education. This can be facilitated by their teacher through online teaching and learning or they can equally go to websites teaching all these things

Conclusion

The challenges facing the management of schools, colleges and universities of education in Nigeria can be reduced if the government and the staff can work jointly to achieve goals of science education. The fact remains that business ventures will succeed if graduates and youth are holistically educated and trained through direct content delivery and e-learning content delivery to possess requisite entrepreneurial skills and competencies expected in managing business and resources in the COVID era.

Recommendations

The following recommendations are made based on the studies`

1. The government should ensure that schools, colleges and universities of education are adequately funded and set out measures to see that funds should not be misappropriated. Adequate fund should be provided for training materials and equipment.
2. The government should employ qualified lecturers and ensure continuous development of lecturers from time to time.
3. The government should create appropriate policy framework and programs to develop the capability of graduates and youths.



4. There should be improved curriculum, innovative approaches and e – teaching practical oriented approaches to empower and equip students to be competent so as to meet the global competitiveness.
5. Skill acquisition programmes,, mentorship, outreach and role model programs are also needed to empower the graduates and young people to survive on their own in a COVID 19 pandemic.
6. The government should equip acquisition centres in and outside schools with necessary tools, materials and equipment to ensure effective and efficient training of the graduates. They should use necessary media to sensitize the public especially on the need to engage skill acquisition training in science education through e – learning in all areas for the graduates of our tertiary institutions.
7. Workshops, seminars and conferences should be organized through zoom for lecturers, students and graduates of science education so that they will not be left out in solving global challenges.



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