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## The Contribution of Science and Technology Education to National Development: The Nigerian Experience

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### Abstract

In order to enhance Science and Technology Education, it is necessary to understand the contribution of Science and Technology Education to national development. This paper examines the contribution of Science and Technology Education to national development: The Nigerian experience with a view of making it a tool for national development worthwhile. Since societies that discriminate technical education among its counterpart pays a high price in their ability to reduce poverty and develop. Enhancing national development depends on improving the situation of technical education. Reducing the gap in education reduces individual poverty and encourages economic growth and enhances national development. Problems and Challenges to National Education Policies were also discussed as they relate to difficulty in finding, training and retraining of well qualified science teachers, difficulty in keeping up with emerging science and changing teaching practice, public perceptions related to science, difficulty in maintaining a relevant science curriculum at all levels, funding and lack of information. In order to overcome the challenges of science and Technology education, the paper offers recommendations with a view to enhancing the contribution of Science and Technology Education to national development.

**Key words:** National Development, Poverty, Technical Education, Science & Technology.

### Introduction

The Nigerian educational system took its root from the traditional system of the pre-colonial era. This was a period of indigenous education in which traditional education activities were practiced in various vocations like farming, weaving, blacksmithing, pot making, traditional medicine, hunting, etc. Learning at that time was characterized by apprenticeship and much of unrealized and unexplained science and technology were practiced. There was no formal curriculum but the training was relevant to the needs of the society. Some authors described the training as somehow primitive and localized (Ajeyalemi, 2008), because it was informal.

Education as defined by Okojie (2007), involves the socialization of individuals to become integral part of the society in which they live. Essentially, the science that was regarded as informal and indigenous was practiced in the pre-colonial era. It was stimulating, informative and useful. It provided a lead way for understanding, interpreting and relating with the world and nature. The limitations however are numerous especially in its inability to provide adequate scientific explanations for causes and events observed in the natural world.

Science embraces every attempt of humans to explore, interpret and manage the natural world. It is dynamic and essentially concerned with the search and explanation of both regularities and irregularities in nature. It involves the quest for actions and reactions, causes and effects in the environment. The purpose of science is to transform the environment towards improving the general quality of life, thus making the world a better

place in which to live. Science is primarily concerned with the intellectualization of facts and values in an unbiased manner (Samuel, 1996).

Formal and informal sciences interact with one another. In Nigeria, both are practiced in different contexts and their linkage is advocated (Seweje, 2000). Although this perspective seems retrogressive considering the present pace of global scientific and technological advancement, the motive is crucial in orientating learners to perceive science as action taking place daily in the environment.

In Nigerian traditional society, the activities of informal science are indispensable and numerous. Azikiwe (1999) contended that women are directly responsible for the food consumed by the family, for the health, nutrition and educational needs of members of the family.

This era ushered in western education with the advent of missionaries in Nigeria. It was through this that the informal or crude science became reformed as the formal science and technology. There was better understanding that transformed individuals and Nigeria as an entity from the world of yesterday to western world characterized by increasing discoveries, inventions and innovations. This development also paved the way for the integration of science and technology into the curricula of schools.

The science that is formal involve a systematic study of natural phenomena and its study allows students to experience the richness and the excitement of the natural world as they engage in inquiry, critical thinking and the demonstration of skills. The scientific enterprise is one that is challenging and innovative. It blends with technology which focuses on inventions and problem solving. Consequently, the harmonious interplay of science, technology and society is the springboard for sustainable development. It equally facilitates and enhances industrial and technological progress among the people and within a nation. This consciousness stems into global agitations for literacy in science and technology.

### **Science and Technology in the National Education Policies**

Nigerian educational system prioritized science and technology with policies that are favorably disposed to science and technology education. The national policy on education and the national policy on science and technology made good provisions for science and technology education. Government through the education policy empowered the Early Childhood Care and Education (ECCE), the Basic Education, the senior secondary education, technical and scientific education and tertiary education with robust plan for science and technology education in the programmes. (Federal Government of Nigeria, (FGN), 2004). The policy came into existence in 1977 and education was conceived as an instrument “par excellence” in achieving national unity, objectives and goals. The policy derives its philosophy from the four main national goals which are;

- a) a free and democratic society
- b) a just and egalitarian society
- c) a great and dynamic economy
- d) a land full of bright opportunities for all citizens.

While adopting education as instrument par excellence, the federal government gave premium on the importance of science and technology and in line with global perspectives of science for all, made provisions for science and technology education in the national policy on education. Meanwhile, the aims and objectives of Nigerian education according to the policy include:

- i) The inculcation of national consciousness and national unity.
- ii) The inculcation of right type of values and attitudes for the survival of the individual and the Nigerian society.
- iii) The training of the mind in the understanding of the world around.

- iv) The acquisition of appropriate skills, abilities and competencies both mental and physical as equipment for the individual to live in and contribute to the development of the society.

The federal government specified the goals of science education in the policy and states as follows;

“Special provisions and incentives shall be made for the study of the sciences at each level of the National education system. For this purpose, the functions of all agencies involved in the promotion of the study of sciences shall be adequately supported by government. In addition, Government shall popularize the study of the sciences and the production of adequate number of scientists to inspire and support national development” (FGN, 2004).

It further states that “science and technology shall continue to be taught in an integrated manner in the schools to promote in the students, the appreciation of basic ideas”. (FGN, 2004). These are clear indications that the national policy on education gives premium to science and technology education.

### **Organizations Principles of Transformative Education in Science and Technology**

These principles as highlighted by Obikezie (2003) are as follows:

- a) A blend of General with specialist knowledge. This is an integration of knowledge in science, political economic, information, technology with disciplinary specialization .
- b) High Emphasis on Commitment or people oriented research. This is the process of harnessing and galvanizing all intellectual and scientific forces of inquiry and discovery towards the solutions of perceived societal problems so as to ensure an overall improvement in the conditions of life of the people.
- c) The enterprising university model. Ability to create own wealth and endowment to ensure adequate funding and survival.
- d) Visionary and transparent leadership. This is the process of assembling, positioning, enabling and motivating people to work co-operatively to achieve defined goals.
- e) Those that will take the leadership of our tertiary institutions should be men and women of good character, transparent, honest with high moral and professional principles, full of innovative and creative ideas.

In furtherance to government support for science and technology education, Information and Communication Technology (ICT) which is an integral aspect of science and technology is adopted by the policy to apply to all levels of education.

Information and Communication Technology (ICT) is regarded as a strong weapon for sustainable development empowering people for global competitiveness. This culminated in the development and propagation of ICT policy in Nigeria and for the Nigerian University system. To this end, the National Universities Commission (NUC) in 1994 initiated efforts to put in place a National ICT network with full internet connectivity in Nigerian universities (Gusen & Olarinoye, 2007).

At the level of the ECCE, government objective is to inculcate in the child the spirit of inquiry and creativity through the exploration of nature and the local environment. While at the primary school level, it is incorporated into the Basic education programme.

The Honourable Minister for Education in 2006 at the opening ceremony of the 22<sup>nd</sup> annual conference/workshop of the Nigerian Institute of Science / Laboratory Technology held at Abuja declared that government in response to promoting science and technology education embarked on various initiatives to empower the youths through appropriate education in technology and science occupations through;

- a) Design of science and technology curricula that gives priority to the complete development of human personality that is sensitive to perfection, order and beauty.
- b) Policy innovations like:
  - i) Setting up an action plan, following the resolutions of the higher education summit in 2002, to review the policy and mandates of polytechnics and colleges of education to enable them award degrees.
  - ii) Setting up plans to integrate entrepreneurial education into the scheme of technology education.
  - iii) Introduction of post- HND programmes to enable holders of HND to qualify for professional registration and practice.

Source: <http://www.nislt.gov.ng/docs/Ministers%20paper.doc>

### **Problems and Challenges to National Education Policies**

Policies when documented are fair and genuine but the implementation often encounter bottlenecks hence objectives and goals are eventually rarely met. Babalola (2008) noted the problems associated with educational policy and planning in Nigeria, which includes those of power relation at the directive stage of planning, poor preparation and costing, and weak evaluation of projects.

With respect to the implementation of educational policies, Olujuwon (2002) identified areas either not implemented or not satisfactorily implemented to evolve around the following; the development of national consciousness and unity, inter institutional cooperation, teaching and learning, areas of need and priority, training of staff in methods and techniques of teaching and indifference on the part of government.

A lot of funds are pumped into policy planning and documentation but it is disheartening when the plans fail to yield through lack of implementation or bad implementation. Supervisory and financial problems are also some of the reasons for failure in the implementation of education policies in Nigeria.

### **The Way Forward**

From the foregoing, there is clear demonstration of governments' positive intentions for science and technology education having realized that it is the vehicle by which a nation can be lifted to attain scientific and technological sophistry. This is overwhelmingly but to pretend that there is no shortfall in enrolment and performance in science and technology education is deceptive.

In November 2, 2006, the Honourable Minister for Education at one of the official ceremonies in Abuja delivered the keynote address titled "science and technology for youth empowerment" specifically states as follows:

Our education system is malfunctioning creating in particular problems of scientific and technological manpower production. The situation is so pronounced today that the nation faces crisis of scarcity of scientific and technological manpower. In essence, we are producing less and less of leaders of tomorrow: the managers, the entrepreneurial class, the teachers, the doctors, the policy makers, the law enforcement makers, the professionals. This is because the transition through the various levels of education is not in favour of technology and science career.

Source: <http://www.nislt.gov.ng/docs/Ministers%20paper.doc>

Government is not irresponsible too to the decline in participation in science and technology education programmes that seems to defy possible solution. The president in the headline of one of the Nigerian read newspaper THISDAY of March 3, 2008 states; “FG, W’ bank to promote science education”, Mr. president alluded that the Federal Government, in conjunction with World Bank, is ready to promote science and technical education at the nation’s tertiary institutions. All these are steps taken to ameliorate the problem.

At the International Council of Associations for Science Education (ICASE) world conference 2007, delegates noted the need to stage action to bridge gaps between science, technology and the public. The identified some key reasons for a global decline in the level of interest in science include;

- a) Difficulty in finding, training and retraining of well qualified science teachers.
- b) Difficulty in keeping up with emerging science and changing teaching practice.
- c) Public perceptions related to science.
- d) Difficulty in maintaining a relevant science curriculum at all levels.

(Source: The Perth Journal 6).

### **Conclusions**

Since science and technology are part of the national strategy for development, its literacy is essential. Part of what is needed to enhance that process is public pressure to encourage more Nigerians to study science and technology.

Science and technology education has suffered enormous setback in Nigeria due to the low status accorded to it in general. Some of the problems emanate from the various interpretations of science and technology education by policy makers as well as by the implementers of policies on science and technology education. New policies are needed to clarify the importance, role of science and technology education, and to address the requirements in various sectors of society. In view of these the following recommendations are made.

### **Recommendations**

- All stake holders in science education from policy makers to implementers including parents must have input in national development.
- The government should demonstrate its political will in working to rebuild the Nigerian economy through science and technology education.
- The government should make science and technology education a priority in its broad national development strategy.

- Science and technology education should be supported by foundations, business, NGOs and international development agencies.
- The gaps between science, technology and the public should be bridged.
- The government should encourage and support the establishment and development of professional science and technology organizations, especially teacher organizations nationwide.
- There should be effective and proper monitory of educational practices from pre-planning stage through planning stage to post-planning stage (implementation).

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