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ACHIEVING SUSTAINABLE NATIONAL DEVELOPMENT IN NIGERIA THROUGH PHYSICS EDUCATION

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ABSTRACT

Physics plays many vital roles in the national development of a country and its applications are crucial to the economy of any society irrespective of their status as underdeveloped, developing and developed. It is a discipline that has applications in many facets of economic development, including health, agriculture, water, energy and information technology. The physicist plays an important role in research and development through the expansion of knowledge and provision of a

Introduction

The importance of physics for the economic development of every country is obvious. The knowledge of Physics plays a very significant role in the development of any nation. It forms the basis for technological advancement of any nation. Sani (2012), asserts that the knowledge of physics plays a vital role in the development of any society.

Physics is the most basic of sciences, and its concepts and techniques underpin the progress of all other branches of science. It is also a cross-cutting discipline that has applications in many sectors of economic development, including health, agriculture, water, energy and information technology. Physics is the bedrock of scientific and technological development in any country. The developed countries have leveraged on the knowledge of physics with a view to improving the wellbeing of its citizens. In the Nigerian educational sphere, a high premium is placed on physics as a subject. It must be well known and passed before a student can be admitted to study science courses of any tertiary institution

Physics deals with energy and matter and their interactions. It is sometimes referred to as the science of measurement and its knowledge has contributed greatly to the invention of instruments and devices that has improved life expectancy and the general wellbeing of humans. Physics therefore, is an important subject that helps people understand the increasingly technological changing society (Zhaoyao,2002). The influence of Physics is felt in medicinal methods including imaging techniques such as X-rays, Computerised Tomography (CT)-Scanning, ultra-sound techniques, Magnetic Resonance Imaging (MRI) techniques and diagnostic patient screening techniques. The unravelling of Deoxyribonucleic acid (DNA)

platform for innovation which has revolutionized our world. To this end, the knowledge of physics needs to be accorded the utmost priority by the government of the day so that sustainable national development will not remain a pipe dream. This paper therefore discusses relevance of Physics education to national development. Since Physics lies in the heart of science and technology, the paper concluded that educationists and science educators should ensure that science is taught beyond recitation of laws and principles but to see to problem solving, critical thinking, and value judgment during physics classes. Some recommendations to achieving a sustainable national development were suggested.

Keywords: Sustainable Development, National Development, Physics Education

structure and the subsequent genome project required a significant input from Physics techniques (Stanley,2000).

Electromagnetism is key in the generation of electricity, mobile phone communication, optical and satellite communication, portable electronics, radio and radar perception, and X-ray crystallography (Campbell, 2006). Laser applications are used in commerce and industry, continuing research into challenges posed by diseases such as cancer, Ebola, and HIV/AIDS, will require high precision equipment employing physics principles (Amadalo, Ocholla & Memba, 2012). Man's voyage to the moon and the exploration of the uncharted universe has been made possible by the application of the knowledge of physics. Better and more efficient machines to keep astronauts safe as they navigate space have been built. Hence, the development of nations cannot be divorced from the application of the knowledge of Physics.

However, despite our awareness of the importance of physics to national development, our educational institutions have continually churned out half-baked physicists and physics educators. Several reasons ranging from teaching methods, curriculum content, funding, negative attitudes of students and teaching materials have been adduced. Furthermore, the methods of teaching employed by most physics teachers do not inspire and ignite passion in their students. They are made to learn by rote and absorb whatever the teacher hands down without question in a completely teacher centred situation. With this attitude, Nigeria as a country cannot appropriate the advantages inherent in physics education which is a precursor to sustainable development.

The Concept of Physics Education

Physics education refers to the methods employed to teach physics and the quest to finding the most effective methods for teaching physics. The teacher's methods of teaching may go a long way in enhancing effective learning by the students. The traditional method of teaching science (Physics inclusive) in the schools involves "chalk and talk" activities which can be teacher-centred. In this case, the students are mere audience in the classrooms who regard the teacher as the repertoire of knowledge.

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There is agitation to inculcate the 21st century approaches to science teaching in Nigeria. These include inquiry method, collaborative teaching, discovery method etc. They are purely child-centred approaches. Here, the students are guided to discover facts and construct their own idea and understanding of the concepts of the study. However, through personal observation, most science teachers shy away from activity-oriented instructional methods that are more effective and stick to inadequate traditional methods of teaching. The practical activities that could enhance creative thinking in the learners are given "lip-service" in Nigerian schools (Ajayi, 2000).

Physics education and research is important because:

i. Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about Nature.
ii. Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world.
iii. Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries.
iv. Physics is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of the other physical and biomedical sciences.
v. Physics extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological, and environmental sciences, plus astrophysics and cosmology - subjects of substantial importance to all peoples of the world.
vi. Physics improves our quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery.

The Concept of Sustainable National Development

The most interesting aspect of sustainable development is the fact that it raises the well-being and standard of living of people without mortgaging the future. Therefore, the concept of sustainable national Development remains the index for measuring development.

The Bruntland Commission, (1987) defined sustainable Development as "the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs."

In another definition by Munasinghe (2004), sustainable national Development is a process of improving the range of opportunities that will enable individual humans and communities to achieve their aspirations and full potential over a sustained period of time while maintaining the resilience of economic, social and environmental systems.

Age (2005), identified some objectives which sustainable national development is expected to realize: increase capital income and employment, promoting human welfare satisfying basic needs; protecting the environment. Considering the path of future generation, achieving equity between rich and poor and participation on a broad basis in development and decision making is important

From the above definitions, there are common phenomena which they all shared; that is prioritizing the development of the present generation without compromising the future generation. According to Nwogu (2009), the well-being of any nation largely depends on its

sustainable economic development. The concept of sustainable development has become a global medium for expressing the need to depart from hitherto dominant models of development that apparently fail to balance the needs of people and the planet in the pursuit of peace and prosperity (Wals, 2009)

According to Usoro, Usoro, Akpan & Otu (2010), development is lowering levels of poverty, illiteracy, and unemployment and income inequality. Dike (2007), on the other hand stresses that, "national development encompasses social and political development as well as economic development defined as conceiving ideas of modernization such as a rise in productivity, social and economic equity, improved institutions and values". Economic development is therefore an important part of general development in any society. The main business of economic development is to increase the standard of living and the general wellbeing of the people in an economy where almost everybody can be self-reliant.

Physics and Sustainable National Development

Development can be described as an increase in the well-being of citizens of a country. It can also be termed as government of a country setting up a system that ensures a continuous and self-sustaining economic growth, security of lives and property and an increase in the standard of living its citizens. Countries can be classified as developed and developing based on their economic development.

There are significant social and economic differences between developed and developing countries. Many of the underlying causes of these differences are rooted in the long history of development of such nations and include social, cultural and economic variables, historical and political elements, international relations, and geographical factors.

According to the UN, a developing country is a country with a relatively low standard of living, undeveloped industrial base, and moderate to low Human Development Index (HDI). This index is a comparative measure of poverty, literacy, education, life expectancy, and other factors for countries worldwide. The index was conceived in 1990 by Pakistani economist Mahbub ul Haq, and has been employed since 1993 by the United Nations Development Programme in its annual Human Development Report.

The HDI measures the average achievements in a country in **two** basic dimensions of human development:

- A long and healthy life, as measured by life expectancy at birth.
- Knowledge, as measured by the adult literacy rate (with two-thirds weight) and the combined primary, secondary, and tertiary gross enrollment ratio (with one-third weight).

Development entails a modern infrastructure (both physical and institutional), and a move away from low value added sectors such as agriculture and natural resource extraction. Developed countries usually have economic systems based on continuous, self-sustaining economic growth and high standards of living.

Development brings better hope to its citizenry and improves the life of its citizen in all ramifications. Development according to Hornby (2001) is the gradual growth of something so that it becomes more advanced and stronger. Going by this definition, it involves fortification of all institutions and reduction of abject poverty.

In the view of Oyemelukwe in Onyesom (2005), development involves the society's transformation through its institutions, organizations, social rules, customary usages and attitude to an extent that makes the society more and more positively responsive to desired modern change. Olowookere (2012) defined national development as the continuous economic, political and technological improvement of a nation-state, culminating in improved standard of living of its citizens.

National development is better sustained through quality education and the knowledge of science acquisition among others play a vital role. Science promotes attributes such as patience, respect for fact not fiction, discovery, honesty, respect for logic and abhorrence of superstition which are crucial to any society's development. These qualities are embedded in the science, more importantly in Physics education. There would be no sustainable development without scientific development and scientific development is hinge on physics acquisitions and its applications. Physics is taught to enable students acquire relevant proficiency in scientific concept and skills. The study of Physics involves the pursuit of truth, hence it inculcates intellectual honesty, diligence, perseverance and observation in the learners (Das, 1985). No nation will be able to experience sustainable development without development of its people. Tolu and Abe (2011) opined that development is essential and critical to the growth and sustenance of any country. The recent economic growth of many developed nation has underlying factor of implication of physics knowledge.

Physics drives economic across Information, Medicines, Agriculture, Technology, Engineering, Industry, life science, other sectors even Education. The foremost objective of the Physics National Curriculum is to provide basic literacy in Physics for functional living in the society. This is tailored to pursue national development. This can upfront carriers in Physics related subjects for the national sustenance that will promote other developments. With well-established carriers in the nation, social, political and culture are refined to meet up with human needs.

Conclusion

Physics Education is the cornerstone of achieving a sustainable national development. There are no doubts achieving sustainable national development is the goal of all developing nations, Nigeria inclusive. As such there are the needs to invest, encourage, enlighten people and train more teachers Physics education. The roles of government at all levels are to facilitate and create an enabling environment for the achievement of any development. Science educators should ensure that science is taught beyond recitation of laws and principles but to see to problem solving, critical thinking, and value judgment during physics classes . Government should continue to work assiduously and leave no stones in her quest to achieve this sustainable development. However, the need for monitoring, supervising and ensuring that all the financial and other investment on physics education for the sole purpose of achieving sustainable development are not diverted for other ventures.

Recommendations

To achieve a sustainable national development through Physics education, the following recommendations are made.

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1. The teaching of science subjects (Physics) should be extended to student's immediate environment and natural phenomenon.
2. There should be continuous training for in-service science (Physics) teachers periodically to equip them in the appropriate teaching methods, the use of instructional materials and method of improvisation to be used in teaching abstract concepts for students to see the relevant of the subject to natural occurrences.
3. Government should call on curriculum planners to reform curricula such that teaching strategies that discourage rote learning should be enforced in the secondary and tertiary institutions of learning.
4. The teaching of Physics should be child centred rather than teacher centred
5. Information and Communication Technologies should be deployed in physics education to make it more interesting.
6. A training plan that states clearly what the student is expected to learn and what the employer is expected to provide, should be developed as an integral part of national strategy.
7. Regular seminars and workshops should be organised to keep teachers abreast of current development in the field of Physics education and how best to impact them on their students.
8. More students should be encouraged in take up science (Physics) subject in secondary level. This can be achieved through the help of the teachers and career counsellors since science (Physics) is a key factor to national development.
9. There should be exchange programmes between developed and developing countries in term of personnel in education sectors, especially in the area of sciences.
10. There should a public private partnership on how best to have efficient and meaningful physics education geared towards national development.

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