Sustainability of National Development through Quality Science Education in Nigeria

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Abstract

The paper viewed Biology and Biology education, Chemistry and Chemistry Education as well as Physics and Physics education and their status in Nigeria. In addition, concepts of science education and national sustainable development were discussed with their various challenges. The paper was concluded with recommendations that the government at all levels as well as the school authorities should aid the promotion of science education in order to ensure the sustainability of the national environment

Keywords: Biology education, Chemistry education, Physics education,, Sustainability, National Development

Introduction

One of the ways to achieve the scientific literacy is science education. Science education plays major roles both in Science and Technology as well as other aspects of national development. Science education also helps to improve the social, economic, political, and the entire lifestyle of mankind. Science Education according to Garba (2009) can be defined as "that aspects of education which leads to acquisition of practical and applied skills as well as basic scientific knowledge". If science and technology will be sustained and promoted, then science education according to Awolere (2015) should be seen and taken as a major instrument.

Concept of Biology and Biology Education

Biology education according to Ahmad, Abubakar and Yau (2014), and cited by Awolere, (2020) is the field concerned with sharing scientific knowledge and methods with people not considered part of scientific community. Despite the importance of biology in the overall development of any economy, yet, it is observed that the expected development in all areas is confronted with poor infrastructure. According to Araoye (2015) biology education is a typical education which aims at training and marketability of essential skills for the well being of man. As a matter of fact, the knowledge of plant and animal, their use and management represent one of the few opportunities of the nation's state of well being, development and of course, productivity.

The importance of biology, being one of the cornerstones of science and technology in this 21st century cannot be overemphasized (Awolere, 2015) Thus, he puts biology education as the education that serves both individual and social roles by inculcating knowledge and right types of attitude for the survival of both the individual and the society at large. Education, particularly biology education is central to sustainable livelihood hence Teng (2012) opined that biology is a pivotal knowledge component to meeting humankind's requirements and thereby contributing to sustainable development. Acquisition of biology knowledge is connected to building a sustainable interaction between human society and nature.

Concept of Chemistry and Chemistry Education

Chemistry is another popular science subject among senior secondary school students in Nigeria. Chemistry according to Emendu (2014) addresses the needs of majority through its relevance and functionality in content, practice and application. Chemistry has been the pivot of science and hence the most needed tool, scientifically, for human, capital and national development. The wheel of progress have in no small way be slow down, thereby hindering the overall development of science and chemistry education in the nation. The concept of chemistry as a science is centered on life and this encompasses the three states of matter-solid, liquid and gas in a give and take processes.

According to Uwague and Ojebeh (2008), chemistry is one of the naturally and well established means through which the nation's abundant natural resources can be harnessed into useful ventures for the overall economic and socio-political well-being of its citizenry. Okieimen (2007) equally asserted that chemistry is all about everything in the world.

What many nations like Nigeria need now is a functional chemistry education that will assist in national development. Chemistry education has been identified to be one of the major bedrock for the transformation of our national economy. Chemistry Education can be seen as the acquisition of knowledge or ideals relevant to chemistry. It is concerned with the impartment of knowledge on properties, components, transformations and interactions of matter.

Concept of Physics and Physics Education

Physics is another science subject majorly done in science education. Doscher, Hazari, Potvin & Klotz (2004) opined in their work that physics classroom provides an excellent opportunity for students to comprehend global suatainability issues and simultaneously be empowered by their science learning. Students according to them, exposed to physics teaching receive pedagogical guidance which give them power to be assets for sustainability of their immediate environment.

Status of Biology, Chemistry and Physics Education in Nigeria

Biology or chemistry as well as physics in Nigeria, as science subject is mostly taken by students of the senior secondary schools among the pure and applied science subjects. The three are the most combined subjects/course for the award of NCE by Colleges of education. In the University, degrees of B.Sc, M.Sc and Ph.D are awarded in biology or chemistry as well as physics. Essentially, Biology, Chemistry and Physics form the bed rock subjects for all science and science related courses in the tertiary institutions. Students wishing to study engineering, agriculture, medicine, pharmacy, nursing, medical laboratory, and the likes must have credits

in at least any two of the three subjects. Regrettably, biology, chemistry and physics education are yet to make any noticeable impact in the nation due to lack of commitment on the part of the government and all stake holders.

Concept of Science Education

Science education is the application of educational (learning) theories in the endless search for knowledge, resulting in he development of the cognitive, affective and psychomotor domains through some systematic processes involving careful observation, deduction and testing by empirical means and is a sure tool for the promotion of development of ant state. This is because the application of its knowledge will enable its beneficiaries to solve the ever occurring challenges of life in society. (Buseri, 1995:11)

Science education is the field concerned with sharing scientific knowledge, and method, with people not considered part of scientific community. Science education has been identified as one of the major bedrock for the sustainable development of our country, which is seen as knowledge or ideas acquisition relevant to knowledge (Ahmed, Abubakar & Yau 2014).

Some of the aims of Science Teaching include:

a. Science is taught in schools because general education is not complete without it.
b. Science in schools is introduced not to turn out scientists, but to impart liberal education.
c. To acquaint pupils with the broad outline of great scientific principles.
d. To prepare children to earn the living with their determined goal of life.
e. Aims at helping children even in their ordinary life to use the gifts of science everyday.
f. To make the pupils wonder about things and to make them put question out of curiosity.
g. To understand the system of observation, guess and experiment which is known as scientific method.
h. Aims at helping pupils to live in the modern world, to introduce them the methods and systems of science and to develop their attitude towards science.
i. Has a value as character training. It develops an attitude which is a habit of thinking, feeling and acting, a mixture of curiosity and caution.

Concept of National Development

National Development according to Clement, Bello & Sunusi (2017) is an aspect of the general development process. As a concept, development is the desire and ability to use what is available to continuously improve the quality of life and liberate people from the vicious circle of poverty. It is also synonymous with self-reliance which requires the ability to learn how to improve one's well-being without recourse to others. It involves the ability to act and apply knowledge, the ability to use underlying activities to improve the knowledge of the process of development and of knowledge itself.

Science Education and Sustainable Development

Sustainability: Sustainability according to Itari and Ugbe (2018) is the ability to sustain, maintain, provide for or nourish something for an indefinite period without damaging or depleting it. In recent years, an understanding of the concept of sustainability has been firmly established by many scholars and researchers. Sustainability consists of three dimensions: the protection of natural environment, the maintenance of economic vitality and observance of specific social considerations about human development. The notion of sustainability can be understood in various meanings and is defined in many contexts.

Development: Development implies change or growth in a people's life style. It could also mean a change or an increase in the structural facilities of a people, community or society (Itari,1995). But to some scholars, development is the power of the people to solve their problems with their own wisdom, knowledge, experience, and resources with a view to eliminate poverty, pestilence and starvation. In fact, there are as many definitions and assumptions about development as there are scholars on the globe. Even policy measures directed against man and his development are sometimes described as development initiatives (Onunwa, 2007).

Sustainable Development: Is therefore concerned with the creation and sustenance of the conditions for current and future generations of human to live well on this planet. Hence, as noted by Sims and Falkenberg, (2013) right from the beginning a multi-prong approach to the idea of sustainable society was taken that went beyond concerns for only the destruction of the national development to include the concern for meeting the essential needs of all peoples and those needs are met in a sustainable way in consideration of the needs of future generations.

Quality Science Education for Sustainable Development: Right from time immemorial, scholars have been very much concerned about the relationship between quality education and development (Akinsanya, 2004). The truism that education is the surest way to sustainably develop any people or society needs no contention. Education once again, is the process of imparting and acquiring knowledge, skills, attitudes, values and experience in institution of learning, while living, at work or play. The skills so acquired are subsequently applied to sustain present and future generation in their everyday life. It is the proper nurturing, transmission and application of such skills and knowledge that guarantees development and sustenance of the society. Itari and Ugbe (2018)

Therefore, the role of quality education in sustainable development according to Itari and Ugbe (2018) can be summarized as follows:

1. Education is here regarded as an instrument of social change which could transform the society in significant ways. Education is paramount when trying to enable a change in values and attitudes towards sustainability. The report of UNs World Commission Environment and Development (WCED) (1987) recognized that “sustainable

development requires changes in values and attitude towards environment and development" and that education plays a central role in achieving those changes in values and attitudes (Sims and Falkenberg, 2013). Education for Sustainable Development (ESD) is one of the most important tools for raising awareness about the environmental issues within a sustainable development context.

2. Education for sustainable development grows a variety of sources and it is delivered through casual, informal, non-formal and formal strategies. (Bedawy, 2014).
3. Contemporary sustainable development education is therefore expected to be focused on the above issues and must be oriented on future development, ensuring proper quality of present and future life. Educational providers are also encouraged to provide sustainable training to professionals and practitioners and should encourage research on sustainable development issues.
4. Education for sustainable development involves learning how to make decisions that considers the long term future of the economy, ecology and equity of all communities. UNESCO argues that education has a special responsibility to generate the knowledge needed as well as communicate this knowledge to decision makers and the public at large. (UNESCO, 2001, 2003). Therefore, contemporary sustainable development education is expected to orient on future development, ensuring proper quality of present and future wife.
5. Education empowers people for their roles in society. Therefore, formal, non-formal and informal education are key actors in education for sustainable development alone. Because education cannot implement education for sustainable development alone because education for sustainable development is a life-long process, the formal, non formal and in formal education sectors should work together to accomplish education for sustainable development goals and objectives (Ilechukwu et al 2014).
6. Education for sustainable development functions to educate, train and undertake research to contribute to the sustainable development to the society. (Peason & O.'Toole 2005, Bedawy, 2014).
7. Education also produces leaders of the country who manage the affairs of government and private sector industries who constitute the stake holders of sustainable development. By so doing, the educational system creates a vanguard group of leaders in each sector of society who will take primary and leading roles in promoting the values for sustainable development (Bedawy 2014).
8. To enhance learning about sustainable development different teaching methodologies should help be adopted throughout all levels of the educational strata. Methods that will help disseminate information quickly and easily to learners should be applied and should be combined with other methods for effectiveness. Doing so will facilitate learners, involvement, communication skills and critical thinking about sustainable development issues.

Educational institutions play a leading role in building more sustainable and creating new paradigms as they have the mission to promote development through both teaching and research. But it should be noted that sustainable development can be practiced only through a teacher who himself has been trained on values and perspectives of sustainable development. Therefore, teacher education is seen as an important actor or agent of change in promoting the social, economic and environmental values of sustainable development in the society (Johnson, 2007). A good science education programme is expected to achieve an appreciable national development. But, it is a reality that Nigeria as a nation is not developed in spite of the proposals of the successive government as contained in the national policy on education.

Challenges of Science Education in Nigeria

Due to this utilitarian nature of science education to national development, the Nigerian government has in principle emphasized its promotion in both its Constitution and National Policy on Education. In spite of this, its proper development in the country appears elusive due to the government underfunding of the entire education sector resulting in the non actualization of the science education dreams in the country.

Nigeria science and education programme is not contributing to the national development contrary to expectation. The impotence and disabilities are attributable to defects inherent or associated with certain factor like: historical evolution; aims and objectives; parental gender factor; curriculum factors; teachers and teaching methods; availability of resources; evaluation processes; research and review among others.

Students have been performing very poorly in science disciplines at Senior School Certification Examinations (SSCE) as is evident from Chief Examiners' Reports (2000,2003, and 2004). In view of the fact that the quality of science and technology education is a sine qua non for advancement of any nation, identification of major problems facing it will help to adopt the appropriate remedial steps. Aspects of science and education occur knowingly or unknowingly during the informal, formal and non-formal education. This is because science is linked in many ways to society, especially through its technological application. Hence Clement et al (2017) suggested that "the basic need in science education is to teach about Science Technology and Society (STS) and the various ways they interact with each other". But, this is not the case in Nigeria. The challenges of science education in Nigeria are subsumed in the above suggestions from Ziman. These challenges are associated with goals of science education, childhood home orientation/education gender issues, research and review, curriculum issues, training of teachers/educators, methods of teaching; use of computer and internet, evaluation processes; issues of resources among others, and form the subsequent sub-headings.

According to Nwachukwu (2012), the following

are the major challenges of Science education in Nigeria:

i Constraints to Attainment of Aims and Objectives
ii Role of Parents and Childhood Orientation
iii Gender Challenges
iv The Status of Curriculum Content
v Problems in the Science Classrooms
vi Non-usage of Computers and Internet for Science Teaching
vii Issues Relating to Science Teachers and the Methods of Teaching

Conclusion

This paper has discussed in details the place of science education in sustainable national development Nigeria. Attempt was made to highlight the status and the significance of biology and chemistry education, particularly to the sustainable national development Nigeria. From the paper, it can be concluded that a functional and quality science education will positively influence the national development in all areas.

Recommendations:

The following recommendations were made:

I. That priority attention should be given to science-based education in the country's educational planning as well as following up such plans with genuine commitments at the level of implementation so that Nigeria, like other countries, can maximize the gains of a well planned, funded and executed science education programme for the stimulation of the country's development more so with a vision 20:20.20 in focus. This is the part followed by the industrialized countries of the world.
ii. There should be adequate and proper training and retraining of teachers in contents and processes of science and education;
iii. Revisiting and off-loading the existing science curricula, elimination of gender biases, counseling parents/youth on the much needed national development are recommended.
iv. Ensuring that all practices in science education are monitored and evaluated from time to time, with shift of emphasis away from paper certificates and rote learning, to, an integration of science, technology and society.

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