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BASIC SCIENCE CURRICULUM AND DEVELOPMENT IN NIGERIA: POST COVID-19 CHALLENGES AND PROSPECTS.

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Abstract
Science and technology interplay with the society to bring about sustainable development.The position of Basic Science as the bedrock for all science subjects in the secondary school has led to its inclusion in the Nigeria's school curriculum. Also explored were the importance of Basic Science and the post COVID-19 challenges facing its teaching. The challenges examined are lack of motivation of teachers, lack of interest among students, and lack of infrastructural facilities among others. Based on these, there is every need to review the status quo of curriculum in Nigeria in order to consolidate further, the new basic education program that will ensure effective actualization. Finally, the paper recommended among others, massive advocacy and sensitization of teachers, students, parents, school administrators and supervisors on the new basic science curriculum to aid effective implementation. These recommendations, if properly effected would enhance effective teaching of basic science during this post COVID-19 era.

Introduction
Science and technology interplay with the society to bring about sustainable development. Nations that are considered to be developed and largely considered as civilized have achieved that status through purposeful scientific education of their citizens (Bolarin, 2011).In Nigeria, education is perceived as an instrument for achievement of national objectives (Odili, Ebisine&Ajuar, 2011).According to the National Policy in Education (Federal Republic of Nigeria, 2013), education is an "instrument per excellence" for achievement of national development.

This explains the huge amount of money government earmarks for education in its annual budget.

To buttress the emphasis on science and technology education in the national policy on Education, Basic Science has been made mandatory as a subject for all Nigerian children at the basic education level. The Basic Science concepts are organized into themes and avoid duplication of contents and unnecessary repetition of topics in the different science disciplines, it therefore arouses curiosity and develops scientific attitudes and skills in students. This is to help children to develop reflective thinking and good habits which are needed for scientific method and successful future life (Agogo & Ode, 2011). Basic Science is aimed at enabling the child who is exposed to it to acquire the specific science process skills such as observing, organizing information acquired, generalizing on the basis of acquired information, predicting as a result of generalization and designing experiment to check predictions (FRN, 2013). Basic Science is also a subject which is trusted to grant the students general education and emphasizes the importance of observation for increased understanding of the environment.

The Basic Science curriculum is a broad field curriculum in which subject matter is integrated with the various science subject areas of Biology, Chemistry, Physics, Astronomy, Geology and Environmental Science, and synthesized to provide a wholistic and unified nature of science (FRN, 2013). The broad based multi-disciplinary: industry-oriented approach brings students into the centre of learning and succeeds in removing the general phobia around the study of science. The task before the Basic Science curriculum in two-folds, namely to provide a sound general education for all Nigerian children and to lay an adequate foundation for these children who would further their education in the core sciences subjects such as Biology.

Basic Science is taught at the primary and junior secondary schools so as to catch the pupils' heart young. This is to help children to develop reflective thinking and good habits which are needed for scientific method and successful future life (Agogo & Ode, 2011). The Basic Science Curriculum inculcates the right values and norms of the society to foster development. Despite the relative importance of science and technology to the country's quest for technological advancement, there is a continuous trend of poor

implementation of the basic science curriculum due to inadequate competencies.

Background and Literature

Nations all over the world (including Nigeria), strive to have its citizens educated in Science, Technology, Engineering and Mathematics (STEM) disciplines (Ndirika, 2012; Umar &Salihu, 2015; Enemarie, 2016; Nwachukwu, 2017 & Ajayi, 2017). The reason is not far-fetched; there are numerous contributions of science and technology to human development. Nigeria as a developing nation has made quite commendable efforts to enhance scientific literacy of its citizens.

Consequent upon these efforts, Nigerian policy-makers and educators recognize the role of science and technology in the achievement of education for all and national development in the present millennium (Ogundele, Okunlola, Damilola and Godfrey, 2020). It invites critical testing rather than acceptance (Stenhouse, 2013). This has informed an evaluation process that led to the development of the Nine-year Basic Science and Technology Curriculum of the Universal Basic Education (UBE) into the Nigeria educational school curriculum. Basic Science and Technology curriculum content was conceived out of the present needs and desire of the Nigerian society. The UBE Act (2004), which was signed into law in May 2004, provided the legal framework for the programme and an indication of its effective take-off. The curriculum was implemented in September 2008 in primary one in primary schools in Nigeria.

Enemarie (2016) opine that, Nigeria is looking forward to be among the most scientific and technologically advanced nations of the world. The reason is not far-fetched from numerous contributions of science and technology to human development. The author added that, for any nation, especially Nigeria, to achieve scientific and technologically advancement, it becomes imperative to start planning for a firm basic scientific education foundation for her citizens from childhood. This is because children begin career exploration at a very young age.

Curriculum is a particular form of specification about the practice of teaching. It is not a package of materials or syllabus on ground to be covered rather it is a way of translating educational idea into a hypothetical statements.

Furthermore, curriculum is said to be a specification about the practice of teaching which involves pragmatic

efficacy of the learners' experiences. Curriculum is an organized plan of course outlined with the objectives and learning experience to be used for achievement of these objectives (Ogundele et al, 2020). According to Kelly (2011), "curriculum is all the learning which is planned and guided by the school, whether it is carried out in groups or individually, inside or outside the school". Thus, curriculum is a tool of education where teachers educate and humanize the whole man.

Basic Science combines science and technology. Basic science is a core subject in the National Curriculum at the lower and upper basic level. Basic Science is one among science subjects which expresses the fundamental unity of scientific thought (Maduabum, 2011). Basic Science on the other hand is basic training in scientific skills required for human survival, sustainable development and societal transformation. However, basic science is a science subject.

Science is the knowledge obtained from the systematic study of the structure and behaviour of the physical world, especially by observing, measuring and experimenting and the development of theories to describe the results of these activities (Ajayi &Ogbeba, 2017). It also involves the use of many practical processes of investigation and discovery (Enemarie, Ogbeba& Ajayi, 2019). Science is a systematic and practical investigation of natural phenomena aimed at discovering more knowledge.

In Nigeria, Basic Science is an important subject that is taught at the Upper Basic Education level while core science subjects such as Biology is taught at the Senior Secondary level. It is expected that by teaching Basic Science to children at basic education level, every Nigerian student would be given the basic knowledge and understanding of what science is all about and some of the innovations that are taking place around them. This assertion blends with the objectives of science teaching at the Upper Basic level of Education which is to produce individuals who will be able to live effectively in the modern age of science and technology and contribute to the development of the nation (FRN, 2013).

To move with this pace, Basic Science is taught at the primary school so as to catch the pupils' heart young. As a follow up, Basic Science is taught at the upper basic education level to enable students to build up and concretize the knowledge of science they had at the primary school level and to lay the foundation for the study of the core

science subjects such as Biology at the senior secondary level of education.

The provisions of the MDGs (Millennium Development Goals) and the NEEDS (National Economic Empowerment and Development Strategies) profoundly influenced the objectives, contents, materials and methods of the nine-year basic education curriculum (Odili, Ebisine&Ajuar, 2011). This notwithstanding, there are numerous importance of basic science.

Importance of Basic Science

The importance of basic science cannot be overemphasized. In cognizance with the importance of science and technology, science subjects such as Basic Science are taught in Upper Basic schools in Nigeria to prepare a base for any science and technological development. This statement buttressed by Ekundayo (2012) maintains that Basic Science enables students to understand science concepts, principles, theories and laws which are further laborated in the core sciences. Ogunjobi (2016) affirms that children should be exposed to the rudiments of science and technology education. The subject (Basic Science and Technology) prepares students at the upper basic level for the study of core science subjects (biology, chemistry and physics) at the senior secondary school level (Chukwuneke and Chikwenze, 2012). By implication, this will be of great importance to man by getting swindled into obscurity and extinction while he still lives on earth.

It serves as the bedrock which provides the required training in scientific skills to meet the growing needs of the society. It is the fundamental knowledge acquired through basic science at the upper basic level that leads to the transformation of the world through dramatic advances in almost all fields including medicine, engineering, electronics and aeronautics among others.

The importance of basic science curriculum is enormous. The Basic Science Curriculum inculcates the right values and norms of the society to foster development. Basic Science equally helps to bring information; action and international education. But the teachers of Basic science do not seem to adequately possess the required skills thereby creating competency gaps during instructional delivery. Ukor and Agbidye (2015) concludes that basic science curriculum infrastructure raises more concerns than hopes and calls for a more proactive reform in the curriculum of science and technology at the basic school level.

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Concept on Basic Science Curriculum

The 9-year Basic Science and Technology Curriculum is the product of re-alignment and restructuring of the revised curricula for Primary Science and Junior Secondary School Integrated Science. Basic Science properly evolved from Integrated Science. Integrated Science is a science presented to child in such a way that the child gains the concept of the fundamental unity of science, the commonality of approach to problems of scientific nature and an understanding of the role and function of science in everyday life and the world in which they live (Federal Republic of Nigeria, 2013).

Some relevant themes in Integrated Science are still maintained in the Basic Science Curriculum. In selecting the contents, three major issues shaping the development of nations worldwide, and influencing the world of knowledge today were identified (Ogundele et al, 2020). These issues are globalization, Information and Communication Technology (ICT) and entrepreneurship education. Ogunjobi (2016) affirms that children should be exposed to the rudiments of science and technology education. The features of Basic science are the first form of science a child comes across at the secondary school level.

The features of the nine-year Basic Science Curriculum were stipulated and structured as follows: Lower Basic Education Curriculum (Primary One to Three Classes), Middle Basic Education Curriculum (Primary Four to Six Classes) and Upper Basic Education Curriculum (Junior Secondary School Classes-JSS One to Three). Basic Science is considered the bedrock of all science subjects at the senior secondary school (SSS) level (Ogundele et al, 2020).

In selecting the contents, three major issues shaping the development of nations worldwide, and influencing the world of knowledge today were identified. These are globalization, Information and Communication Technology (ICT) and entrepreneurship education. The curriculum of the basic is unique in several aspects. This therefore calls for the preparedness of Science, Technology and Mathematics (STM) teachers towards effective reform of STM education and basic science teaching in junior secondary schools. Basic Science properly evolved from Integrated Science.

The desire of Nigeria to be identified with contemporary development worldwide, called for the infusion of relevant contents of four non-school curriculum innovations in the

areas of; Environmental Education (EE), Drug Abuse Education (DAE), Population and Family Life Education (POP/FLE) And Sexually Transmitted Infection (STI) including HIV/AIDS (Ogundele et al, 2020). Infusion of content occurred in every class from basic 1to 9.

Objectives and themes of basic science curriculum

The overall objectives of the new Basic Science Curriculum outlined by Adeniyi (2010) are to enable the learners to

- develop interest in science and technology;
- acquire basic skills in science and technology;
- apply their scientific and technological knowledge and skills to meet societal needs;
- take advantage of the numerous career opportunities offered by science and technology; and
- become prepared for further studies in science and technology.

In order to achieve a holistic presentation of science and technology contents to learners, the thematic approach to content organization was adopted.

Consequently, four themes were used to cover knowledge, skills and attitudinal requirements (NERDC, 2012). These are:

- ❖ You and Environment,
- ❖ Living and Non-living Thing,
- ❖ You and Technology, and
- ❖ You and Energy.

At the upper basic level however, theme "3" You and Technology was changed to "Science and Development". The topics under each theme were sequenced in spiral from beginning with the simple to the complex across the 9-year of basic education in order to sustain the interest of learners and promote meaningful learning. The use of guided inquiry method of teaching and learning is implied in the activities prescribed under each topic in order to promote learning by doing and skills development. The theme "Science and Development" was added to expose students to developments in science and technology alongside skills that will enable them to face challenges, make informed decisions, develop survival strategies, and learn to live effectively within the global community.

The Basic Science Curriculum is seen as built-in strategies where the learners are required to be involved in inquiry and related activities that can develop critical thinking skills. Basic Science curriculum contents are arranged in particular order of thematic

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and spiral pattern. According to Ovute (2010), the reason for this spiral arrangement of curriculum is not only to sustain student interests in science, but also understanding of simple topics before teaching complex ones in order to promote meaningful learning ; through teacher's competency. Thematic arrangement means that the contents, principles, facts, concepts are organized in themes that is, broad themes and sub-themes taking into account the learners needs, interest and overall societal problems and demands in the present age of science and globalization. In the area of environmental education, students are meant to study and understand the environment in which they live, in other to words, the development of the society is inter connected with man's physical environments.

One of the objectives of Universal Basic Education is to ensure the acquisition of appropriate levels of literacy, numeracy, manipulation, communication and life skills as well as the ethical, moral and civic values needful for laying a solid foundation for lifelong learning (Yusuf and Alabi, 2015). According to Chukwuneke and Chikwene (2012), the basic science curriculum was introduced in response to the reform in education sector. The basic education curriculum is an innovation in Nigeria education system.

Post COVID-19 Challenges Facing the Implementation of Basic Science Curriculum

Despite the relative importance of science and technology to the country's quest for technological advancement, there are continuous trend of so many post COVID-19 challenges facing the implementation of this curriculum and some of these challenges are as follows: The teacher factor, inadequate funding of the programme, inadequate classroom block, inadequate instructional materials, ill equipped library, ill equipped laboratories, poor method of teaching, poor implementation of the curriculum due to teachers' incompetence and gender inequality.

1. The Teacher Factors

The six months training given to the UBE teachers at the take-off of this programme can never be adequate in equipping the teachers with the necessary competence, knowledge, and skills needed to meet up with the goals and objectives of this curriculum (Ogundele et al, 2020). Most of the teachers teaching the basic science are single science specialist and are completely ill equipped to handle this

new curriculum in any way. In other words, the teachers who are implementers of the curriculum are not trained for the programme. Again, is the issue of inadequate number of teachers. In most schools, teachers teaching this basic science are completely inadequate in number. A situation where only two teachers may be teaching basic science from JS1-3, which may have up to 10 streams per level, does not augur well. In this type of situation, the aim of the programme has been defeated.

2. Inadequate Funding

The success of the entire programme largely depends on funding. With the present inadequate provision of funds, the implementation of the curriculum is just like chasing a mirage. There is no meaningful strategy for generating enough funds to ensure that facilities needed for the workability of the curriculum are supplied in significant quantity.

3. Inadequate Classroom Block

No meaningful learning takes place in an overcrowded classroom. Science is activity oriented. What type of activity is expected to take place in a class of 70 to 80 students? So, the fact remains that basic science curriculum is never implemented at the classroom level but on paper.

4. Inadequate Instructional Materials

For successful science teaching, a science teacher requires instructional material to illustrate, emphasize and explain his lesson for easy comprehension and possible application to real life situation. Some of these materials include, chalk, chalk board, models, charts, teacher‘s guild, self-learning modules etc. are grossly inadequate in schools. In many schools the teacher finds it difficult to get chalk to write on the board. So, lack or inadequate provision of the instructional materials poses great threat to the implementation of the basic science curriculum.

5. Inadequate Instructional facilities.

The provision of library services is very essential at any level of education, now that there isinformation boom and also to enhance the spirit of inquiry among students. It is therefore of great importance that library services should be provided for the UBE programme to enable the children to have access to learning materials and information that facilitates their learning process

(Ogundele et al, 2020). Unfortunately, you find out that in most secondary schools, library exists only in name with outdated books and no modern library facilities exist. Where library exists at all, no one supervises to ensure that the children use the library effectively as to inculcate the habit of reading in the students.

6. Inadequate Laboratories

Both the basic science laboratory and the computer laboratory where they exist at all are completely ill-equipped. Most equipment/materials needed for practical work are not available in schools. In a research carried out by Eya and Elechi (2011), they reported that most equipment necessary for meaningful practical work on basic science are not available and where they are
available, most basic science teachers do not know how to use them. In other words, they are under-utilized. This challenge also hinders the achievements of basic science goals and objectives.

7. Poor Method of Instruction

Most Basic Science teachers use the conventional method of teaching which have been found to be deficient in enhancing learning and achieving the objectives of Basic Science Curriculum. Inquiry method is hardly used in teaching. Teachers rely mainly on lecture method of teaching due to lack of adequate equipment and materials for practical work and also as a result of the fact that most teachers do not know how to use the available equipment/materials for practical work. This is a very big challenge facing the implementation of Basic Science Curriculum where students are required to enquire, invent, predict and control events.

8. Poor implementation of the curriculum due to inadequate competencies.

It is regrettable that there is a public outcry due to poor achievement of students in science subjects such as Biology as evidenced by Chief Examiner's report of WAEC in the recent years (Chief Examiner, 2016 & 2017). The report showed that only few students obtained the minimum of five credits in Biology which are considered as one of the requirements to study science related disciplines in tertiary institutions. It is also evident from the Basic Education Certificate Examinations (BECE) in the last five years that Basic Science students' results have been poor (NECO, 2016; & BSEB, 2017). Most of the failures recorded in students' performance in Basic Science have been attributed to inadequate

exposure of students to activities, inadequate preparation, and inability to comprehend questions, lack of effective methods of teaching science subjects, gender insensitivity and lack of qualified science teachers (Balarabe, 2016).

Consequently, Adewale (2016) concluded that students' poor performance in Biology in senior secondary certificate examination is attributed to students' poor knowledge of Basic Science.

9. Gender inequality: Gender refers to the roles and relationships between men and women in a given context (Akper, Gire&Orshi, 2014). Gender imbalance is conceived as the structural relationship of inequality between males and females as manifested in education. Orokpo (2006) observes that girls perform more poorly relative to boys at all levels of educational system in Nigeria especially sciences. Thus, the study investigated if male and female achievement in Basic Science in basic education certificate examination could predict their performance in Biology in senior secondary certificate examination.

PROSPECTS

For the effective delivery of the Basic Science Curriculum to attain its noble objectives, the following are the way forward:

1. Due to the fact that no education system can rise above the quality of its teachers, Basic Science teachers should be given opportunity for in-service training to improve their professional expertise. The Basic science teachers are regarded as the most vital resource in the education industry and at such should be sponsored to seminars, workshops and conferences to be abreast with modern technology in other for them to be innovative to bring development to the nation.
2. The Basic Science laboratories should be adequately equipped to enhance learner centred activities which involve the acquisition of scientific, technological and entrepreneurial skills in order for student to capture the major elements during teaching.
3. Adequate library facilities should be provided in schools so as to help cultivate the habit of reading among students. There should be regular supervision of these students to ensure that the students use the library effectively well to facilitate their learning process and curb some social vices like examination

malpractice, cultism as they hinder the development to the nation.

4. Cultural and family-restraining, inhibiting conditions must be systemically broken down in school by exposing and encouraging both sexes to participate actively in all school activities.
5. If the Nigerian educational system is to develop and compete favourably with advanced countries of the world, there is the need to monitor and evaluate each stage of the implementation process of UBE to ensure adequate utilization of funds in the provision of resources (human, material and infrastructure) as well as compliance with National Policy on Education as reflected in the UBE Act of 2004.

Conclusion

Basic Science Curriculum during the post COVID-19 both in conception and disposition has the capability of developing the nation even beyond the vision 2020 if properly implemented. It will enable Nigerian teachers and learners and the entire society to adjust and adapt to such complex social, scientific and technological changes that would create a new Nigeria, capable of holding out in the emerging new world order during the post COVID-19.

Recommendations

The political class has often paid leap service to education issues thereby putting the system in an unpleasant state. There is therefore the need for change of attitude on the part of the political leaders especially during this post COVID-19 era. The planning and funding of education requires the contribution of all, if Nigeria must progress at this state of development beyond 2021 post COVID-19 survival era. The need to catch up with the western world's level of development always remind the leaders that education has been expected to bring national development, but that certain problems have not allowed the expectation to be achieved during this post COVID-19 era.

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