

*Teaching Science in The Basic Education Levels in Nigeria:  
Challenges and Way Forward*

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**Abstract**

This paper thus looked into the teaching of science in the basic education levels in Nigeria: challenges and way forward. Government and other stakeholders should endeavor to improve the system by assisting, improving and supporting science teaching for national development. The challenges noticed include poor funding, lack of appropriate and adequate teaching materials, lack of qualified teachers, poor attitude of pupils/students to science. Some recommendations were made which includes: taxable adults to contribute financially to funding education, pupils should be encouraged to do science at the higher levels, but primary and junior secondary schools to be made accessible to pupils in villages and hamlets, government should employ qualified teachers to these remote areas with special salaries and other incentives.

Keywords: Basic Education, Improvement, Science, Skills, Teaching

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## **Introduction**

Science is derived from Latin word scientia, "scire" which means to know. This term is used in a broad sense to denote systematized knowledge in any field. This can be narrowed down to knowledge about the structure and behavior of nature and physical world based on the facts that can be proved. Science can be further divided into these subheadings (Encarta Encyclopedia, 2004).

- a. Pure or Natural Science
- b. Social Science
- c. Applied Science
  - i. **Pure or Natural Science** - This can be divided into physical and biological science (study of life) while physical science are studies of astronomy, chemistry, geology and so on.
  - ii. **Social Science** - Social science is the study of origin and development of human society and institutions, relationships, and ideas involved social life and so on.
  - iii. **Applied Science** - Knowledge gained from science used in solving real life problems, this is applied science that is. field of study like engineering, medicine, space explorations, information technology and so on.

## **Science Education in Nigeria**

It is always difficult to state categorically when science education developed in any civilization, but one can state when major breakthroughs were made. Remarkable changes were made in science education/teaching in Nigeria as stated here:-

### **(A) Establishment of Missionary Secondary Schools**

In 1859, science education/teaching was introduced in missionary secondary schools in Lagos and nature study was taught on the environment including outdoor observation of plants, animals and non-living things. Although science teaching progressed with further establishment of more missionary schools in Nigeria, the quality of teachers and teaching of science and the number of pupils/students interested in science education lacked a lot of things at this period, (Ayodele 1999). These include:-

- i. Lack of science laboratories.
- ii. Lack of qualified science teachers.
- iii. Lack of interest or enthusiasm shown by the colonial government.
- iv. Lack of instructional objectives in science teaching.
- v. Lack of funds to promote science education.
- vi. Lack of science text books.

### **(B) Colonial Government Participation in Science Education**

Within the period 1883 - 1930 the position changed when the then colonial government passed education ordinance bill of 1908. The bill stipulated certain condition, for government to give grants to missionary schools. With these grants,, some of the missionary schools were able to acquire science equipment for laboratory instruction.

### **(C) Local Community Participation and Government Effort**

Before 1931, science education did not progress much because most parents were not literate enough to understand the benefits of science education. Those that were literate preferred their children to study abroad and preferred fields of study like: law and humanity. The trend continued until 1932 when literate parents put pressure on government to establish Yaba College (up graded in 1963 to Yaba College of Technology) with the objectives to provide teachers to teach basic science subject in secondary schools, in addition to providing qualified assistances in medical, engineering and other vocational education. The period 1931-1959, witnessed, a lot of local community effort at spreading science education.

The enactment of the 1948 education ordinance further enhanced science education in Nigeria; other notable events that promoted science education in Nigeria are:

- i. Establishment of university colleges Ibadan in 1948 ;
- ii. Introduction of high school certificate 1951;
- iii. Setting up of an examination board later known as (West African Examination Council) in 1952;
- iv. Inauguration of Science Teacher Association of Nigeria (STAN) in 30th November 1957;
- v. Introduction of free universal primary education in western region in 1955 and free universal primary education in eastern region 1957;
- vi. Establishment of federal college of arts and science and technology at Ibadan in 1950, Zaria in 1952 and Enugu, 1954;
- vii. Establishment General Certificate Education GCE in 1958

A lot of committees, commissions, and institutions were created between 1958 and 1960 to enhance science education.

### **(D) Curriculum Innovations in Science Education that Promoted Rapid Development**

There are other remarkable innovations that enhanced science education between 1960 and to the year 2004 that are worth mentioning. They are:

- i. Establishment of federal government colleges otherwise known as unity schools in 1973. These unity schools were highly equipped with spacious science laboratory thereby affording students the opportunities to learn science.
- ii. Another major event is the establishment of national youth service corps (NYSC) programme in June, 1973. Science graduates were posted to compliment the acute shortage of science teachers in many schools of the federation - Adesina (2000).
- iii. A new National Policy on Education was established in 1977. The basic aim of the policy was technological transfer or awareness. Education in this programme is free and compulsory for every citizen of school age that is the first nine years in school- for the basic education levels (FME, 2004).

### **Relevance of Basic Science**

One of the important goals of schooling is to teach science students to think positively and school subjects taught should help to accomplish this goal and if basic science

lessons can be planned towards achieving the set goals the followings might be attained, Piadilla (1990)

- Basic Science forms the foundation of all the sciences like Biology, Physics and Chemistry that the students study at a later stage of their education.
- It helps cultivate and develop in the students the skill of inquiring, knowing and rational mind for the conduct of a good life and democracy,
- It enhances better understanding of the immediate environment.
- It helps to promote a change in disposition or behavior that is relatively permanent overtime and brought about by experience (Adeyanju, 2003).

If Basic Science is to be used to achieve national objectives, then the use of good teaching methods through which these knowledge and skills can be conveyed to learners easily must be adopted. This met study is premised on teaching science in the basic education levels in Nigeria challenges a hod of teaching becomes a very important companion for effective teaching and learning in this case.

### **Empirical Study on the Teaching of Basic Science**

The target of the study is premised on teaching science in the basic education levels in Nigeria: challenges and way forward. Science has been accepted in the entire world as the vehicle for technological advancement, Adeniran (2005). Science plays an important function in educational system of all the nations of the world including Nigeria, because science has the power of overwhelming force that can lead to decision making in the life of individual student which might affect the nation. The place of science is widely recognized and has made science to be globally outstanding and distinct among other subjects and as important tool for technological development and advancement. Considering the importance of science in the development of the individual and the nation, this has led to the special position and recognition given to science in the curriculum of both the primary and junior secondary schools levels as a core – subjects in Nigeria. Science should be taught well and to attain the level of desired scientific and technological height, effective science teaching must be put in place.

Science should be taught to assist in contributing to knowledge through its uniqueness – skills, with emphasis on hypothesizing, encouraging the students to use and manipulate things in their immediate environment, by observing, making inferences based on previously gathered data, obeying the rules of being precise in quantity to be used, using the appropriate words or symbols, classifying objects accordingly and state the results honestly and precisely.

#### **Basic Science Process Skills includes the followings:**

Observing – imploring the senses to collect and gather relevant information and obtain objective of events.

Inferring – bringing in or introducing some information gathered relating previously gathered data or information.

Measuring –quantity, size, weight, distance, capacity of a substance using both standard and nonstandard (unspecific) measures to ascribe or describe the dimension, quantity of a substance.

Communicating –the use of symbols, words, diagrams, pictures, words to illustrate, describe an events or actions.

Classifying – divide, put or arrange into classes or grouping objects or events into categories based on characteristics or properties.

Predicting – to make something known in advance especially using inference, stating the result of a future event based on a specific pattern of evidence, Dahunsi (2014)

A reasonable portion of the science curriculum should emphasize process skills, according to the federal government science curriculum produced by the federal ministry of education (2004). Teachers need to select curricula which emphasize science process skills. Importance and emphasize should be made on the implementation of this and there should be special provision for materials needed for this purpose.

### **Theoretical Frame Work**

Science students need to improve in skill acquisition, decision making and have better understanding of principles and concepts in science and inquiry based learning is concerned with the need for good methods used in science teaching, this can be promoted through the use of adequate and appropriate teaching methods at all levels. Science students are expected to be capable of formal logical reasoning and abstract thinking and these can be developed through inquiry.

Inquiry theory of teaching help science in posing questions or problems rather than presenting already known facts or ideas of the teacher which may also lead to easier method of acquiring knowledge without involving much thinking. Questions are asked that will allow for developing scientific attitudes.

This teaching method of science discussed is inquiry/problem solving and it involves:

- Allowing them create question on their own.
  - Let them arrive with presentable proof to answer the questions.
  - Ability to explain the presentation.
  - Creating room to linking knowledge achieved from the finding process.
  - Giving room for contribution and supporting finding with reasonable explanation.
- Here science students/pupils must be involved in formulation of questions, making observations, performing experiments and to find out what information/findings already known or recorded.

It involves four levels –

**Confirmation inquiry level-** (the materials are known but students only work further leading to new knowledge).

**Structured inquiry** – students are to provide answers to questions posed by the teacher and the teacher provides outline on how to carry out the findings.

**Guided inquiry** – students are given question – they design and follow their own procedures for testing.

**True inquiry** – students get questions, design, develop procedure and get their results.

For a successful use of inquiry method, the following must be considered:

- Students should not be encouraged to memorize.
- Allow them to develop new knowledge that builds in previous knowledge.
- Lead them to develop new understanding with the use of previous understanding of concepts and of new scientific knowledge.
- Encourage team/ peer group learning.
- Allow freedom of acquiring knowledge, Wikipedia (2014)

### **Challenges Facing Science Teaching in Nigeria**

Despite the fact that the government has a claim of having invested a lot in science education, there are some persistent challenges as stated here below Ayodele, (1999):

#### **Inadequacy of Science Textbooks**

Science text books are not adequately available; the ones available are written by foreigners, with their language and cultural background, making it difficult for indigenous students to understand. Although indigenous teachers/authors tried to compliment by writing science text books but the books cannot bridge the existing gaps to meet scientific standard of the outside world, Ribadu & Yusuf (2006).

#### **Inadequacy of Science Laboratory Apparatus and Equipment**

Most laboratories are ill-equipped, schools rely more on imported laboratory apparatus and equipment and the grants are never enough. Although government took a giant step by establishing science laboratory manufacturing industries and these industries do not have enough raw materials and man power.

#### **Large Class Sizes in Science Teaching**

One teacher to 20 students as recommended still remains a dream in schools. Classes are over populated to the tune of 40 and above.

#### **Inadequacy of Science Teachers**

Science teachers are not sufficient. Most science teachers are not professionally trained. The few available should be encouraged and allowed to go for in-service training, workshops, seminars and conference and the back up with reasonable incentives should be a continuous issue.

#### **Approaches to Science Teaching**

Science is an abstract course and will only be understood through the use of adequate and appropriate teaching methods. Some science teachers do not put extra effort in improvisation of teaching materials.

### **Students' Attitude and Aspirations**

Some students/pupils have made up their mind that they are not going to study science, therefore will not waste time on the subjects.

### **Poor Funding of Science Teaching**

Inadequate funding of science is one of the obstacles to effective management of schools in the country. Improper management of the little funds available has also contributed to the big and seems to be incurable problem in Nigeria educational system, and overcoming these holds the key to educational development and success in the country, [www.onlinenigeria.com](http://www.onlinenigeria.com) (2014).

### **Way Forward**

- Government to encourage and assist science teachers the principal executors of the curriculum to produce books for pupils' use with the financial assistance of stakeholders because they are conversant with the content and know the instructional material needs and requirements of their pupils. Government, parents and other stakeholders should buy good science books, science teaching materials with laboratory apparatus and equipment Ajayi & Adeosun (2004) for schools with the involvement of subject teachers.
- Funding of schools should be taken seriously, in a situation where government claims to spend a lot on science education and nothing to show for it and the cry for fund is getting louder daily. Allocation should be closely monitored to prevent embezzlement by the people charged with responsibility of managing it. Also taxable adults to contribute financially to education and any damage made on any facilities and equipment should be replaced or repaired immediately.
- Provision of more science schools should be of paramount interest of the government. State and local governments should put up more classrooms and laboratories to achieve the stipulated ratio in order to avoid overcrowding, which is harmful to effective teaching and learning Kankia (2007).
- Schools should be planned very close to the people as neighbor as stated in the National Policy on Education, FME (2004), to relieve students from trekking long distance before getting to schools.
- More science schools automatically mean more qualified science teachers; government should make provision and prepare for re-training of qualified science teachers in Nigeria. In this regard, all institutions designed to train and upgrade science teachers should wake up to their responsibilities in giving adequate and qualitative training to the prospective teachers. As much as there is need to train more science teachers to fill the classes; quality must be the watchword. Science teachers should also be positively motivated to ensure dedication and conditions of service to be improved to keep them on the job and for better results.
- Government to enlighten parents and guardians on the importance of science to development and they in return are to encourage their wards to do and take science subjects seriously.
- Community members should be charged with the responsibility of encouraging the pupils/youths to study science subjects in future, Dahunsi (2007).
- Inspectors of education should visit schools and ensure that good teaching methods and appropriate instructional materials are used for teaching science, Abidoeye (2005). Science teachers' allowances should be revisited upward and paid along with salaries.

## **Conclusion**

Conclusively, other problems that can be deduced on the teaching of science are: ignorance of the importance of science by the masses; government policies on education which affects funding; poor motivational factor of parents or guardians of pupils in schools who tend to discourage their children feeding them with the ideas that science is difficult and an abstract subject; qualified science teachers posted to remote areas to be paid special salaries and allowances and incentives like holiday trips to a comfortable place in and out of the country with reasonable allowances attached to the trips to be paid promptly..

## **Recommendations**

The following recommendations are made.

- This image of science teachers reflects much on the pupils'/students' interest in a course. Government should improve the standard of living of science teachers to make them concentrate on teaching profession alone rather than engaging in odd jobs to make ends meet, Adeyemo, Oke & Ishola (2009). Government should appoint professional teachers to educational posts rather than politicians who will eventually politicize education.
- Frequent organization of train the trainers' workshops for science teachers will aid them to acquire new skills and exchange ideas and views on how to improve science education, Onuigbo & Eze (2012).
- Science teachers should be trained on how to improvise laboratory equipment to supplement government effort and up with the need for basic equipment for science education. In addition, all the established science equipment manufacturing sectors should be encouraged to produce enough science equipment, Onuigbo & Eze (2012).
- Science class size should be reduced to about 20 pupils/students per teacher, Talata (2012).
- The policy that established the 6-3-3-4 system of education should be revisited and the target reviewed so that at the end of primary education the candidate would have learnt basic technology like wood work, masonry, applied art and so on.
- More practical approach should be adopted towards teaching science students to give room for application of what learnt in science classes so as to appreciate the subject. Government should make provisions for the supply of materials for practical to schools in good conditions with power supply that should be made available in schools & in regular supply for practical classes, Dahunsi (2014).
- Indigenous scientists should be encouraged to write more science books with our cultural background and rich in expected science norms and ethics.
- Governments can greatly improve the quality of science education system if they can increase funding of all levels of education. Funding of science should be provided on the basis of needs and not what the government can afford. Higher quality science education can be accomplished, cost of education be improved and increased in – takes of pupils be encouraged and promoted, Dahunsi (2010).

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