

# STATE OF SCIENCE AND TECHNOLOGY EDUCATION IN NIGERIA

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## **Abstract**

Science and technology are closely related concepts whose interaction is symbolic in nature. It is no gain saying that science and technology have some critical factors of economic and social development. That is why some nations are either classified developed or under developed as a reflection of the state of scientific and technological development. Hence, science and technology education is aimed at giving or providing support for the development of science and technology. This paper attempts to highlight some of the efforts made by successive government in the promotion of science and technology education in Nigeria. It also attempts to discuss some of the problems bedevilling the progress of science and technology education in the Nigerian setting. It finally gave a hint on the direction that science and technology education in Nigeria should take to reduce the multifarious problems that bedevil it. Conclusions are also drawn.

## **Introduction**

Science as a concept has no universal definition. Hence the definition of science varies from one scientist to another. Some see science as the 'What', 'How' and 'Why' of things happening in the environment in which man lives. Yet, others see it generally as what scientists do in their quest for knowledge about nature. In a more concrete term some scientists define science in terms of its products or processes. As a product, science is referred to as stock of accumulated knowledge which evolve from the application of the processes, that is, method of science. In this context, the product of science is an ordered body of knowledge in the form of concepts, laws, theories and generalizations. And as a process, science involves observing, classifying, measuring,

experimenting and questioning, hypothesizing, recording, controlling variables, interpreting data and communicating.

On the other hand, technology may be defined as the science of industrial arts. It is a systematic knowledge gained through science and its application to industrial processes. It is for most purposes regarded as applied science. Ogunniyi (1986), sees technology as the knowledge and study of human endeavours in creating or using tools, techniques, resources and systems to manage the man-made and natural environment for the purpose of extending human potentials and the relationship of these to individual society and the civilization processes. Technology therefore, according to Okoye (1997), includes both physical objects and the techniques associated with them.

Science and technology therefore, have a pervious interface and so are closely related, what is more, their interaction is symbiotic. For example, to develop certain technologies to an advanced level requires scientific theorization. The steam engine, for example, was by no means invented on the basis of scientific research. Because of this, science and technology have since become very closely linked, and are regarded by some as the two sides of the same scientific coin (Aghadiuno, 1996). in the same vein, science and technology has been expressed by some philosophers of science as expressed in the words of Kupers (1978) thus:

As regards the domain of object of science and technology, we should indicate no difference since in principle one cannot distinguish between 'nature' and 'artificial nature'. In both domains the same nature is involved and the same laws are valid (p.65).

From the foregoing therefore, the conception of science as completely different from technology is therefore a misconception. And according to Aghadiuno (1997), science is and has always been 'technological' at least secondarily. Similarly, technology has always been 'scientific' in order to develop to maturity.

Education has on its own remained a vital tool for rapid, social, economic, political, scientific and technological development of any society. Science and technology are also agents for rapid social and societal development. In this context science and technology education is aimed at giving or providing support for them by:

- i) Generating widespread public understanding about science and technology,
- ii) Supporting science and technology as agents of change, and
- iii) Training the required manpower for science and technology.

For science and technology education to be able to do the above, there should be as pointed by Okoye (1997);

- i) Up to date and relevant curricula;
- ii) Appropriate teaching and learning materials in terms of quality and quantity;
- iii) Standard laboratories and laboratory equipment, and
- iv) Properly trained and well-equipped science and technology teachers.

It is no gain saying that science and technology have some critical factors of economic and social development. The utilization of science and technology in national life marks the difference between development and under-development. This is why some nations of the world are classified as either developed or under-developed as a reflection of their state of scientific and technological development. While the developed world are characterized by their attainment of sophistication in science and technology, the under-developed countries lack such

characteristics. Science and technology is therefore an instrument that is used in the upliftment of the economy of any country. Nigeria as a developing nation has had a fair share of experience in science and technology education over the years as a nation. In this paper, effort will be made to highlight some of these experiences, problems facing science and technology education in Nigeria and the direction that science and technology education in Nigeria should take to bring a concerted development to the nation.

### **A Highlight of the Efforts of the Nigerian Government in the Promotion of Science and Technology Education**

After the attainment of independence in Nigeria in October 1<sup>st</sup>, 1960, the need for the acquisition of science and technology became a necessity. This is because it will afford the rapid development of Nigeria as a nation. The 1963 United Nations Conference on the application of science and technology for the benefit of Third World Countries and the 1964 UNESCO International Conference on Research and Training in Africa gave boost to the development of science and technology in Nigeria. As a follow-up the Nigerian government in 1967 engaged the services of a UNESCO science policy advice to reassess the status of science and technology in the country on appropriate policy measures. This resulted in the establishment of the Nigerian Council for Science and Technology (NCST) in 1967.

In 1977, NCST, together with its research councils was replaced by the National Science and Technology Research Departments Agency (NSTDA). This Agency operated five research departments of Planning, Natural Science, Mechanical Science, Agricultural and Biological Science. It also offered research grants to tertiary institutions for projects of national interest. In 1979, the Federal Ministry of Science and Technology was established and it took over the duties of NSTDA.

Successive government over the years realising the importance of science and technology education have done a lot to popularise science and technology in Nigeria. Among the many steps already taken are:

1. The introduction of science fairs and science clubs in schools.
2. The introduction of Junior Engineers, Technicians Scientists (JETS) competitions in secondary schools.
3. The establishment of special science secondary schools in some states of the federation.
4. The pegging of the approved quota for admission into Nigerian Universities at sixty percent (60%) for Science and Science related subjects and forty percent (40%) for Arts;
5. The establishment of specialized institutions in the areas of science and technology by the Federal Government e.g.
  - (a) Federal Universities of Technology
  - (b) Federal Universities of Agriculture;
6. Award of scholarships to deserving students studying science (including science related and technology subjects;
7. Establishment of Polytechnics, Technical Colleges and Colleges of Education (Technical) in many states of Nigeria;
8. Organisation of regular annual in-service and short-term training to enhance the competence of Science, Mathematics and primary science teachers across the country.
9. Full implementation of the Industrial Training Fund (ITF) scheme for students to enhance STM education.
10. Establishment of science and Technical Colleges at lower levels to encourage teaching and learning of science and technical subjects;
11. Publication of science and technology journals by bodies such as STAN, NBTE and other bodies to improve and broaden their knowledge;
12. Organisation of science workshops, conferences and seminars to encourage the

teaching of science, technology and mathematics (STM) in schools;

13. Provision of adequate teaching materials and textbooks as well as infrastructures and instructional aids for the teaching of science and technology in schools;
14. Establishment of scientific and technological research centres for research purposes and productions of scientific, technological and teaching materials;
15. The introduction of computer education in schools as well as computer assisted learning (FMST, 1986; Okoye, 1997; Agboghroma and Umudhe, 2006; Agboghroma and Oiodu, 2007; Imiere, 2004).

### **Problems of Science and Technology Education in Nigeria**

The problems facing the development of science and technology education in Nigeria are multifarious. These problems range from lack of adequate text books, lack of funds to purchase equipment, over-crowded classrooms/ laboratory /timetable, lack of cooperation by administrations, the pressure of external certificate examination, etc, to lack of proper monitoring and feedback mechanisms, poor preparation of teachers who teach the new programmes. Others include lack of motivation among teachers, the rapid rate at which teachers are transferred from one school to another or out of the profession, the use of obsolete teaching methods, improper planning and implementation procedures, over whelming number of activities demanded by the new curricula, shortage of qualified science teachers, lack of clear cut goals, scanty research reports on the performance of the programmes and so on. Also another important items that is missing in the development of science in Nigeria is the conspicuous absence of an active involvement of the scientific community. Despite well-informed opinions and research evidence to show that the type of science taught in our institutions provides at best ready made knowledge which is isolated from our cultural background, professional scientists

still pay little attention to this problem (Abubakar, 1960; Weaver, 1964; Bajah, 1975; Ogunyemi, 1977; Ogunniyi, 1986; Okoye, 1996, etc).

The major problem among the highlighted problems is the planning and implementation stage as well as the lack of clear-cut policies in the realization of science education objectives in Nigeria. According to Ogunniyi (1986), as cited by Okoye (1997), it is not the provision of the learning facilities nor the wise use of the facilities that matters, but the socio-political context in which they are used. In Nigeria, science and technology have to fight for survival. The scientists, the intellectuals and the science teachers are not accorded a high social status. This has led to low morale, brain drain within science and technology experts and massive drift among prospective scientists and science teachers to other areas of more rewarding opportunities (Okoye, 1997).

Other problems that have bedevilled the realization of science and technology education in Nigeria, according to Mogbo (2000) and Asuquo (2002), as cited by Imiere (2004), include:

1. Constant strike actions and political instability;
2. Cultism in schools, colleges and university;
3. Unionism/radicalism of teachers and students;
4. Schisms between school authority, staff and students;
5. Exploitation of students; like wise
6. Over dependence on printed materials. Efforts should be geared towards how to 'do' science and not 'read' science in text books; and
7. Problem of semantics - who is a technician, technologist or scientist.

### **The Direction Science and Technology Education in Nigeria should take**

No doubt, there are indeed a number of problems facing science and technology education in Nigeria. Fortunately, people of all

shades of opinion are aware of the magnitude of these problems facing science and technology education in Nigeria. Based on the observed problems above, government, stakeholders, public and non-government organisations (NGOs) should rediversify their efforts towards:-

1. Increasing emphasis on rural integration as a useful catalyst to concerted efforts at planning and implementation of virile science education programmes all over Nigeria. To be relevant now and in future according to Okoye (1997), the science and technology curricula should reflect both contemporary and emerging needs of the diversified cultures. The curricula should be made to reflect the diversified cultural heritage of the Nigerian setting rather than just one at present;
2. The relevance of the curricula to the needs and aspirations of the Nigerian setting. Although science is universal by nature, the needs of the different cultures and economics are not the same. To this end, topics that relate to mechanized farming, control of malaria and many tropical diseases, ecological balance, provision of good potable water, food production, construction of good roads etc are more relevant to the Nigerian setting than stick to the science curricula of the industrialized societies.
3. Carrying out research into existing curriculum materials for reviews and modification or introduce an alternative to the existing curriculum as pointed out earlier.
4. Emphasizing science and technology teaching by developing scientific attitudes as well as application of scientific knowledge and process for solving social problems.
5. Organising regular conferences, symposia, exhibitions, seminars and workshops for teachers to promote science and technology education.
6. Providing enough basic instructional facilities, equipment and materials needed for science and technology education in

**schools, colleges, polytechnics and universities.**

7. Encouraging teachers to employ varied teaching methods with use of teaching aids to make learning interesting to learners.
8. Providing well furnished science and technology museums, laboratories and libraries in schools colleges, polytechnics and universities.
9. Ensuring proper monitoring of teaching of science and technology education courses or subjects in schools, colleges, polytechnics and universities to ensure that learners acquire the desired scientific and technological attitudes.
10. Encouraging early exposure of children to science and technology education to arouse their curiosity and develop interest in science and technology.
11. Funding of science and technology education.
12. Checking the activities of unionism, cultism, examination malpractices and other vices mention earlier.
13. Political stability of the country i.e. the need to have good government.
14. Providing a better remuneration package for science and technology personnel and teachers, and so on.

### **Conclusion**

The paper has tried to address the state of science and technology education in Nigeria. A highlight of the efforts of the Nigerian Government in the promotion of science and technology education was examined to justify the high premium placed on the importance of science and technology by successive government of Nigeria. The paper also discussed the problems that have continued to confront science and technology education in Nigeria and finally gave a hint on the direction that science and technology education in Nigeria should take to reduce the bedevilling problems that has confronted the development of science and technology education in Nigeria.

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