

PROMOTING DEVELOPMENT IN NIGERIA BEYOND 2020 THROUGH SCIENCE/TECHNOLOGY EDUCATION

By

CECILIA CHINWE OGBU, Ph.D
*Department of Science Education
Enugu State College of Education (Technical),
Enugu.*

Abstract

This paper addresses promoting development in Nigeria beyond 2020 through Science/Technology Education. It made a lot of clarifications for example, it examines the concept of science as got from Latin word 'scientia' meaning 'knowledge' which is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. It also highlighted the meaning of education and enumerated its types as formal, informal and non-formal education. It also examines the National Policy on Education i.e. the Federal Government of Nigeria's views on science and technology. Furthermore, it enumerated the importance of science education to National development among which are that without science education, information and communication technology would be impossible. Finally, it concluded that since science and technology are part of the national strategy for development, its literacy is essential. Also since national development is important because it develops technological education in order to meet the growing needs of the nation, that government should have a clear demonstration of positive intentions for science and technology education realizing that it is the vehicle by which a nation can be lifted to attain scientific and technological sophistry.

The Nigerian educational system took its roots 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 (Ajeyalemi, 2008). 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

Pristine

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 we live (Journal of Education and Practice (www.iiste.org)). 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 healthy, 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.

Cecilia Chinwe Ogbu

Conceptual Clarifications

Various Definition of Science

From Wikipedia, the free encyclopedia Jump to: navigation, search

Science (from Latin *scientia*, meaning “knowledge”) is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. In an older and closely related meaning, “science” also refers to a body of knowledge itself, of the type that can be rationally explained and reliably applied. A practitioner of science is known as a scientist. In classical antiquity, science as a type of knowledge was closely linked to philosophy. During the Islamic Golden Age, foundation for the scientific method was laid, which emphasized experimental data and reproducibility of its results. In the West during the early modern period the words “science” and “philosophy of nature” were sometimes used interchangeably. Not until the 17th century, natural philosophy (which is today called “natural science”) was considered a separate branch of philosophy in the West.

In modern usage, “science” most often refers to a way of pursuing knowledge, not only the knowledge itself. It is also often restricted to those branches of study that seek to explain the phenomena of the material universe. In the 17th and 18th centuries scientists increasingly sought to formulate knowledge in terms of *laws of nature* such as Newton’s Law of motion and over the course of the 19th century, the word “science” became increasingly associated with the scientific method itself, as a disciplined way to studying the natural world, including physics, chemistry, geology and biology. It is in the 19th century also that the term *scientist* was created by the naturalist-theologian William Whewell to distinguish those who sought knowledge on nature from those who sought other types of knowledge. However, “science” has also continued to be used in a broad sense to denote reliable and teachable knowledge about a topic, as reflected in modern terms like library science or computer science. This is also reflected in the names of some areas of academic study such as “social science” or “political science” (<http://www.nisit.gov.ng/docs/ministersc/o20paper.doc>)

Definition of Education

Education in its general sense is a form of learning in which the knowledge, skills, values, beliefs and habits of group of people are transferred from one generation to the next through storytelling, discussion, teaching, training, and or research (Odiba, 2012). Education may also include informal transmission of such information from one human being to another. Education frequently takes place under the guidance of others, but learners may also educate themselves (autodidactic learning) (Odiba, 2012). Any

Pristine

experience that has a formative effect on the way one thinks, feels or acts may be considered educational.

According to Okojie, (2007), education is the process and result of the acquisition of systematized knowledge and skills. Associated with education are the transfer from one generation to the next of knowledge of all of mankind's cultural riches; the mastery of socio-historical knowledge, as reflected in the natural sciences, social sciences, technology, and art and the acquisition of work habits and skills. Education is essential to preparing for life and work. It is the basic means by which people come to know and acquire culture and it is the foundation of culture's development.

Education is any process, either formal or informal, that shapes the potential of a maturing organism. Informal education that results from the constant effect of environment and its strength in shaping values and habits cannot be overestimated. Formal education is conscious effort by human society to impart the skills and modes of thought considered essential for social functioning. Techniques of instruction often reflect the attitudes of society, i.e., authoritarian groups typically sponsor dogmatic methods, while democratic systems may emphasize freedom of thought (Seweje, 2000).

Types of Education: Education is classified into three types, namely: formal, informal and non-formal

(A) Formal Education is:

- (i) Planned with particular end in view
- (ii) Limited to a specific period
- (iii) Given by specially qualified teachers
- (v) Includes activities outside the classroom
- (vi) Observes strict discipline.

(B) Informal Education: In this type of education,

- (i) It is incidental and spontaneous
- (ii) It is not-pre-planned
- (iii) It is not imparted by any specialized agency
- (iv) It has no prescribed time-table or curriculum
- (v) It may be negative also

Cecilia Chinwe Ogbu

(C) Non-Formal Education

Non-formal education is one of the recent concepts getting into use. Indian involvement in non-formal education has increased as a result of interest in making education a life-long affair rather than a matter of formal schooling. Therefore, it is:

- (i) Derived from the expression 'formal education
- (ii) Done outside the realm of formal education
- (iii) Conscious and deliberate
- (iv) To be organized for a homogeneous group
- (v) Serving the need of the identified group.

Definitions of Development

1. The systematic use of scientific and technical knowledge to meet specific objectives or requirements.
2. An extension of the theoretical or practical aspects of a concept, design, discovery, or invention.
3. The process of economic and social transformation that is based on complex cultural and environmental factors and their interactions.
4. The process of improvements to a parcel of land, such as grading, subdivisions, drainage, access, roads, utilities.

(<http://www.nislt.gov.ng/docs/ministers%20paper.docs>).

Definition of Science Education

Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The learners may be children, college students, or adults within the general public. The field of science education includes work in science content, science process (the scientific method), some social science, and some teaching pedagogy. The standards for science education provide expectations for the development of understanding for students through the entire course of their K-12 education and beyond. The traditional subjects included in the standards are physical, life, earth, space, and human sciences.

(<http://www.nislt.gov.ng/docs/ministers%20paper.docs>).

Science and Technology in the National Education Policies

Nigerian educational system prioritized science and technology with policies that are favourably 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

Pristine

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 round (Journal of Education and Practice www.iiste.org)
- (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 (Journal of Education and Practice www.iiste.org).

The Federal Government specified the goals of 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.

Cecilia Chinwe Ogbu

Importance of Science & Science Education to National Development Beyond 2020

1. Science provides unique training in observation and reasoning. Science students reason from definitely ascertained facts and form clear concepts. It makes one systematic and enables him to form objective judgments.
2. The discoveries have added to the prosperity of human race with vast increase of knowledge. Herbert Spencer in his, "What knowledge is of Most Worth" gives information which study of science furnishes. According to him, science learning is incomparably more useful for our guidance in life. Other chief subjects too provide an intellectual training not inferior to that of science. Practically, we live in a world of scientific discoveries, so science education cannot be neglected.
3. Science has its cultural values. It has a literature of its own. The Scientific discoveries of Galileo, Newton, Faraday, Darwin, Pasteur, Kelvin, Bose, Armstrong and others are treasures of mankind. So, Science has won the first rank of humanistic studies.
4. Science has utilitarian value. It trains child to use his leisure properly. These are clearly illustrated in scientific hobbies.
5. Modern knowledge of science provides great intellectual pleasure. An educated person is under very great disadvantage if he is not familiar with that knowledge.
6. Knowledge of the methods of observation and experiment in the different branches of science helps pupils to develop a logical mind, a critical judgment and a capacity for methodical organization.
7. Science is useful in that it remedies some of the defects of the ordinary school education. It is found to be the most valuable element in the education of those who show special aptitude. Science provides discipline of mind.

In the case of Science Education, it is very important to the development of any nation in many areas. A graduate of physics education can be self employed as opined by Samuel (1996). Many of the physics graduates have some knowledge of electronics that is enough for them to be able to have a little period of training as apprentices and then, stand alone as electronic technician. For instance, semiconductor is very important in the modern technology that if properly learnt is enough for one to stand upon for a living; semiconductor physics is part of what any graduate in physics will learn and

Pristine

should learn. Semiconductor is very important in a growing economy like ours in Nigeria; it is useful in ceramic industry and a well trained physics education graduate can be well established in ceramic industry.

Without science education, Information and Communication Technology would be impossible. Science and technology will not be possible without science education; for instance engineering, medicine, architecture etc will not be possible if there is no one to teach the students the core subjects for these courses. Biology education is very important to any growing economy like Nigeria. Many graduates of biology education are self employed and employers of labour. Many own schools for themselves where people works and earn their living while some are in to fish business. There are colleges of education where students of chemistry department are taught how to make dye and chalk; graduates of these departments can establish their own chalk business as soon as they graduate. If supported with fund, many schools do not need to buy chalk outside anymore and they can equally produce for other schools.

How Could Science/Technology Education Lead To National Development/Way Forward

Since development helps in environmental sustainability, helps in provision of basic human needs such as food, shelter, water etc, deals with infrastructure that can sustain other basic human need for the long term, help to control climate change and help to provide financial stability, Nigerian Government should have a clear demonstration of positive intentions for science and technology. Also since national development is important because it; provides and expands educational facilities to ensure education gets to the door step of every Nigerian child; overhaul and reform the content of general education to make it more responsive to the socio-economic needs of the country, develops and consolidates the nation's higher education in response to the manpower needs of the country, develops technological education in order to meet the growing needs of the nations to mention but a few. Government should have a clear demonstration of positive intentions for science and technology education realizing that it is the vehicle by which a nation can be lifted to attain scientific and technological sophistry, just as listed above. Though this is overwhelming 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 delivering the keynote address titled "science and technology for youth empowerment" specifically states as follows; Our education

Cecilia Chinwe Ogbu

system is malfunctioning creating in particular problems of scientific and technological manpower production (Journal of Education and Practice www.iiste.or). 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 (<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 key reasons for a global decline in the level of interest in science include;

- (a) Difficulty in funding, training and retaining 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, among others.

If the above reasons that led to decline in the level of interest in science should be taken care of, added to the efforts Federal Government and World Bank were doing to promote science and technical education at the nations tertiary institutions certainly science and technology education could lead to national development beyond 2020.

Conclusion

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,

Pristine

role of science and technology education, and to address the requirements in various sectors of society.

References

- Ajeyalemi, D. (2008): Curriculum Reforms in the Nigerian Educational System: How Sustainable in Development and Sustainable in Nigerian Educational System. *Proceedings of the 2nd National Conference of the Institute of Education, Olabisi Onabanjo University.*
- Azikiwe, U. (1999): Relevance of Adult Education Program to Women for Sustainable Development. *Nigerian Journal of Curriculum Studies.* 6(1).
- Federal Government of Nigeria (2004). *National Policy on Education.* Abuja.
- Odiba, A.I. (2012): Educational Quality Improvement in Nigeria; Interventions, Challenges and Solutions. *A Paper Presented at the Maiden Seminar of Al-Hikma College of Education Ankpa.*
- Okojie, M.U. (2007); “The State of Social Studies Education in Nigeria” *Paper Presented at the 4th Annual National Conference of Association for Encouraging Qualitative Education (ASSEQEN), Asaba, May 2007.*
- Samuel, T. (1996): Towards a Result-Oriented Science and Technology Policy for Nigeria: *A New Agenda: Studies in Education* 2(1), 26-30.
- Seweje, I.O. (2000): The Challenge of Science Teaching in Nigeria Today. *Journal of Educational Foundation and Management.* 1(1), 208-220.
- Journal of Education and Practice (www.iiste.org)
- <http://www.nisit.gov.ng/docs/ministers%20paper.doc>.