Science Education as a Catalyst for Nigeria's Science and Technology Progress

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Abstract- ***One of the major global educational concerns today is the development of science and technology. Nigeria is not left out in this move. Science education is the foundation for science and technology. The main objective of the science education as a catalyst for Nigeria's science and technology progress is to measure the impact of science education on the development of science and technology in Nigeria. The paper discusses the history of science education in Nigeria, its expansion and curriculum as well as its relevance in achieving Nigeria's aspirations in the development of science and technology. The paper concludes that, with effective science education teachers and some other recommendations made, Nigeria can achieve its goals in science and technology development.***

Keywords: Science Education, Catalyst, Science, Technology, Nigeria, Progress.

I. INTRODUCTION

Science education is the bedrock of the development of science and technology in every society. The paper discusses the historical evolution of science education, science education needs in Nigeria, science curriculum composition, teaching importance and role of science education in Nigeria as well as some suggestions to improve teaching of STEM in schools in Nigeria.

Definition:
There are different definitions of science by several scientists and educators.
Aristotle defines science as certain knowledge through causes. He views science subjectively as a set of knowledge. Mario Bunge (1983) classified science in two ways: factual science; which studies natural or social processes through observation and experimentation (e.g Physics) and formal science, which studies abstract relationship between signs and ideas (e.g Maths).

Ezequiel Ander, defines science as "a system of concepts about the phenomena and laws of the external world or the spiritual activity of individuals, which allows foreseeing and transforming reality for society's benefit". And Alan F. Chalmers, in "What is this thing called science" (1999), (3rd edition), discusses science as knowledge derived from facts of experience. He explores topics such as observation, experiment, induction, falsification, and the philosophy, underpinning scientific inquiry. He notes that science is widely esteemed and seen as reliable because it is based on evidence rather than opinion. However, The Science Council of Nigeria (2015) defines science as "the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence". The definition includes objective observation, experimentation, induction, repetition, critical analysis, verification, peer review and assessment.

Western Science (Modern science)
According to Abimbola (1997), western science can be understood through three major aspects which are: Attitudes, Processes (methods) and products.
(a) Attitudes: Attitudes refer to certain beliefs, values and behaviours characteristic of scientists such as curiosity, humility, skepticism, open-mindedness, avoidance of dogmatism and a positive approach to failure. These attitudes are what form informal rules which guide scientific investigations.
(b) Processes (Methods): These are specific ways of investigating problems and acquiring knowledge which include ability to observe, classify, measure, hypotheses predict, describe, ask critical questions about nature, design and conduct experiments and draw conclusions from the data.
(c) Products: These are the accumulated, tested and systematized body of scientific knowledge which includes concepts, principles, laws and theories which explain, relate and predict natural phenomena in a simple and efficient manner.

Thus, Abimbola's view contrasts with indigenous or traditional world views by emphasizing empirical evidence, methodical inquiry and critical skepticism as central to understanding the natural world. Also, he presents the scientific world view as a

combination of a mindset toward inquiry and standardized methods for conducting investigations among others.

Science Education in Nigeria

Ogunleye (1999) believes that Nigeria, on gaining political independence, brought along with it rational consciousness and awareness among Nigerians. These consciousness and awareness were informed by several panels and commissions which were set up by the government to study the educational priorities of the country Nigeria. Some of them are:

1. The Banjo Commission of 1960 which examined the structure of education in the former western region of Nigeria and made some recommendations which helped in moving the region forward.
2. The Ashby Commission of 1960 also, which was set up by the federal Government to carry out an investigation into the Nigerian manpower requirements up to 1980. They came up with a report which contributed significantly to the development of education in Nigeria including science education.

However, the report frowned at the serious neglect of science and technology education in the country. So, the Panel made special recommendations for improvement of science education particularly in Northern Nigeria.

They are as follows:

(a) There should be a progressive increase in the enrolment of primary school children in Northern Nigeria.

(b) There should be the introduction into secondary school system of science, vocational/technical subjects to reduce the bias for literacy studies and expansion of enrolment into secondary schools.

The period of Rapid Expansion and Curriculum Innovation in Science Education

The period (1970-1980), according to Ogunleye (1999), was a relatively crowded period of the growth and development of science education in Nigeria. Six major events or happenings were responsible for this assertion; Some of which are explained below:

Perhaps it is important to mention that, from 1967 to 1970, there was a way of survival in Nigeria where the Igbos had no choice but to struggle for survival after the war ended in 1970. With 'no victor, no vanquished' slogan of the general Gowon government, the eastern region was forced back to the main stream of one Nigeria. Thus, 1970 was considered to be a post war period. Unity schools were established in all parts of the country as a means of promoting national co-existence and unity.

The second major event that happened was the establishment of National Youth Service Corps (NYSC) scheme which was launched in June, 1973. This is one year national service which provides enough opportunities for graduates of science and technology from our universities to assist in teaching science and technology subjects in the schools. Thus, improving the quality of science education in the country which in turn leads to producing experts in science and technology.

The third notable event was the population explosion enrolment in various institutions of learning as well as expansion in terms of the number of such institutions. This led to the launching of the Universal Primary Education (UPE) in 1976, by the federal Government. During the period (1976), there were very low enrolments in schools in the country. There were 5,930,296 primary school pupils, 704,917 secondary school pupils, 31,511 university students. As the UPE graduates proceeded for secondary education, there was unprecedented jump in enrolment in 1982/1983 when UPE showed up for enrolment (Ibrahim, H. I. et al) (2008).

Nigeria's Science and Technology Aspirations

Nigeria has already established several primary and secondary schools, colleges of education, polytechnics, universities and several other research centres and institutes all with a view to achieving its aspirations for science and technology. So, again, Nigeria, by harnessing science and technology, focuses on driving national economic progress, innovation and sustainable development

The Federal Ministry of Innovation, Science and Technology (FMIST) plays pivotal role in achieving this target/aspirations.

The aspirations include:

1. Boosting local productivity and innovation by collaborating with research institutes and government agencies.

2. Promoting home grown innovations and technology.
3. Protecting intellectual property.
4. Supporting technology incubation programmes.
5. Fostering startups through patent registration.
6. Promoting science, technology and innovation to bridge research output gaps.

Thus, Nigeria aspires to build a knowledge based economy through science driven solutions which improve living standards, create jobs and position the country in the global innovation landscape.

Science Education and Nigeria's Progress in Science and Technology

For Nigeria to achieve its aspirations in the development of science and technology, science education must be supported by giving it solid foundation from the root (that is from the primary school level) since it is the gateway to science and technology growth and national development in general.

Thus, science education plays a vital role in making Nigeria one of the largest economies in the world. The government must encourage both public and private schools to put more emphasis on science and technology education.

Equally, for Nigeria to attain the goal of being among the top economies of the world, science education must be taken seriously. This can lead to achieving dependable economy, education, agriculture, health, technology and innovation among others.

In terms of education, science must be given priority and children from the primary school level should be encouraged to study science and technical courses. When they become experts in different fields of science, Medicine, Engineering etc. Nigeria can reduce over dependence on other countries for scientific and technological breakthrough. It can produce its own products using the available raw materials.

Agriculture can also be supported by creating and using modern farming methods, implements and chemicals. The trained Nigerians can invent different farming tools through discovery and experimentation. This can lead to independence in terms of food, create employment opportunities and subsequently reduce poverty in the society. This will further ensure national food security and contributes significantly to foreign exchange earnings of the country.

Similarly, Nigerian Health Sector can also be improved by imparting science education in our schools and universities. Graduates in Health and other medical fields can give their support in manning our health centres and hospitals. Many diseases can be tackled thereby improving living and economic conditions of the citizenry.

Also, with sound science and technology education experts, our technology and technical know-how will improve leading to achieving dependence in the sectors.

However, the above can better be achieved if enough science teachers are trained, employed and supported. We need teachers of Chemistry, Biology, Physics, Mathematics, Agricultural Science, Basic Science, Integrated Science and equally important, English which remains the language of communication in Nigerian schools.

CONCLUSION

This paper which is an explanation of science education as a catalyst for science and technology progress in Nigeria, sheds light on the place of science education in achieving Nigeria's science and technology aspirations. The study shows that science education is a pivotal factor in achieving excellence in science and technology development. Introducing science education, employing science teachers, supporting the project in various ways, will make it easy for Nigeria to achieve it's goals. The paper further examines the aspects of western science, discusses science education in Nigeria, period of rapid expansion and curriculum innovation in science education as well as Nigeria's aspirations in science and technology. The paper concludes with some recommendations for Nigeria to realize its dreams in achieving science and technology progress.

RECOMMENDATIONS

For Nigeria to achieve its goals of being among the largest economies in the world, the following recommendations have been advanced. They are:

1. Science curricula should be well implemented in Nigerian schools.

2. Science teachers should be motivated in conditions of service by enjoying special package.
3. Science education should be encouraged at all levels with reliable internet services, investing in solar energy and improved ICT.
4. Funding of science education should be increased by increasing budgetary allocation to science and technology.
5. Government should create enabling environment for innovation and learning.
6. Government should also focus more attention on training and re-retraining of Nigerian scholars on science and technology programmes.
7. Lastly, government should re-consider policy reforms on science and technology.

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