

# REPOSITIONING SCIENCE EDUCATION IN NIGERIA

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## **Abstract**

This Paper focuses on the need to restructure the present position of teaching and learning of science with National Development in view. It therefore demands looking at what science is, its relationship with Education and the impact in the Society. Hence a bit of the historical development of teaching science in Nigeria is discussed here, the trend and suggestion for a possible way out. Again, the use of indigenous language in teaching science has been advocated for in this paper as a way to drive home some technical terms for better understanding. Also the true implementation of the 6-3-3-4 system of Education is encouraged here. The contributions of the artisans are also X-rayed in this work and I advise that our education planners should realize the importance of such people in the Society in terms of practical acquisition as to match theory with practical in our Educational endeavours.

## **Definition Of Science Education**

Science education may be defined as the study of the inter-relationship between science as a discipline and the application of educational principles to its understanding, teaching and learning.

It therefore means that science education involves the study of some science in-depth and in addition, educational disciplines that relate specially to how scientific knowledge and concepts are learnt and verified; how scientific concepts are programmed for understanding and how science curricula can be meaningfully evaluated. Science education then is an applied field which derives its authenticity from the fact that science as a field of endeavour is fundamental to human survival and hence must be seen as the right of every individual to learn.

Science education according to Hudson (1993) consists of three areas:

- (a) Learning science (acquiring and developing conceptual and theoretical knowledge).
- (b) Learning about science (developing an understanding of the nature and methods of science awareness of the complex interactions between science and Society).
- (c) Doing science (engaging in the developing expertise in scientific enquiry and problem solving).

Indeed, each of these aspects contributes to the development of society especially in the cultivation of scientific culture and education of the future generations in the acquisition of basic knowledge, skills and attitude for coping with the ever-demanding world we live in.

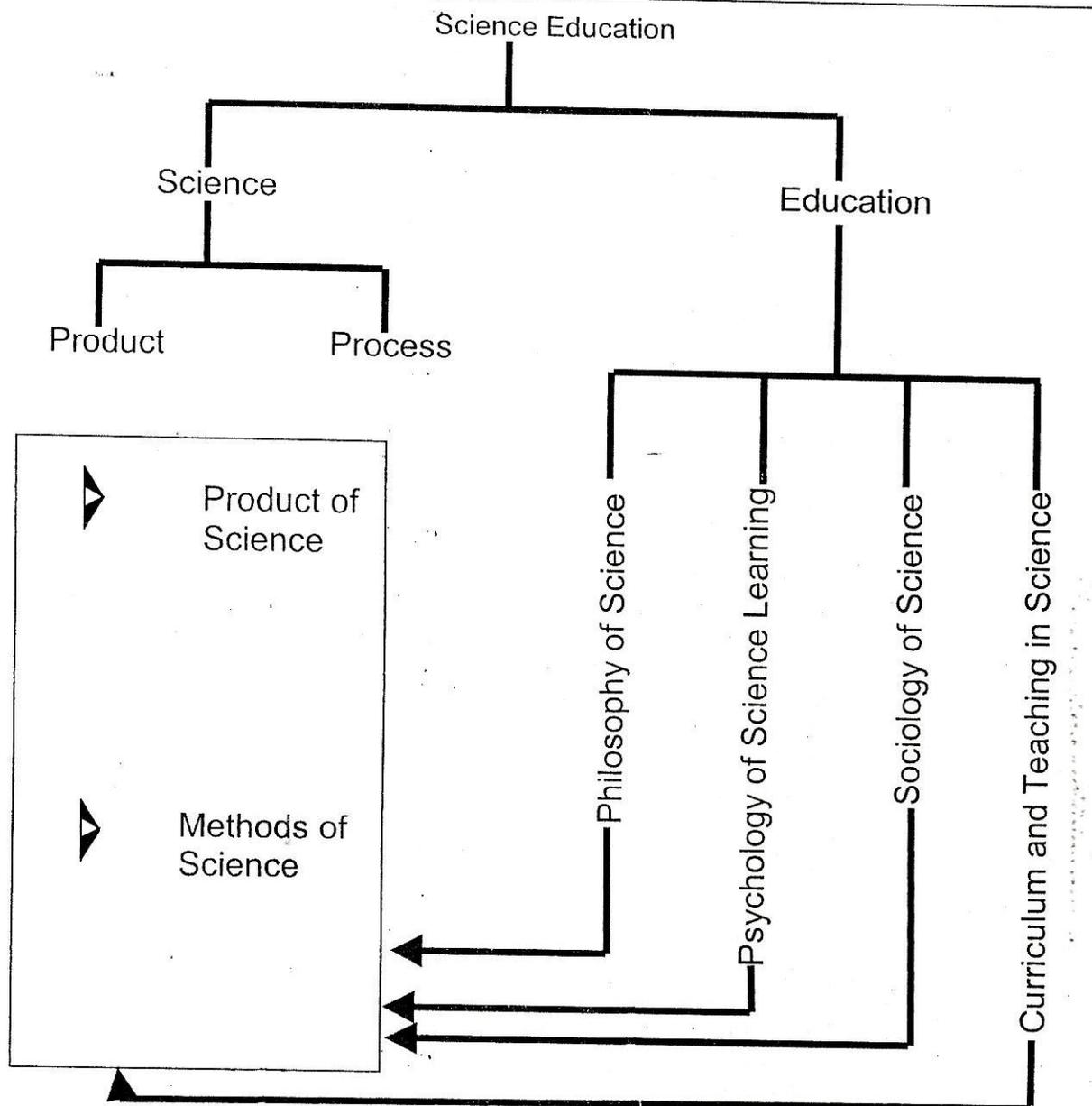


Fig. 1: *Source:* Science Education:

Theory and Practice. N. E. Dienne and SPT Gbamanja(1990:12)

A close look at the above diagram shows that a Science educator should be vast to a reasonable extent in all the facets of Science and education. He must learn the history, philosophy, sociology of Science and curriculum inclusive. In a short while, we shall discuss briefly the historical development of Science education in Nigeria.

#### **Historical Development Of Science Education In Nigeria**

Although it is not certain as to when teaching Science was first introduced in Nigeria. The genesis of Science teaching could be traced back to 1859 when the rudiments of Science were first introduced following the establishment of missionary secondary school in Lagos.

According to Omolewa (1977), all educational institutions before 1959 in the Country taught primary school subjects such as languages, writing geography, drawing, hygiene, singing and history to the exclusion of Science. Abdullahi (1982) however claimed that the foundations for Science teaching were laid in Nigeria between 1961 and 1897 when rudiments of Science were introduced in

the- table of some missionary secondary schools and teacher training colleges. Notable among these institutions were CMS Grammar School, Lagos, Methodist Boys High School, Lagos; Hope Waddell Institute, Calabar; and Baptist Training College, Ogbomosho to mention but a few.

With the establishment of these post-primary institutions the time-table of these schools were observed to include such subjects like: botany, physiology, natural philosophy and nature study. Bajah (1982) claimed that the rudiments of Science at that time was nature study that involved the teacher and pupils learning about the environment in form of observation of plants, animals and non-living things. It can therefore be reasonably assumed that teaching Science progressed with the establishment of more missionary Schools.

### Science Education At Present

Teaching and learning Science in Africa has no future unless it becomes self-generating and develops its own values and technologies. Till date, education in general in independent sub-Saharan Africa has been shaped by policies and practices which owe allegiance to religion, trade, and technologies that are non-African.

As African nations strive to achieve scientific and technological knowledge, there should be imperative recognition by some educational authorities and political leaders that the nationals are; endowed with creative and inventive abilities which should not be denied. In this regard the greatest challenges in Science education in Nigeria today has been the question of Science curriculum package especially Science curriculum development at all levels of education that will meet our need.

Science is the basis of technology and for effective living in this modern age of Science and technology, it is essential that every child is given an opportunity to acquire at least the basic knowledge and processes of Science. It is probably in recognition of this fact that led the Federal Government of Nigeria to introduce the 6-3-3-4 system of education in the country. One of the important features of this policy is the compulsory teaching of Science and technology at junior secondary schools and the requirements that at least one of the three Science subjects-Physics, Chemistry and Biology be taught as core subjects in the senior secondary schools; and the recommendation that 60% of the intakes into the universities be in Science and Science related areas (FRN, 2004). If this policy is to permeate the practice of teaching Science for ultimate attainment of national objectives, then recent trends in the teaching and learning of Science in our schools need to be reversed.

While the search for effectiveness in the teaching and learning of Science has been a focal point of Science education research over the years, and in spite of the immense and material resources apportioned to (the teaching and learning of Science, the various efforts put in so far have not produced the desired effects, going by the recurring poor performance of students in Science subjects at the senior secondary school level. An analysis of past results show that there has been a steady increase in the number of students who sit for senior school certificate examination (SSCE) in science subjects yearly, but there has also been a steady increase in failure rates in these subjects.

Sources:- . . . Courtesy of office of the Senior Deputy Project Registrar/Head of Research, WAEC, Lagos, May/ June 1994.

The researcher therefore solicit for a total review of the current science curriculum package with the societal need in mind. See Table 1

Year	Maths	Biology	Chemistry	Physics	Agric. science
1983	N.A (8.9)	*299,413 (8.9)	113,475 (12.3)	*66,960 (14.6)	N.A (26.0)
1984	188,797 (10.5)	104,529 (10.6)	112,729 (25.2)	40,772 (23.4)	16,635 (31.1)

1985	454,26 (11.6)	350,476 (11.7)	114,380 (19.8)	63,062 (25.9)	142,633 (15.3)
1986	523,852 (10.2)	392,075 (16.2)	134,154 (29.2)	79,746 (24.8)	188,134 (17.0)
1987	411,248 (14.1)	310,501 (11.2)	120,765 (27.1)	76,656 (24.7)	159,328 (17.2)
1988	93,657 (11.0)	89,342 (9.3)	34,508 (20.7)	26,297 (31.5)	62,712 (30.8)
1989	91,142 (8.8)	87,710 (11.8)	35,702 (10.8)	28,524 (9.5)	63,690 (20.0) !
1990	185,133 (10.6)	190,386 (15.7)'	80,059 (4.1)	63,161 (20.1)	150,587 (25.1)
1991	294,079 (23.0)	285,690 (9.8)	116,856 (22.1)	96,742 (31-2)	220,221 (34.3)
1992	361,506 (9.8)	355,582 (14.8)	140,856 (22.1)	122,809 (21.1)	270.562 . (28.9) 1
Total		2,465,704	1,003,154	664,729	
Average %	(11.8)	(16.0)	(19.80)	(22.7)	(2.5)

Source: Courtesy of Office of the Senior Deputy Project Registrar/Head of Research, WAEC, Lagos, May/June 1994

NA NOT Available

\* - Source: Courtesy of WAEC, Office of the Senior Deputy Registrar, Head of National Service, July 1991 (Lagos)

( ) Percentage success at Credit passes (1 - 6)

Performance of students in Science, technology and mathematics has been a source of concern to education planners in Nigeria and the society in general. It is sad to note that the performance in these subjects in Nigeria educational system is very disappointing.

This paper suggests a total review of the current science curriculum to match the scientific and technological needs of our country Nigeria.

### **Impediments on the Progress of Science Education**

Though, science was offered in many schools during and after the colonial rule, it has been typically stereotyped textbook type of curriculum which did not utilize the learner's immediate environment. Certain stereotypes about Africa's attitude towards science and technology are still maintained. The world view is that Africans are unscientific in their ways and very superstitious in their attitudes. The African environment is even regarded as lacking in those forces that would stimulate scientific and rational thinking. These ideas have apparently compelled African nations too to accept that they will always depend on imported technologies and ideas for their own achievement.

In this situation, (he African is believed to be the client whose problems should be solved only by other people. There is always a mad rush to advanced countries for expert advice, transfer of technology, and importation of all sorts of foreign culture which may not be suitable in solving the local problems of the African environment.

The study of science as an exciting discipline in solving our everyday problem should be advocated by the school curricula and this demands restructuring the science curricula at all levels to suit our local needs.

Among all factors militating against science education is the ever notorious problem of finance. Inadequate and management of finance consequently has led to the question of inadequacy of training facilities in schools and particularly in our institutions of higher learning. There is grossly lack of essential facilities such as accommodation, instructional materials, laboratories, libraries and other facilities necessary for teaching science. In the absence of well equipped science laboratory, qualified and well trained personnel to teach science, teaching science becomes dull, imaginative, and

rote memory becomes inevitable. This accounts for one of the reasons why many students do not even opt for science courses and in the end flee from science and science related careers.

### The Place Of Our Indigenous Industries And School Curriculum

The usefulness of places like Ala Ojii in Aba, Artisan quarters in Enugu, and other craft centres in our country should be integrated into our educational training and precisely in teaching and learning science programmes. This can be done by way of sending students on short - term courses or even making regular field trips to such places and incorporate them into the school curriculum. Africans are highly creative in nature and have made some marvelous strides in science and technological inventions (Ibeabuchi, 1982). A clear evidence of this is the case of Damian Anyanwu, a young Nigerian who built a conventional television, Frequency Modulated (FM) stereo transmitters, body contact microphone and solar radio which were believed to use neither electricity nor batteries, rather chemicals produced from local herbs and vegetables for their operation. His own kind of transmitters were different and of special quality because their components and operation depended solely on local materials (Ibeabuchi, 1982). Again, one cannot forget the kind of valuable services the road --side mechanics in Nigeria and perhaps elsewhere can offer to car users. These road - side mechanics sometime construct and improvise vehicle parts which ordinarily may not be available in store in this present economic condition.

Are these all? The answer is no, going by what history has about us. Pottery for instance, is one of the traditional crafts widely practiced, in various parts of Nigeria. Origin of this from archaeological findings point to Eleru in Ondo State and Afikpo in Ebonyi State about 3600B.C in the former and 3000B.C in the latter. In Nigeria pottery has been a cottage industry. In other words, the relevance of our local crafts and industries should not be lost, sight of; hence the researcher calls for immediate integration of our local craft practices in our school curriculum as to reshape our knowledge of science to meet societal needs and aspiration.

Other indigenous industries include

	Product	Area(s)
i	Salt production	Uburu in Afikpo • Itsekiri Ijaw, etc
2	Iron work	Awka in Anambra State Igbo - Ukwu Abiriba in Abia State Nok in Jos Taruga in Niger State etc
3	Bronze work	Igbo - Ukwu Ife
4	Carving/Sculpture: (a) Wood carving (b) Calabash carving and Decoration	Edo land Igbo land Nupeland Yoruba land
5	Leather work	Fulani Hausa Kanuri
6	Cloth weaving	Akwete Okene Bida

7	Dyeing	Hausa Igbo Edo Efik Tiv Yoruba
8	Boat/Canoe making	Ijaw Urhobo Itsekiri Efik Kanuri Jukun
9,	Mai making	Efik Ibibio Igbo Itsekiri Urhobo Yoruba
10	Soap making	Practiced in many communities of the country.
11	Basket making	Practice in many communities

Source: History for senior secondary school books 1 & 2, Linus Okafor, first published 1989, pp. 225.

### Questions

1. What is the place of our craft education in the school curriculum now?
2. Is it true that the problem of not achieving our educational goals in Nigeria lies on implementation of stated policies and not planning?

### Remedies to the Present and Future State of Science Education in Nigeria

It is a well known fact that the improvement in technological practices and competences in most advanced countries were built on local antecedents. This means that what we need is functional science and technological education as to develop indigenously, building upon local technical practices through the artisans. Therefore the teaching and learning of science should be tailored toward utilizing the resources of our environment.

Hayward (1992) observed: "The modern kitchen is stocked with quality approved materials and is probably the safest laboratory in the world". In other words, a naturally occurring or man-made site in the environment can be modified or restructured by the teacher to suit learning purposes. For instance, a mechanic workshop with unserviceable vehicles can be restructured or modified for auto mechanic workshop lessons. The proper use of the environment in teaching science has the potential of enabling the learner to appreciate the scientific bases on the natural phenomena which he experiences in his environment. For instance, the concept of thunder and lightning will then be rightly viewed as natural interaction of positive and negative electrical charges in the atmosphere and not the hard work of wicked medicine man or witch/wizard who supposedly generates and targets them at his enemies.

In similar manner, the rainbow would be correctly viewed as natural event

caused by the dispersion of sunlight by water droplets, and not as omen predicting the death of celebrated chief or an important person in the locality. In the same way, echoes will be seen as resulting from the reflection of sound waves, and not produced by evil spirits. Obi (1979) rightly observed: taboos and superstition constitute cultural barriers to change and therefore impede scientific development.

There is no doubt, there are other commonly encountered phenomena in nature and daily practices in our society that can be deployed as teaching. Learning resources in science education. If carefully examined, this experience can serve as viable learning resource in all branches of natural and applied sciences of Chemistry, Physics, Biology, Mathematics, Agricultural Science, Medical Sciences and Technology.

Below are some naturally occurring phenomena and commonly encountered practices in our

	Phenomenon	Science concepts
1	Echoes in local caves, empty room, and hollow tree trunks in the forest	To teach reflection of sound waves.
2	Waterfalls in the locality	Generation of hydroelectric energy and energy conversion .
3	African clay pot	Porosity, evaporation refrigeration cooling by
4	Anthill	Cone and stability.
5	Local thatched roof	Insulation, conductors and insulators of heat.
6	Juices of native plants	Dyeing of clothes, colours and viscous fluids.

7	The pulse	Time keeping, periodic motion.
8	See - saw	Balance, moments of forces.
9	Spinning - top ' koso <sup>1</sup> or okoso, spinning wheel.	Rotational motion, circular motion forces and involved in circular motion.
10	The span of the hand	Measurement .
11	Water pool on the road	Evaporation and rain formation.
12	The moon	Reflection.
13	Shadow	Opacity and time - keeping, propagation of light and transparency of materials.
14	Catapult, Bow and arrow	Elasticity, inter-conversion of energy.
15	Tapping of string tied at the two ends	Motion of sound wave.
16	The local dug - out canoe	Principle of flotation.
17	Joints of the human body	The lever principle.
18	Wind and kite	Motion of air, balance of forces.
19	Wetness of a road, smoothness of a scrubbed floor	Friction.
20	Rainbow	Refraction of light, colours of the spectrum of white light.
21	Thunder and lightning	Lightning conductors, charged particles in the atmosphere, speeds of light and sound.
22	Root movement in plants	Motion in plants.
23	Trumpets, rattles, hand bells and gong.	Conversion of mechanical energy sound to energy.
24	Rubbing of, our palms vigorously or any two surfaces	Production of heat, friction and conversion of mechanical energy to heat energy.

25	Leaf and fruit falls	Gravitational pulls.
26	Shells and bones e. t. c.	Carbonates.

The use of the environment should however be seen as supportive arrangement to standard classroom and laboratory teaching/ learning experiences. Knowledge acquired from the environment is expected either to concretize classroom experiences in a concluded programme of study or form a basis upon which new idea can be built and developed in future lessons. If we use the environment in teaching science, we stand the chance of making the entire society scientifically literate. Again, using environment to teach science has added advantage of cutting costs and leads both the teacher and the learner into cultivating the habit of, and gaining expertise in improvising science teaching materials where the standard ones are not in sight or in short supply.

Also, the use of indigenous language in teaching and learning of science will go a long way to help. It should be noted that the use of mother tongue in the teaching of science was indeed a unique pioneering effort of Fafunwa which unfortunately has neither been further adopted for use in schools of the Federation nor has there been further research efforts over the years to vigorously explore the teaching of science in the mother tongue.

Today, virtually all primary schools in Nigeria still teach science in English language to pupils thereby creating for them a concentric circle of difficulties in understanding science (Fafunwa et al, 1989). Sequel to this, the introduction of the Universal Basic Education (UBE) may give a good result in future. This programme advocates that the indigenous language of a child should be used in teaching him at the cradle stage of his life i.e. between primaries one to three after which English Language may be used. However we should not lose sight of what obtains in such advanced countries like: Japan, Russia, China, and Germany to mention but a few. They excel in science and technology in that they start their early education in their language and that helps them to understand the basic concepts of what they are going to meet in future. It is the same reason why these countries make it compulsory for foreign students wishing to study in their country to learn their language first before going into their actual course.

In conclusion, there has not been remarkable improvement in our scientific and technical no-how due to the problems earlier highlighted in the paper and development can only come when these problems are addressed. I therefore recommend as follows:

1. Functional science and technological education built on our local antecedents.
2. The ingenuity of the artisans in our society should be fully utilized through proper arrangement by involving them Fully both at the planning and implementation stages of the curriculum.
3. The teaching and learning of science should be tailored toward utilizing the resources of our local environment as to meet the need of the society.
4. Education planners should emphasize the use of indigenous language in teaching science.
5. Craft education should be revitalized and made compulsory in our school curriculum.
6. There should be a total review of the current science curriculum that will match the scientific and technological needs of our country Nigeria.

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