

Science Education: A Tool for Sustainability in Nigeria's Development

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Abstract

Science education is the key to the development of any nation. Societal welfare and economic empowerment are paramount important in national development objectives of any nation and the level of sustainable development of any human society is directly dependent on the quality of science education learned and applied by the citizenry. The purpose of this paper is to examine the involvement of science education in promoting sustainable development. The paper considers the concept of education and science education as a tool for achieving sustainable development in Nigeria. It also talks about the facets of development that can be sustained through science education which include, peaceful co-existence, research, agriculture, poverty alleviation, rural development, health and nutrition. In conclusion, the paper observed that to make science education a tool for sustainable development in Nigeria, content, teacher education, and curriculum materials should be given special attention. The paper also suggested that, adequate training and motivation of teachers, connecting knowledge gained in school to everyday life and provision of adequate and infrastructural facilities will help improve science education which promotes and sustains the nation's development.

Keywords: Science Education, Sustainability, Development, Nigeria

Introduction

In the world today, education impacts in-depth knowledge and understanding so as to advance the members of the society to new frontiers of knowledge in different walks of life. Education is a fundamental human right and very important to the well – being of an individual and the society at large. It lies in at the heart of promoting behavioural change in man, and has been identified as an instrument for socio-economic, cultural, political development and transformation. The economic transformation requires substantial re-organisation of the economy, adoption of new technologies and promoting sustainable patterns of consumption and production, protecting efficient management of human and material resources (Enrico and Lngeborg, 2015).

According to Hornby, (2012) education is a social science, teaching and learning that encompass specific knowledge, beliefs and skills. Education efforts are deliberately chosen to influence and assist people with the aim of improving knowledge, physical and morals that can gradually deliver the people to live happily and all that will be beneficial to the people and the society at large (Herman, 2013).

Education is a deliberately planned process through which an individual is helped to attain the development of his potentialities. Through education, an individual acquires the necessary knowledge and skills needed for lifelong sustainability and development of the society or nation. Maclean (2008) opined that, although there are many keys to development such as improved infrastructure as dams, roads, telecommunication facilities, ports and the likes, education is regarded still as the master key to economic and social development.

Orkaa and Kwaghbo (2011), observed that science, technology and innovation policy cannot be viable unless it is underpinned by well designed measures designed to address such issues as learning, research and development (R & D) therefore, education in Nigeria should be geared towards the preparation of individuals for the industrial, scientific and technological age in order to achieve sustainable development and global competitiveness. The key to energizing education system throughout the country should be a consensus on content standards for the teaching and learning process (Kumar, 2000).

Consequently, the overwhelming call for preparation of a citizenry capable of competing in an increasing global society that is highly influenced by science and technology brings to bare the need for qualitative science education and not the theoretical approach to learning or the memorization of facts. According to Omer (2011), the new world order and the globalization agenda of the present century are controlled by development of science.

Concept of Science Education

Science is from a latin word “scientia” meaning “knowledge”. It is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Lyndsay, (2009) in explorable website 2019 defines science in the following ways:

- Science is the observation, identification, description, experimentation, investigation and theoretical explanation of natural phenomena.

- It is the branch of knowledge or study dealing with a body of facts or truth systematically arranged and showing the operation of general laws.
- It is the systematic knowledge of the physical or material world gained through observation and experimentation.
- It is a skill especially reflecting a precise application of facts or principle.

Uza (2014), stated that pure science is the investigation of nature to satisfy the need to know, while applied science is the application of pure science to solve practical human problems. From the above definition, science is concerned with the means of acquiring established knowledge through careful observation, and testing natural phenomenon. Science is practical oriented and has ultimate goal aimed at satisfying the human needs or solving scientific problem. Scientific process is associated with important attributes such as curiosity, persistent industrious objectivity, rationality, suspended judgment, open – mindedness and honesty (Okafor, 2012). He further opined that science education provides basic and integrated process skills, including: serving as a tool for functional skills acquisition and job creation, helping to mobilize and develop public – private partnerships to support and fund general education and promoting Information and Communication Technology (ICT) at all levels. Science education emphasizes skills for problem – solving and decision making that is needed for successful life in the 21st century.

Science education is particularly important in everyday life because, there is not one aspect of daily life that science had not touched. It generates knowledge through discoveries and equips the learners with the required skills with which to make life easier than has ever been.

According to Juma and Yee – Cheong (2005), a nation's ability to solve problems and initiate sustainable economic growth is strictly dependent on its capabilities in science, technology and innovation. Science and technology linked to economic growth determine the ability to provide social amenities and adequate infrastructure. Science, technology and innovation have potentials in addressing the challenges associated with poverty and hunger elimination by creating job opportunity, empowering youth with vocational or entrepreneurship skills (Orkaa and kwaghbo, 2011).

Science education is viewed by Pember and Humbe (2009), as a process of teaching or training especially in school to improve one's knowledge about the environment and to develop one's skill of systematic inquiry as well as national attitudinal characteristics. It equips teachers,

learners and the society with knowledge, skills, equipment and freedom to perform noble tasks useful for improving socio-economic standard.

Some of the basic skills which science education inculcates in people include observation, measurement, communication, recording, experimentation, controlling variables, questioning, prediction, relationship, understanding space and time, inference and formulating models (Cirfat, Zumyil & Metshak, 2007). Observation for instance involves careful examination of a thing or an aspect to get useful information that in most cases forms the basis of scientific activities or discoveries. Measurement is another useful skill that can be acquired through scientific experiments in schools. It involves using measuring instrument to describe properties of an object in terms of size, volume, length, height and area. Again, prediction is a scientific skill that enables an individual to infer or make forecast on the happenings around his environment. The goal of science education is to get the necessary facts, skills, process and attitudes into the student's head in order to effectively prepare them for the industrialized economy of the present century. Omadibi (2005), states the goals of modern science education as thus:

- To develop in the learner a command of rational powers.
- To develop in the student the ability and confidence to inquire.
- To develop an understanding of the changing nature of the environment in terms of maths, life energy and their interactions.

Similarly in Nigeria, National Policy on Education (2004) outlined the goals of science education as follows:

- (i) Cultivating, inquiring, knowing and rational mind for the conduct of good life and democracy.
- (ii) Produce scientists for national development, technological development.
- (iii) Provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life.

Globally, the study of science is being popularized and supported by the government and different agencies to produce scientists who will inspire national development. When students learn how to use the scientific facts and procedures transmitted in the classroom in real world social and practical settings, really, sustainable development will be achieved.

Sustainable Development

Historically speaking, Sustainable development is an electric concept as a wide array of views fall under its umbrella. In our country today, sustainable development is very sacrosanct for us to have a good and stable

economy. Science education for sustainable development allows individual to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. In this case, science education for sustainable development refers to different key sustainable development issued into teaching and learning, for instance, climate change, poverty reduction, disaster risk reduction, biodiversity etc. Brundtland Commission (2011), defined sustainable development as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In other words, it means a better quality of life for everyone, now and for generations to come. United Nations Millennium Declaration identifies environmental protection, social and economic developments as the inseparable components of human progress.

Sustainable development is a pattern of economic growth in which resources used aim to meet human needs while preserving the environment so that these needs can be met not only in the present but also for generations to come. Specifically, Ahuja (2012), stresses that economic development is expressed in the following parameters;

- Increase in improvement in human capital
- Increase in food supply and agricultural output
- Increase in income.

Achieving sustainable development depends on the initiative, resourcefulness, creativity and discipline of human beings who are managers of developmental programmes. However, Michael (2012), referred to sustainable development as, the ability to meet the needs of the present while contributing to the future generation needs. Hence sustainability is a process which tells of development of all aspects of human life affecting substance. Science education for sustainable development consequently promotes competencies such as critical thinking, imaging future scenario and making decision in a collaborative way.

Science Education: A Tool for Achieving Sustainable Development in Nigeria.

Science education is a sure tool for national development and transforms the world both intellectually and physically. According to Cantner and Pyka (2001), Science education has been recognized as the main drivers behind increasing productivity and a key long – term lever for economic growth and prosperity. Science education is described as a fundamental tool for the implementation of the agenda for 2030 sustainable development goals (SDGs), because, it supports both economic growth and environmental sustainability, developing new and more sustainable ways to

satisfy human needs and empowering people to drive their own future (Enrico and Lngerborg, 2015).

According to the 2030 Agenda as indicated by European Union, Science education will provide the following opportunities:- serves as powerful drives of economic growth, enabling regulatory and governance frameworks, promotion of co-operation and partnerships between stakeholders etc.

However, in Nigeria the dividend of science education are yet to be pronounced despite all efforts being made by various governments and agencies. But the situation of unemployment of the science teachers in Nigeria has failed to produce skilled human capital and creative professionals needed for transformation into national prosperity. Some of the constraints put forward as facing science education in Nigeria include, constant strike action, inadequate funding, examination malpractice curriculum issues, quality of teachers, methods of teaching, poor evaluation kick of physical facilities and teachers' attitudes (Asuquo, 2002, (Nwachukwu, 2012, and Akpan, 2008). These and many other challenges portray that educational system in Nigeria is ill – suited. Therefore, there is need for concerted efforts by all the stakeholders to bring about desired change in the country.

The transformation agenda and brain awards programme of the federal Government are the steps in the right direction but appreciable progress can only be achieved when the whole efforts are marched with effective and relevant schooling. When that is done, science education can be used as a tool to achieve sustainable development in the facets of life which include peaceful co-existence, research, agriculture, reduction in poverty, rural development, health and nutrition (Obi and Obiadazie, 2014).

The Role of Science Education in Sustainable Development

Peaceful Co-existence

Economic growth and sustainable development can only be achieved in a peaceful environment. Science education accords a student some basic attitudes as teamwork, open-mindedness and respect for people's opinion. These positive habits acquired in the school will likely be applied in later lives to promote peaceful co-existence in the society. Quality education makes people better neighbours and citizens and makes political and social life more healthy and meaningful.

Research

Teaching science as inquiry brings the students to the world of inquiry and discovery while in school. This approach will stimulate research

in the future science graduate. This will bring about technological changes in the economy and increase in productivity development. Science education creates new employment opportunities through research.

Agriculture

Sustainable agriculture may be defined as environmentally friendly methods of farming that allow the production of crops and animals without damage to human and natural system. Scientific skills and knowledge can lead to technological change and modernization in agriculture. Better agriculture will lead to employment opportunities, increase in food production and reduction in Poverty.

Reduction in poverty

Poverty reduction is a key feature of sustainable development. Level of earned income is shown clearly to be dependent on level of education (Ahuja, 2012). It follows that if many people are exposed to good education, level of poverty will be bridged and reduced greatly, science education equips students with the necessary skills and knowledge such as critical thinking that can lead to discoveries and technological advancement. Many scientists who made useful discoveries, in most case end up being very rich as well. The cases of Bill Gate and Emeagwai are very good examples.

Health and Nutrition

Science education provides skills, scientific discoveries and technological advances in medicine and food production. Science has led to the discovery of better drugs for the treatment of some serious diseases plaguing mankind. Better food and healthier environment mean more productive society which falls under the realm of sustainable development.

Rural Development

If sustainable development is to be attained in Nigeria, then benefits of science education must be channeled towards rural development. Skills that science education provides can lead to technological advancement which if spread to rural areas will lead to faster development of the nation. Science education produces individuals who are better prepared for greater contributions to the society. Ochu (2007), notes that the difference between developing and developed countries is based on the quality and quantity of science and technology they possess. Poverty and unemployment can be reduced through agriculture and rural development.

Conclusion

Science education is vital for national socio-economic growth and development, empowers the nation's active workforce with vocational and entrepreneurship skills acquisition which leads to massive employment of the youths because, the foundation of productive economy is employment which yields to productive engagement of the nation's populace. To make science education a tool for sustainable development in Nigeria, the following area should be given special attention, content and methods of teaching science, teacher education and curriculum materials. Effective implementation of the required science curriculum will lead to rapid economic growth, poverty alleviation, increase in productivity, clean and healthier environment. If all the necessary strategies are put in place by the stakeholders, Nigeria will in no distant future make for a sustainable national development which is necessary in elimination of some critical problems such as chronic unemployment, poverty and insecurity, bedeviling the well-being of the citizenry.

Suggestions

- The wealth drawn from people, their expertise and talents form a base for finding viable solutions to the issues of sustainability and development of this nation. The followings are suggested as the tools for sustainability in Nigeria's development;
- Stakeholders in education should ensure adequate training and motivation of teachers for effective science education.
- The government through various ministries should organize regular and relevant training programmes for serving teachers
- The policy-makers should ensure regular review of curriculum to meet up with the present needs of the society. Also the school administrators and teachers should ensure proper implementation of the curriculum at school levels.
- The government, school and society at large should ensure that knowledge gained in the classroom is connected to life outside school to make for easier applications. This can be achieved through innovative teaching strategies such as discovery, inquiry, project, field work and excursion methods.
- The government and proprietors of schools should ensure adequate equipment and infrastructural facilities that will promote effective instructional process. That is to say that the school laboratories, libraries and research centers should be adequately equipped with

the relevant and functional physical resources for effective teaching and learning of science.

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