
**SCIENCE, WEALTH
CREATION AND THE
CHALLENGE OF
SUSTAINABLE NATIONAL
DEVELOPMENT**

(The Ajumogobia Foundation Lecture, delivered by Professor A.A. Illemobade, at the 52nd Annual Conference of the Science Teachers' Association of Nigeria (STAN), held at the Federal University of Technology, Akure, 17 August, 2011)

“Education is not the filling of a pail, but the lighting of a fire”. W.B Yeats, Irish Poet and dramatist, a Nobel Laureate”

*“Nothing we do changes the past;
Everything we do changes the future”. The Register-Guard.*

1. INTRODUCTION.

I wish to start by acknowledging what a great honour and privilege given to me by the Chairman of the Board of Trustees, Ajumogobia Science Foundation, Professor O.O. Akinkugbe, and distinguished members of the Board of Trustees, to present the annual lecture of the Foundation at this 52nd conference of the Science Teachers' Association of Nigeria (STAN). I am also grateful to the Chairman and members of the Executive Board and indeed, the entire membership of STAN for providing me the platform for doing so, knowing what great and noble role the Association has been playing in the teaching of Science and technology in our educational institutions over the years.

In his letter of invitation to me to give this lecture, the Secretary of the Foundation, Dr. Ben Akpan, kindly pointed out that I was free to choose my topic for the lecture which, at first, sounded great. Afterwards, however, this free choice presented a challenge of its own, which reminds me of my time in the graduate school in the U.S.A. when one of our course teachers asked us to set questions on a course we were halfway through. After we had done so, he told us what a wonderful job we had done but then returned copies of the questions we set to the individuals that set them as a

class test. You need to see how we struggled to answer our own questions! I hope the idea of choosing your own topic by the Foundation is not a “Catch 22”!

In choosing my topic however, I had the opportunity of reading through the first lecture of the Foundation given by one of the foremost and respected Science Education teachers in Nigeria, Professor Ayotunde Yoloje, and the one given by the Board of Trustees’ Chairman, Emeritus Professor of Medicine and Laureate, Professor Oladipo Akinkugbe, CFR. I also looked through a document containing the aims and objectives of STAN. A particular one that attracted my attention emphasises the need “to help Science Teachers keep in touch with developments in science and its application to industry and commerce” which, to me, translates as making teachers of science relevant to sustainable national development. Thus, the title “**Science, Wealth Creation and the Challenge of sustainable National Development**”.

This presentation will look at Science in its broadest sense which, when properly harnessed and deployed, creates wealth both for the individuals and the nation, improves livelihoods (food security, human and animal health and welfare), generates employment and improves the GDP of any country.

2. SCIENCE AND WEALTH CREATION. If Science, according to Webster's New Collegiate Dictionary, is "knowledge attained through study or practice," or "knowledge covering general truths of the operation of general laws, especially as obtained and tested through scientific method [and] concerned with the physical world," the way it is taught or deployed can make the difference between one that leads to or not to wealth creation. This reminds me of the experience my class had in our lower form secondary school mathematics classes. There were these two teachers of mathematics, one taught in the lower classes (Forms I – III) and the other in the upper classes (Forms IV – V). The teacher who taught in the lower classes had graduated from a Higher Elementary College with some years experience during which he was studying for the GCE Advanced Level examination. In the arithmetic class that he taught, the emphasis for him was getting the arithmetical answer correct. So all you must do to pass his examination is strive to get the right answer, not how you arrived at it. The result was that only those who were endowed did well in the subject and those who were struggling, gradually lost interest.

However, the situation changed when we got promoted to the higher class. The teacher, a university graduate in mathematics, was generally not interested in the right answer, but his emphasis was on the process followed to reach the answer. The consequence of this is that your answer may be wrong, but you may score a high mark if the process followed would otherwise, have led to the right answer. The response was a dramatic change in performance to the extent that those who thought they could not make it at the Cambridge School Certificate Examination were dreaming of earning a distinction in the subject. In other words, it is the journey, not the arrival that matters. I call the method of the first teacher as unsustainable while the approach of the second teacher as one that leads to sustainable development not only in mathematics but also in other spheres of life. In his inaugural lecture at the Ajumogobia Foundation in 1999, Professor Yoloye referred to a story credited to the famous twins of Abeokuta Grammar School, Femi and Dotun Oyewole. Chief Awokoya had arrived Abeokuta Grammar School in 1941 to teach Science, where the twins were pupil teachers. They explained how Chief Awokoya's fascinating teaching skill had impressed and inspired them to study science and how his explanation that "*the sum total of anabolism and catabolism is called metabolism*" has stuck to their memory and drawn spontaneous applause from the Biology class.

Basic or Pure Science.

Basic or Pure science is said to be that science that describes the most fundamental objects, forces, and the relations between them and the laws governing them. Basic research is concerned "with developing valid, complete, and coherent descriptions and explanations. It is interested in organizing data into the most general and parsimonious laws or qualified statements of uniformity". The emphasis is on comprehension or understanding. It is motivated by curiosity and inquisitiveness about natural phenomena. While research in basic science most often does not lead to wealth creation, applied science very often does. However, In dealing with this matter of basic versus applied science, Professor Akinkugbe, reminded us in his presentation at the 50th STAN Conference of 2007, how great ideas and curiosity, the basis of science, had led Scientists of old to great breakthroughs of unimaginable proportion and thus led to improved livelihoods and human welfare. It is his curiosity and inquisitiveness that led Benjamin Franklin to discover electricity, a major development concern in Nigeria today. Franklin was engaged in basic

scientific research when he tried to explore and compare lightening with static electricity generated by feet rubbing on a rug. He did not do it to find a better way to light Philadelphia at night, nor to transmit information (applied science): he just wanted to “know” or “to understand”! It is this curiosity and inquisitiveness that led to inventions that have fuelled the growth and development of the advanced countries of the world.

Applied Science.

This branch of Science is concerned with the discovery of solutions to practical problems and places emphasis upon those factual data which have more immediate utility or application.

While we in Nigeria may not have recorded such landmark breakthroughs as Benjamin Franklin did, I would like to draw attention to a simple technology that has been adopted in Nigeria and which has developed into what I refer to as “**Pure water revolution**”. This revolution has swept through our country today. All that is needed is a source of fairly clean water, purification outfit and packaging materials. It has generated employment, reduced poverty and created wealth, and brought smiles to many families, but the non-biodegradable sachet used in packaging the water has brought in its wake a major environmental disaster. Drainages in the cities have been littered with empty water sachets through indiscriminate disposal, leading in many cases to blockage of drains and flooding with resultant loss of property and even, lives; the highways have become unsightly due to careless disposal of the empty sachets by motorists. Agricultural land has been affected by the dumping of this waste, making top soil difficult for ploughing. For instance, the Government of Abia State recently cried out that the top soil in that state had been packed with disposable empty water sachets, making ploughing of land for agriculture a herculean task. We also have other similar cases in the country like pampers, cellophane packaging and rechargeable GSM cards coming upon us. I will like to treat the case of pure water as an example.

The issue is that we have adopted a technology, a product of science, which we have deployed widely. It is providing us with immense opportunity to generate employment, create wealth and reduce poverty, yet the way and manner it has been deployed is unsustainable because we fail to appreciate and plan for how to deal with the environmental consequences resulting from our inaction. I will return to this later. But in the meantime, I would like to address the issue of sustainability or sustainable development.

3. SUSTAINABLE DEVELOPMENT

It is important to first define what is meant by sustainable development in order to understand why it is important and why we should pursue it. There are many definitions of sustainable development, but the most frequently quoted definition is one from the report of “**Our common Future**” otherwise known as the Brundtland Report:

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

In other words, the concept of sustainable development is based on improving the quality of life for all without increasing the use of our natural resources beyond the capacity of the environment to supply them indefinitely. It reminds us about what we need to understand - that inaction has consequences, and that we must find innovative ways to change institutional structures and influence individual behaviour. It is, therefore, about taking action, changing policy and practice at all levels, from individuals to the international.

During the 2006 fourth biennial State of the Planet conference organized by the Earth Institute of the Columbia University, New York, and co-sponsored by the New York Academy of Science, one of the most single important questions posed was: “is sustainable development feasible?” This question apparently resonated throughout the conference majorly because of the complexities of the resolution of the issues involved. In his overview of the conference by the Editor, he observed that the:

“State of Planet 06 threw into high relief the fact that achieving sustainable development will test the human race’s celebrated ability to adapt and innovate –

and test it on a scale so vast and a timetable so compressed and with a set of challenges so fiendishly complex, as to aggravate the difficulty by orders of magnitude.”

We can also ask that same question whether in Nigeria, sustainable development is possible in the face of massive corruption and poverty and the competing developmental needs. The answer to that apparently simple question can be very complex, but we must make a bold start.

There is a popular page 4 in the Punch Newspaper, a national daily, called “**BIG Naira begins with Small kobo**” providing information and encouraging interested readers to consider several ways of making “extra income” by producing some products or engaging in a particular trade. In most of the products’ production, packaging materials used are invariably plastic materials. One would like to see similar publications that places emphasis on how to dispose such packages in an environmentally friendly manner, for instance through recycling.

In considering therefore, the issue of “pure water revolution” in Nigeria, we must conclude that, yes, it is a good development because it reduces poverty, generates employment and creates wealth, but it is unsustainable because of the negative impact on the environment, and our inaction. But we can start reversing the trend by looking at what the Lagos Government of former Governor, Chief Lateef Jakande, did in the 80s. At that time, The Nigerian Bottling Company (NBC), bottlers of Coca-Cola products had started marketing their products in cans in Nigeria. Several people who bought the products disposed the empty cans indiscriminately on the streets, in the drains and on the verges. The result was that empty cans littered virtually everywhere in Lagos and on the highways. What the government did at the time was to apply the principle that the polluter must pay for his pollution, in this case, Nigerian Bottling Company (NBC). The company was made to clear the empty cans from where they were littered. To do this, NBC employed private companies to do it on its behalf, thus creating employment for hundreds of unemployed people, while the collected cans were piled up in some locations in Lagos. Shortly thereafter, however, these empty cans started disappearing from the dumpsites because people suddenly found new uses for them through recycling. Governments at all levels and

the private sector and users of such products can also commence to reverse the ugly situation by putting in place the following:

- Change in Policy and Practice at all levels that favour the development of effective institutional structures and which positively influence individual behaviours and perspectives;
- Policies that encourage and instil in the populace the sense of ownership;
- Discouraging the Dependency Syndrome which has been so pervasive in our communities.
- Enforcement of appropriate environmental legislations.

The beauty of Science then is that apart from providing understanding of our environment in its general and specific ways, it lends itself to how Nature can be manipulated to serve humans in a way that can positively affect our lives. On the other side of the coin is how we carefully manipulate and deploy science to serve our present needs without compromising the ability of future generations to meet their own needs. That, I submit, is sustainable development.

It is now left for me, Honourable Chairman, ladies and gentlemen, to pay homage to the man being honoured today, Chief Feniobu Iroloye Ajumogobia, a man whose life and times has been a model for sustainable development and tremendous encouragement to many in the past and will continue to be so far into the future. A man who chose for his vocation the “Poorest of Trades and noblest of Professions”. His life reminds me of a quotation by William Butler Yeats, the Irish Poet and dramatist, a Nobel Laureate:

“Education is not the filling of a pail, but the lighting of a fire”.

I am therefore, humbled by the achievements of this noble gentlemen, who has lit a fire that will continue to provide a model of sacrifice and dedication to Science teaching and Science Teachers’ Association of Nigeria and their products. I feel a sense of awe and at the same time, gratitude to have been asked to deliver this year’s lecture. I therefore wish to close by drawing the attention of all of us, to another favourite quotation of mine published in “The Register-Guard” at a memorial:

“Nothing we do changes the past;

Everything we do changes the future”

Honourable Chairman, Members of the Board of Trustees, distinguished members of the Science Teachers Association of Nigeria, distinguished invitees, Ladies and Gentlemen, I thank you for your attention.