

Challenges in The Teaching and Learning of Science Education in 21st Century in Nigeria

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Abstract

The paper investigated the science education challenges in 21st century and contemporary issues in our country. Science education is the field of science that is concerned with sharing of scientific ideas and the process of teaching and learning scientific pedagogy so as to provide good expectations for the development and understanding of scientific environment. It is also an issue which explains the existence of life. It is concerned with the study of living organisms, their structures, functions, heredity and variation. It is an education that serves as the basis for understanding the complexity of organisms and how they function. It exposes the students to world of knowledge of self, immediate and distance environment, for meaningful and relevant knowledge of science that will help them to make choice in career and apply scientific knowledge to everyday life. There are many challenges that need special attention, Despite the importance of science education, students face a lot of challenges in 21st century science education. The aim of conducting this study is to analyse the challenges of science education in 21st century. Some of the challenges were that students indulge in examination malpractice for them to pass their examination, most teacher do not have knowledge of computer, type of text books, teachers methodology, financial problem, lack of adequate planning, indiscipline, exploitation, prostitution, inter-tribal crash, insecurity, abduction of students. Based on the findings the following suggestions were made: Teachers should be well strategized to bring about meaningful learning that will improve students performance, teachers should use digital technology in teaching because the students are digital natives, Government should provide adequate security in Nigeria schools, eradicate rape, prostitution, employing qualified guidance and councillors to assist the students to be disciplined.

Keywords: Challenges, Development, Insecurity, Science Education

INTRODUCTION

Science education is the field that is concerned with sharing science content and processes with individual and community at large. The development of scientific reasoning competencies is considered a key goal of 21st century science education. The need for improved science teaching and learning has increased efforts to understand what knowledge and skills teachers need in order to engage science students in effective learning in the 21st century science classroom. Many scholars from various fields recognized the importance and impact of science education, as well as the current and emerging challenges and opportunities to science education. Hodson [2011] impresses upon an audience of educators, policymakers and administrators, the need to re-engage and re-design curriculum to make science education more formidable and useful as competitive value and solution to science educational challenges in this century. Hodson provides more than a framework for re-

designing science education and science literacy programs because it reflects similar calls by other experts to make science literacy an action-oriented approach in building curriculum for social change and activism.

Science education in the 21st century must focus on developing strategies and solutions to our common problems, and in doing so, we must consider the importance of approaches built around collaboration and participatory pedagogy. We are living in a global society where diversity impacts on science call for a variety of perspectives and appreciation of the different learning needs and methods that students and citizens use to understand science even at the most basic level as it unravels in nature. There emerges a necessity to change our understanding of the approach to science literacy as educators, as we recognize that the platform for applying its body of knowledge has changed and is constantly changing. We are living in a world where science itself must adapt and thus, we ourselves, especially teachers and educators of the discipline must immediately recognize that we are not teaching a static discipline. We must therefore broaden our own horizons as new knowledge and ideas emerge to replace and add credibility to those we have held on to as the correct way, while recognizing that some ideas become obsolete. Science literacy requires recognizing that learners have responsibilities for their own learning and creating opportunities and strategies for self-experience to become part of formal classrooms. For this to happen,

According to Hodson (2011), science teachers or educators must understand the rationale and elements of science literacy to apply and promote new paradigms in a borderless classroom called the global environment. One of the complex issues in the field of science education includes availability of text books and class room resources, preparing and training of science teachers including both pre-service and in-service professional training, political and religious oppositions and so many other factors.

CONCEPTUAL CLARIFICATION

Education: It is about supporting and enhancing the design and development of high quality students learning experience, promoting teaching, learning and research in science education, maintain its goal and practices. Education includes beliefs about what is worth learning and how students acquire learning outcome.

Learning: Also known as category learning attainment and concept formation is defined by Bruner (2006) as the search for and listing of attributes that can be used to distinguish exemplars from non-exemplars of various categories. Learning is the process of acquiring new understanding, knowledge, behaviour, skills, values, attitudes and preferences. Some learning is immediate or induced by single events. Teachers are the engineers of every profession. They have an ultimate role in actualization of science educational goals and overall development in 21st century science education.

Science Education: Science education cultivates students curiosity about the world and enhance scientific thinking through inquiry process, students will recognized the nature of science education and development of scientific knowledge and science process skills to help them in the society at large.

Motivation: Aacha (2010) opined that motivation is willingness of an employee to contribute high level of effort towards his or her work by the capacity of the effort employer put to satisfy his or her needs as well as personal environment provided by the employer. A motivated employee willingly tries hard to contribute his or her best performance towards accomplishing his or her task, Ngirwa

(2006). Motivation brings about active participation and commitment to achieve prescribed result. Science teachers should be encouraged to put in their best in science teaching

METHODOLOGY

A system, strategies or method used in a particular area of study or activity. This actually affects 21st century science education.

Class Size: It the number of students in the class. When the class size is large, the class teacher will have little opportunity for question and responses. In Enormous class size science teacher will like to work by gathering students in group and not singular bases. In 21st century parents want their wards to go to school and that leads to overcrowded classroom especially in rural areas where there are small class room blocks.

ICT Challenges on Science Educational in the 21st Century

The use of ICT is very essential in science educational development in the 21st century in the science that it links pupils and students with other environment. Information technology is a tool used to enhance educational development in all levels of education (Ebong & Asodike ,2007).

The adoption and use of ICT in the public secondary schools is still under a serious dilemma despite the dramatic increase in the use of ICT, in public schools in Nigeria. The low rate in the adoption and application of the new technology can be attributed to several factors which includes inadequate ICT facilities in schools, poor ICT policies, limited information infrastructures, poor perception of ICT in education among teachers, students and school administrators.

In spite of the calls and yearnings for change from the teacher centered learning to students-centered learning which involves the use of ICT resources, chalkboard and textbooks are still the most continuously dominant class room facilities in virtually all the public post primary institution in Nigeria. The compelling usage of ICT in institution and learning relies upon the accessibility of these facilities and the educators' capability in utilizing them.

Observation has shown that there are limited functional ICT facilities in most Nigeria public schools especially in the rural areas. This in turn hinders the motivation to use them by students for learning. Also lack of adequate computer literate instructors, sporadic power and insufficient financial support are another set of deterrent militating against successful usage of ICT facilities and resources in Government owned institution. For that reason, government needs to provide enough ICT resources and train teachers on the effective utilization of the available facilitates in their teaching process in order to solve the problem

The term 'digital technologies' refers to multi-functional devices with internet connectivity, particularly those that are handheld and portable. In this era where digital aids are used in science teaching and learning, material such as video, projector, magnetic board, interacting board, filmstrip etc There is now two widespread recognitions that such equipment presents opportunities to change the way in which student learning can be organised. Traxler (2010) suggests everyone should have his or her own digital aid. Teachers uses one and often has more than one such device in teaching and learning science education. As a consequence, it has been argued that the availability of such digital devices has the potential to change the traditional dynamics and patterns of the teaching and learning environment. The combination of more Internet access (fixed location) and personal Internet access (mobile) thus provide the opportunity for educators to explore a number of trends in this new era. This article seeks to explore the implications of such technologies for educational organisations and settings at all levels of provision both in science teaching and learning and our curriculum too.

Science Education in the 21st Century Despite living in changed world where information is more readily and easily accessible than at any time in history, most methods of encouraging learning in formal education still depend on the immediacy of the teacher-student interface and particularly those that are enacted in a shared physical environment.

Furthermore, the purposes of education commonly remain ill-defined with an emphasis on attainment of prescribed learning outcomes rather than the development of a skill based curriculum designed to deal with a rapidly changing world. Central to the twenty-first century environment, however, is access to digital technologies which are becoming increasingly personal, powerful and holistic in their capacity to access information. As Gordon (2014) notes, “technology is no longer innate innovative or new” and “learners, teachers, curriculum planners, managements both in colleges and university expect to encounter digital technology in school, colleges and work environments”. Most educational organisations and settings, typically have not managed to have adapted to these developments at present, however, with student learning environments still bearing a worrying correspondence to that and it is a great challenge in 21st century science education.

One of the major concerns arising from this paper is the role of the teacher and their relationship with the students, and need to provide the learner with greater control in a digitally enhanced environment. Consequently, the key issue arising from such a scenario is the notion of flexible learning which should lead to a revision of teaching strategies at the very least. Traditional teacher led teaching environments, it will be argued, that the teacher should move from direction and control to facilitation and guidance of learners, a process requiring new skills and knowledge on behalf of staff charged with leading student learning. This has been described as the transition of teacher from “sage on the stage, to guide on the side” (King, 1993). Science Education in 21st century is fast changing. Science students have become accustomed to new technologies and are always eager to learn new skills and discover fun activities. Thus science teachers have the task to always come with science educational technology technique, new ideas for projects and ways to keep them interested in learning process. This create a burden in science teachers because they cannot give what they do not have as a teacher. They should be studious and upgrade themselves so as to face the challenges of science education in this 21st century. Oloube (2018) emphasized that the amount of interest, commitment and support evidenced by principal policy analysis and implementation actors had a major influence on progress and success of it.

Financial Challenges

Inadequate finance is a serious challenge in 21st century science educational in Nigeria. Some of the problems of finance in science educational are:

- a. Embezzlement and fraud by the people in charge, irregular release of funds, delay in release of fund as well as “inadequate funding”.
- b. Irregular release of fund: for the successful execution of its program as protected, regular release of fund is very necessary. There should be need for the release of fund at regular intervals, it speeds up the action. Conversely, when funds are not released at regular interval there would be frustration and implementation of the programme will be disrupted.
- c. Delay in the release of fund: Delay in the release of fund has resulted to the ineffective implementation of programmes e.g. excursions, field trip, building of laboratory etc which has brought a lot of draw backs in the administration of educational programmes. According to Ukeje cited Julieth et al (2015) tasks in any organization should be carried out to minimize time and efforts.

- d. **Poor financial management:** corruption is one of the main challenges facing 21st century science educational. It arising from embezzlement of fraud of fund meant for education services. There is diversion of educational funds to personal interest which result to poor financial management.
- e. **Inadequate funding:** Science Education is capital intensive and adequate funding is required both human and material to achieve its objectives. There has been public lamentation as a result of dilapidated school structures, non-payment of staff, lack of teaching and learning materials due to inadequate funding of school.
- f. **Exploitation:** It means giving and receiving bribe or gratification or one form of benefits or the other to the detriment of another, which is also known as fraud. This is observed in the area of admission of candidates in schools. The person involved are sometimes deceived for such gratification at the long run. On the other hand, some that are not qualified are given admission into tertiary institution. While some write WAEC and jamb in special centres to get good grade that they cannot defend.

Lack of Adequate Planning: adequate planning focused towards the achievement of stated objectives. It is important aspect of any administration. According to Nwachukwu cited by Juliet et al (2015). We plan for the future, and if planning is not properly done, it gives rise to lack of direction. The importance of planning is to produce individual that would be useful to himself and relevant to the society at large. During planning socio- cultural and economic background of the individual and the society should be taken into consideration. An expert is needed for planning to be successful. Effective planning requires funding, expenditure revenue, profits and other non-material resources like labour e.g. teaching and non-teaching force, infrastructural materials and also time etc. Agabi (2002) sees planning as an action guide, a blue print and a chain of activities requiring some defined procedure. It has been observed that in this 21st century. Poor planning affected science education development in Nigeria.

Motivational factors and good working condition and other sources of motivational factors plays a vital role and objectives. It is equally imperative as one of the challenges science education in 21st century is facing. There is no promotion, leave allowance, good teaching environment especially in rural. Vividly all these affects teaching and learning of science education in 21st century educational because a hungry man is an angry man.

Indiscipline: Achebe cited by Nnolim (2011) defined indiscipline as actions, behaviour and mannerisms e.g. refusal to submit one's desire and actions to the recognition of orderly social conduct. Indiscipline is therefore deviant behaviour of various categories starting from juvenile delinquencies to other serious criminal offences in educational sectors. Examinational malpractice: it is one of the things that affect science educational progress in this 21st century. This made certificates held by graduates for job opportunity in this 21st century in Nigeria has become questionable and this result to students not able to defend their certificate. Examination malpractice is due to laziness and non-seriousness of students to their studies. We observed that some examination centre exists in this nation in 21st century where parents are paying money for qualifying their wards to pass WAEC/SSCE. Some parents go extra mile to make sure that their wards get admission to study medicine because they are medical doctors without asking if they are intelligent enough to perform well in that course.

Cultism/Violence: According to Alubo cited by Worlu (2007) cultist is a group of people who share and propagate peculiar but secret belief divulged only to members. According to Wikipedia in modern English, a cult is a social group that is defined by its unusual regions, spiritual or philosophical beliefs or by its common interest in a particular personality, object or goal. Most students and staff engaged in secret cults and so students should be educated on the adverse effect of cultism. The menace does not only affect the educational sectors in 21st century but the society at large through killing and ritual. The cultists defend their practice to the extent of committing suicide and they do punish deviant members. It is difficult to denounce them because they don't want their secret to be revealed. These cultists are part of political thuggery during election, vandalization of public property, kidnappers, arm robbery, Boko Haram, bandits and other criminal actors. This is one of a serious challenges facing 21st century science education. This cultist results in gambling, drug addiction, cybercrime and other immoral acts. These activities draw students away from their academics since they have no time to study and this affect their academic performance thereby leading to production of half backed students from the educational sectors.

Cultist Challenges on The 21st Century Science Education on the Part of Individual, the Society at Large, (On Education Institution)

- Students and science teachers are physically injured by cult members and they are under constant fear
- Members of the cult destroys facilities of school while clashing with their opponent
- The cultist steal school properties and disrupt social and recreational event in school
- Students find it difficult to attend night prep due to cultist
- Many lives have been lost as a result of cult clashes among opposing cult members
- Harassment, embarrassment and humiliation of innocent students by the cultist.

On The Society

1. There is increase in crime rate as cultist engaged in robbery, assassination, political thuggery and other crime related activities in the society
2. Members constitute themselves into a nuisance leading to disobedience of the laws of the land, embezzlement of public fund and destruction of public valuables
3. It retards national development because the students that constitute manpower of the nation direct their activities to negative things that are of no benefit to the country
4. Any society where there is violence and insecurity, people find it difficult to invest their resources in such a place.
5. There is reduction in revenue generation because most of the cultist engage in kidnapping, illegal bunkery, pipe line vandalization in most region causing land and water pollution.

On The Individual

1. Lost of personal reputation and identity
2. They are perceived as outlaws individual
3. They will be introduced to immoral behaviour as cult membership makes them to indulge in criminal activities such as drug abuse, stealing, maiming, and raping
4. They hardly have time to read and improve on their academic performance as they spent most of their times in meetings, initiation, attacks of the innocent students and rival groups.

Prostitution

Rendering sexual services for financial benefits is called prostitution. It is one of the challenges of 21st century Science educational development. Some is as a result of poverty; it can also be induced by friends or as a result of watching pornographic films. It is a major source of breeding criminals in 21st century science educational sectors and drug addicts and hereby increases criminal activities in our schools. The students that supposed to be in their science classes will indulge in prostitution in search of money.

Political Issues

21st century science educational sector has faced political challenges which tend to disrupt the flow of activities. The challenges is as a number of factors which includes the following:

1. Lack of project by different persons occupying position of authority at different times. Science Educational sectors have been frustrated as a result of new government find it difficult to control the project other governments initiated and abandon to their predecessors either in compression or formation stages. This leads to waste of human and material resources at the end
2. Lack of commitment on the part of political contractors: Members award contracts to inexperience contractors due to political consideration, the contractor cannot give what he /she do not have and so may not complete the work or will do half-baked project that will not last at all. Agabi (2002) has observed that many political decisions have been taken from the perspective of political consideration. Consequently, such contractors are not committed to the projects
3. Lack of community cooperation due to different political group. The school educational development should not be allowed to handle by the government alone the host community has critical role to play in the development of the school cordial relationship should be seen between the school and the host community so that they should assist each other to make a drastic change for good in the 21st century science educational system. The national policy on education (2004) stated that government welcomes the contributions of communities, voluntary agencies and private individuals in education. One of the things that hinders community from co-operating with the school is economic hardship in the society. Lack of fiancé and ways of getting money has diverted the community members from encouraging the school and their younger ones from school activities instead they engage the children and younger ones to go out and look for money (child labour) by hawking or ask them to go to farm and work, take care of their younger ones at home, some will send their children to do housemaid for others and they will collect money in return or other forms of labour when they supposed to be in school. It is very unfortunate that most children especially in the rural areas engage business at the expense of educational pursuit.
4. Lack of co-operation among levels of government i.e. federal, state and local government. There should be mutual co-operation between the three levels of government federal, state and local government in the provision and implementation of science educational program. They should complement each other. One of the challenges of 21st century science education is that the political party that is not in power are been marginalizes by those in power. The allocation that supposes to be given to them were not taken care of. Government finds it difficult to take care of the schools and states around them. Only the state and the schools of the ruling parties are well taken care of. Edem cited by Juliet (2015) has stress on the control

and administration of education in Nigeria stating that there must be safe guard against the encroachment and usurpation of authority by the controlling powers while those not in powers are being marginalized. No road to schools, infrastructure, adequate learning materials, suitable learning environment.

Inter Ethics Clashes Challenges/Insecurity

Inter-ethnic clashes are conflicts between two or more ethnic group as a result of dragging of land, water resources and group solidarity, the conflict leads to school closure and withdrawal of students, disrupted examination, parent both teachers and students from going to school and stimulate massive exodus of professional teachers from the districts and academic calendar disrupted. The conflict always comes with different economic, social and humanitarian consequences. Science Education usually receives a set ball during any of those conflicts. Conflicts affect academic activities in every aspect. Ethnic conflicts tend to involve the dehumanization and genocide. It has generally been observed that ethnic conflicts is one of the greatest obstacle to meaningful science educational development in 21st century in Nigeria educational system due to negative outcome of the subject.

Insecurity: This is the state of being unsafe or secure. Enveloped with danger, instability. According to Orisa (2017) Insecurity is simply not safe or protected. When citizens do not have confident about the country and relationship with others. This issue of insecurity had been a wide discussion in our society, it is no longer a new phenomenon as almost every state in our country, Nigeria have experienced insecurity. This instability creates tension in secondary schools, universities and families and this pose as 21st century challenge in science education because are being abducted and this made it difficult for students to embark on excursion or field trip.

Armed bandits in the early hours of Monday 2am on the 5th July 2021, according to Daily post Nigeria abducted 180 students of Bethel Baptist School located in Marabankido in Chikun Local Government area of Kaduna state. They requested ransom to release the abducted students, also kidnapping of students, Fulani herdsmen, bandits were terrorizing the schools and thereby causing with drawl and closing of schools.

All these affect 21st century Science educational development in Nigeria. As we all know that Nigeria needs economic growth and development through Agriculture, technical and science education, entrepreneurship. These activities cannot take place in the environment of insecurity caused by bandits, Boko haram, insurgency, kidnapping and abduction.

Infrastructure and Utility Facilities

Infrastructure has been identified as one of the facilities that must be properly utilized for successful science teaching and learning outcome. Before the 21st century, the schools do not have enough infrastructure but in 21st century, schools especially in urban area have enough infrastructure. Computer based learning were used in jamb. Quality infrastructural facilities including laboratory enhance quality instructional delivery by science teachers. Obasi (2014) was of the opinion that infrastructure facilities can be over-utilized when they are above normal and are not serviced or repaired.

CONCLUSION

Science education is common heritage of mankind. It is only the treasure that can provide a possible remedy to inequality and bring about acceptable quality life and purpose to majority of people o the world. Science is a field of study, it is also an applied body of knowledge, a way of living and competitive tool and strategy that is not only important to individual, but to national goal and

prosperity. However, to realize the great advantage of science education, we must be able to impact the appropriate ideas, attitude and knowledge to the students and entire citizens which can be done by administrative agencies in education and environment as developed and funded by the government the curriculum and methodology. Some of the challenges of Science education in 21st century were: Inadequate teachers motivation, Inadequate funding, Poor policy implementation, Inadequate teaching staff, Insecurity e.g. unknown gunmen, kidnapping, abduction, bandits, etc.

SUGGESTION

Based on the findings of the paper and various implication which have been highlighted, the following suggestion were made: In-service training should be provided for science teachers for new innovation in science education, Government should provide adequate funds to schools especially rural schools, P.T.A members should liaise with the principal to raise fund and make sure that the fund is used judiciously and avoid illegal levy, Science teachers should be motivated, science teachers should attend workshop, conferences and seminar to adopt more positive teaching methodology especially computer studies and other areas of study.

According to Achuonye (2002) the management should put in place by screening of certificates of candidates admitted into various program to ensure that their certificates are corrects and are original copies of external examination bodies. Government should provide adequate security to our schools.

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