Transforming The Nigerian Nation Through Science, Technology and Mathematics Education
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By

Prof. Jerome O. Okafor, FNSH, FNAHE

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TRANSFORMING THE NIGERIAN NATION THROUGH SERVICES, TECHNOLOGY AND MATHEMATICS EDUCATION

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Prof. Jerome O. Okafor
Nnamdi Azikiwe University, Awka,
Anambra State.

Introduction
I feel greatly honoured to be asked by the School of Sciences, Federal College of Education Obudu to present this lead paper at her 2nd National Conference, holding today, 27th March, 2012. I am particularly thankful to the Provost of the College who gave approval for the Conference, the Dean School of Sciences and members of the Organising Committee for inviting me.

The theme of this conference “Sciences, Technology and Mathematics Education and The National Transformation Agenda” is most appropriate at this time in Nigeria because of Nigeria vision 20:2020. Since I was not given any sub-theme title on which to present a lead paper, I have therefore settled on this title; Transforming the Nigerian Nation Through Sciences, Technology and Mathematics Education.

Transformation as many people may be aware of is associated with growth plus change which involves materials, mental, psychological physical, institutional and organizational innovations. It involves a change in attitude orientation, behaviour, concept and patriotism among others. It lies in the realm of economic growth, demography characteristics, a stable political system, process of differentiation and a realistic view of the process of National building (Adams, 1970). National Transformation Agenda in Nigeria tells us that Nigeria needs change so that we have some better ways of enjoying our lives.

It is now clear that Science, Technology and Mathematics have become part and parcel of the world’s culture, and every person and nation now want to use them maximally for adequate development and improvement of the society. In Nigeria, Mr President’s Transformation Agenda is not a point agenda but holistic and inclusive. The administration’s priorities include but
not limited to education, energy, health and job creation. Central to the realization of transformation Agenda of Mr. President are: Nigeria as a developing economy, access and equity; standards and quality assurance; institutional management; Funding, partnership and resource mobilization.

I have decided to handle this topic from the angle of attempting to give the meaning of education, Science education, technology education and mathematics education. I also looked at the implications of Science Technology and Mathematics (STM) education to our national transformation agenda.

**Education**

Education has been described in different and various ways all of which cannot be correct. It is a universal concept that differs from society to society. It is a normative word, which implies that it is valued in every society and it is desirable and worthwhile (Okafor, 2008). Education according to the New International Webster’s Comprehensive Dictionary of English Language (2004), could be regarded as instruction or training by which people learn to develop and use their mental, moral and physical powers. According to Ocho (1988), education is what makes a man eagerly pursue the ideal perfection of citizenship, and teaches him/her how rightly to rule and to obey. Explaining it further, education involves acquiring literacy and numeracy; being proficient in a job and ability to live in a society. Ukeje (1979) defines education as the process of transmitting, preserving, developing and promoting the culture of the people.

Finally, education is the transmission of what is desirable to individuals to make them knowledgeable and contributing members of the society. It must involve knowledge and understanding such that it characterizes the person’s way of looking at things and is committed to the positive use of that knowledge. The implication of the Nigeria National Transformation Agenda to education is that education should make people want to change for better in terms of all aspects of our lives, socially and economically.

**Science/Science Education**

Science is defined by the New International Webster’s Comprehensive Dictionary of English Language (2004) as knowledge of facts, phenomena, laws and proximate causes gained and verified by exact observation, organized experiment and correct thinking; organized experiment and correct thinking. Hanks in Aniodoh (2002) defined science as the systematic
study of man and his environment based on the deductions and inferences which can be made, and the general laws which can be formulated from reproducible observations and measurements of events within the universe. It is a way of thinking in the pursuit of understanding nature and a way of investigating a body of established knowledge. It is a process as well as a product, and may also be looked at as attitude formation or what we may call the scientific attitude. These characteristics are what are necessary for the sustainability of the Nigeria National Transformation Agenda.

As a scientific process, we refer to the various means or methods by which we arrive at facts or knowledge. It is a way of finding out about things, an endeavour which leads to discovery and seeks to explain man’s environment. Through scientific processes such as observation and experimentation, we arrive at a body of knowledge, which we often refer to as the scientific product. The scientific attitudes are those traits or characteristics which a scientist is expected to exhibit any time, any where in his/her life. The implication of these characteristics to our National Transformation Agenda is that Science should train the citizenry to be persistent, industrious, objective and fair-minded. Other traits associated with science include: curiosity, humility, skepticism (or critical-mindedness), objectivity, rationality, suspended judgement, open-mindedness and honesty among others.

When the word education is added to Science, we have science education. It is therefore the instruction or training by which people learn to develop their critical thinking. Science education fulfils this function through basic and integrated process skills. The concept, “Science education” as we use it here, does not just mean instruction or training in only Science Education Department but also in those other branches of learning like: natural, physical, social and applied sciences; plus all other aspects of human endeavour.

Therefore, science education goals for our National Transformation Agenda should include:

a.  improving the quality of life of all Nigerians;
b.  serving as a tool for functional skill acquisition and job creation leading to poverty reduction;
c.  helping to mobilize and develop public-private partnerships to support and fund general education; and
d.  promoting information and communication (ICT) at all levels.
Technology/Technology Education
Technology is the disciplined process of devising and utilizing techniques to convert resources to material objects (Okeke, 2007). It is a systematic study of the methods and techniques employed in the industry, research, agriculture and commerce to improve the life of man in his environment. Technology is applied science, any valid or reliable process or procedure that is derived from basic research, using the scientific method is considered as technology (Wikipedia Free Encyclopedia). It can be referred to as material objects of use to humanity, such as machines or hardwares, methods of organization and techniques.

Technology is the making, usage and knowledge of tools, machines, techniques, crafts, systems or methods of organization in order to solve a problem or perform a specific function (http/en.wikipedia.org/wiki/technology). In Nigeria it can adequately be applied to our transformation agenda. Technologies significantly affect human as well as other animal species’ ability to control and adapt to their natural environments.

Recent technological developments including the printing press, the telephone, and the internet have lessened physical barriers to communication and allowed humans to interact freely on a global scale. However, not all technologies have been used for peaceful purposes: the development of weapons of mass-destruction has progressed throughout history. In Nigeria, the objectives of National Transformation Agenda will be achieved if the development and use of weapons of mass-destruction can be controlled. This will usher in peace, security and economic growth. Apart from using technology to produce destructive weapons, many technological processes produce unwanted by-products, like pollutants and deplete natural resources to the detriment of the earth and its environment.

As Nigeria faces the challenges of National Transformation Agenda, there is the need to develop technology industries which will provide the basis for chip production, information and communication and computer systems.

Technology education for National Transformation Agenda should be able to contribute in solving societal problems like provision of food, shelter, health, clothing, transportation, communication, raw materials, energy agriculture power, printing, photographing, water, beverages, navigation on land, sea and air; and defence.
The driving forces for technological development for our National Transformation Agenda are economic and physical survival. To achieve the above goals for our National Transformation Agenda, physically Nigerians need food, good health, defence, capabilities and safe shelter. For economic survival, there is also the need to develop transportation, communication, trade, machine tools, fuel and information devise. Formal education in Science and technology will help develop high tech products for meeting the needs of the National Transformation Agenda.

Mathematics/Mathematic Education
Just like Science and technology, mathematics has been defined in various ways. Ezeamenyi in Eze (2008) sees mathematics as the study of size, numbers and patterns. It is the science that enables scientists and technologists to drive relationships among, biological, chemical, geophysical and physical qualities; understand and explain natural phenomena. Nigeria Transformation Agenda cannot be sustained without mathematics because, mathematics has economic value since no business can thrive without proper mathematical and statistical system. To emphasize the importance of mathematics, Galileo Galilei (1564-1642) in Wikipedia encyclopedia said, the universe cannot be read until we have learned the language and become familiar with the characters in which it is written. It is written in mathematical language, and the letters are triangles, circles and other geometrical figures, without which means it is humanly impossible to comprehend a single word.

In the National Transformation Agenda, no progress will be made without adequate use of mathematics. It is the queen of sciences. It should be used in the National Transformation Agenda as an essential tool in many fields, including natural science, engineering and technology; medicine and social sciences. Applied mathematics is relevant to the National Transformation Agenda, because, it the branch of mathematics that concerns itself with mathematical methods that are typically used in sciences, engineering and technology; business and industry.
Implications of National Transformation Agenda for Science, Technology and Mathematics Education

Science, Technology and Mathematics education are imperative for the sustainability of our National Transformation Agenda. They are instruments per excellence for social and economic reformation and reconstruction. The implication therefore is using Science, Technology and Mathematics education to:

a. inculcate transparency and good governance in people;
b. develop sustainable 21st century skills;
c. develop appropriate technology; and
d. evolve appropriate private-public partnership.

In line with the above implications Okafor (2008) says adequate Science, Technology and Mathematics for sustainable National Transformation Agenda should involve:

a. establishment of post basic education Vocational Enterprise Institutions (VEIs) and post secondary education innovative Enterprise Institutions (IEIs). The VEI’s vocational courses should be based on science and technology and should include those for requisite skills to operate in the labour market, and strong desire to be engaged in productive technical/technological/business activities.
b. training to cover competencies and skill acquisition required for job opportunities in construction, beauty, hospitality, music, travel industries and enterprises and would provide ground work for career in a wide range of areas;
c. develop civic education to strengthen value-orientation;
d. create direct link to large number of businesses and industries that will put graduates in touch with leading companies for recruitment; and
e. improve access to enhance employment-oriented skill training (for eradication of poverty and generation of employment and wealth).

Innovative enterprises institutions (IEIs)

In line with the National Transformation Agenda, the IEIs should take care of the development of creative thinking and transformation of knowledge through technological and science processes into wealth and broader economic base. There should also be innovative technologically based
training that promotes application of expertise to improving our society and thus, fulfilling our national goals. Added to the above is the need for drive to keep improving the creative process with fresh ideas. More scientific ways of sustaining the National Transformation agenda include having:

a. Information, communication Technology (ICT) institutes  
b. The school for oil and gas technology  
c. Fashion institute of technology  
d. The film academy  
e. Academy for Creative Arts  
f. The Construction and Engineering Institute  
g. The Paralegal Institute  
h. Institute of Welding and Fabrication  
i. Sports Academy.
Conclusion

This paper will be concluded by attempting to identify a few elements that determine the success/or failure of any transformation agenda. Successful implementation of a transformation agenda had always followed a pattern in which there is a clear recognition of the goals of the agenda. In other words “the what” of the agenda is the key to the subsequent success or failure of the said agenda. Then the process of implementation can now follow.

It may be quickly suggested that successful implementation vis-à-vis achievement of the goals of any transformation agenda should have the following ingredients:

a. careful study before the launch;
b. wide consultation to ensure ownership by stakeholders;
c. commitment of the transformation agenda to genuine promotion of the development/welfare of the entire populace;
d. assurance of the sustainability of the agenda; and
e. adoption of appropriate legal instrument to legitimize the agenda.

Ever since declaration of the Nigeria Transformation Agenda by Federal Government and the declaration of Nigeria vision 20:2020, various governments in Nigeria have been trying to make sure that the goals of the agenda are met. This they do by designing programmes that will drive the long term goals of poverty reduction, employment generation, wealth creation, health, agriculture and value reorientation in the country.

Science, Technology and Mathematics education we have seen are very necessary for the achievement of the goals of Nigeria Transformation Agenda. This can be done through the development of scientific knowledge and attitudes; and giving adequate attention to the establishment of VEIs and IEIs.
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