

THE IMPERATIVES OF SCIENCE AND TECHNOLOGY EDUCATION FOR NATIONAL DEVELOPMENT

Amos Maikano

Abstract

This paper attempts to examine the items of the seven – point agenda of President Umar Musa Yar’adua in their national context, highlighting some of the developmental problems which the reform agenda specifically education set out to solve. It then identified and discussed the ways Science and Technology Education (STE) may be harnessed towards actualizing the reform agenda. STE as an instrument for achieving the seven – point agenda for Nigeria development have the “Chicken and Egg relationship” for goal realization. The President’s seven – point agenda and Vision 20/2020 are appropriate, relevant and provide necessary strategic platform for Nigeria’s take off to becoming a great, dynamic and industrialized economy. Some of the recommendations proffered are: faithful implementation of the free and compulsory UBE, adequate funding of the educational sector, special incentives should be given to science and technology teachers’ to encourage them to take up challenges.

Introduction

Nigeria’s efforts at development since independence in 1960 have seen a number of well articulated national development plans. More recently, developmental targets have been expressed in international acclaimed terms such as Millennium Development Goals (MDG’s), Vision 2010 and 20/2020 and National Economic Empowerment and Development Strategy (NEEDS). Unfortunately, efforts to achieve national development through previous development strategies have been unable to yield the expected results. Hence, the nation remains on the lowest rung of the development ladder as the majority of Nigerians continue to wallow in abject poverty, neglect and deprivation. While the few rich continue to get abundantly richer (Abah, 2008).

Against this uncomfortable background, has risen what appears to be a ray of hope in the form of the seven – point agenda of the present Nigerian government led by President Umar Musa Yar’adua. Right from his campaign manifesto up to the 2008 budget, President Yar’adua has held on to the seven – point agenda as a mark of his good will and commitment to the upliftment of the lot of the majority of Nigerians. Hence, he has adopted the agenda as his most immediate area of focus for the development of the nation (Abah, 2008).

The thrust of this paper therefore examines the context of the seven – point agenda, highlights the problems that have hindered development and which the agenda hopes to overcome, then explores how science and technology education may help towards actualizing the agenda.

The Seven – Point Agenda in Context

In the course of reviewing materials for this paper, the author observed that what the information media have put out as items of the seven – point agenda tend to show some variation. For example, a list released to the Press by the presidency and retrieved from the internet (Presidency, 2007), gave the items of the seven – point agenda as power and energy, food security, wealth creation, transport sector, land reforms, security and education.

Another source (Ochiamia, 2008) also retrieved from internet, stated that, in his inaugural speech on 29th May, 2007, President Yar’adua enumerated the seven – point agenda as power and energy, food security and agriculture, wealth creation and employment, mass transportation, land reforms, security, qualitative and functional education and pursuance of the rule of law. Recently, information from a source in the Presidency (though unpublished) listed the items of the seven – point agenda as electoral reforms, electricity and power generation, health, human rights, agriculture, fight against corruption, education.

The noticeable variations in the items of the seven – point agenda, despite the great similarities in many of them may be due to one or more of the following reasons. Firstly, it may be due to the usual changes that occur to original information as it is transmitted down the line in the

communication chain. Secondly, some of the points could be expressed in different ways without much change to the original intent, and so, advantage is being taken of this. Thirdly, some of the points are closely interrelated and may be merged to bring other essential areas into prominence.

In view of all the above, the following aspects of the seven – point agenda of President Yar’adua have been selected and streamlined in this paper viz:

1. Education
2. Electoral reforms
3. Power and Energy
4. Agriculture and Food security
5. Health and Security
6. Mass transportation
7. Wealth creation and Employment

Education as one of the seven – point agenda is examined below in its national context, with the aim of identifying the main problems that need to be solved in order to achieve national development.

Education

The reform in the education sector as elucidated by the Presidency (2007) is two folds. Firstly, it is aimed at ensuring the minimum acceptable international standards of education for all. Going by the United Nation’s Millennium Development Goals, this implies Universal Primary Education (UPE). But Nigeria has gone a step further to Universal Basic Education (UBE) which includes education for six years in primary school and three years in junior secondary school for all citizens. The second aim of the reform is a strategic educational developmental plan which will ensure excellence in both the tutoring and learning of skills in science and technology by students who will be seen as the future innovators and industrialists of Nigeria. Government plans to achieve this reform through massive injection of funds into the education sector (The Presidency, 2007). In a budget of ₦1.986 trillion for the year 2008, a total of ₦210.45 billion was allocated to the education sector, an increase of 12% over the 2007 allocation. This excludes government intervention through the UBE commission, through which an additional resources of ₦39.7 billion was provided to the States and Local governments to support basic education. The allocation was mainly for improving human resource capacity building , upgrading of facilities in educational institutions and improvement in quality and access to education. In the year 2009 budget, ₦2.87 trillion was ear marked and only ₦33.6 billion was injected in to the educational sector. There was a short fall of ₦176.85 billion(a decreased of 84.03% over the 2008 allocation) excluding the ₦39.7 billion for UBE. Where are we really heading to with this inconsistencies in our policies?.

Science and Technology Education as an Instrument for Achieving the Seven – Point Agenda in Nigeria for National Development.

As outlined above, the seven – point agenda is a broad spectrum reform, planned by government for the economic emancipation of the nation. The possibility of using science and technological education as a key to achieving the agenda rests on governments belief as stated in the National Policy on Education (Federal Republic of Nigeria, 1998), that education is an instrument par excellence for effecting national development. It also rests on the nature of science and technological education and their applicability to the national problems which the seven – point agenda seeks to solve (Abah, 2008).

Science may be viewed as a way of studying the things, events and phenomena that occur in nature as well as the knowledge that results from such studies. The “way” sciences uses to study nature is always practical and involves several types of processes such as making observations, measuring things, asking questions, formulating hypotheses, carrying out experiments and what have you before arriving at the findings or knowledge (Abah, 1982; 1998). According to Ikoku (1989), science and technology education could be described as an organized instructions both formal and informal designed to produce a corps of people who can utilize the ever growing body of scientific and technology knowledge in productive endeavours, teaching and skills transfer. Furthermore, some of the trained corps would be committed to the advancement of scientific and technological knowledge through fundamental or target researches. It is on the basis of this that countries and

societies all over the World use science and technology education as a veritable instrument of an accelerated national development.

The extent to which science and technology education can be use for national development as envisaged by President Yar’adua in his seven – point agenda depends upon the extent to which science education can vigorously and vehemently pursued in terms of application and adoption of the of the acquired scientific skills. According to Okebukola (2002), Nigeria is third rank after Pakistan and Bangladesh. Although Nigeria is rich in natural and human resources, seven out of every ten Nigerians live on less than a dollar per day. The situation is compounded in Nigeria with the low level of investments in scientific research, easily one of the lowest in Africa and in the World as depicted in table 1 below:

Table 1: Expenditure for Science and Engineering, Research and Experimental Development.

Country	% of Group
Africa	
Nigeria	0.1
Benin	0.7
Mauritius	0.3
Egypt	0.2
North America	
Canada	1.4
Cuba	0.8
U.S.A	2.9
Silica	2.9
South America	
Argentina	0.4
Brazil	0.4
Chile	0.5
Venezuela	0.3
Asia	
India	0.9
Israel	3.1
Japan	2.8
Singapore	0.9
Europe	
France	2.3
Germany	4.3
Netherlands	2.2
U.K	2.0

Sources: UNESCO 2002 World Science Report)

Okebukola (2002) pointed out “clearly the minimum needs of human society, however, populous would have to be met in terms of food, shelter, clothing, water, energy, employment, basic education and health care”. This is the reflection of the seven – point agenda of President Yar’adua. Without science and synergistically related discipline, technology, development in these sectors is nowhere. This is because the economic strength of any nation has ceased to increase by quality of natural resources a country has. Rather, to a large extent on the level of investments, it is also able to attract and to a greater extent on the number of scientifically skilled professionals in turn offer services which accounts for significant percentage of Gross Domestic Products (GDP’s) of many countries (Turaki, 2005).

No wonder, today countries like Japan with little or no natural resources have concentrated all their attention on science and technology and with that they were able to become a force to reckon with in this World. The United States of America has remained the most successful example of the harnessing of the combine scientific and technological expertise of government, industry and science from the Universities for the attainment of its national objectives. It is unfortunate that in a

country of ours “ that flow with milk and honey” government has remained largely aloof and indifferent to the activities of societies and scientific activities at least from the point of views of research grant allocation (Wasagu, 2005). Knowledge of science and technology is an important element of what it means to be an educated person in the 21st century. This is because science and technology provides the only formidable base in which national development can successfully stand.

Hurdles towards Utilizing Science and Technology Education for National Development

It is a fact that teaching of science and technology have been guaranteed in Nigeria educational system, but the utilization of technology to attain development have been very slow. The factors responsible for this can be associated with the followings:

1. The science that is being taught in our schools have been too academic and thus produce more conservators of knowledge than innovators who are concerned with the how, why and what scientific knowledge mean and can do for individual and nation.
2. The methodology being employed in teaching science in secondary schools, Colleges of Education, Polytechnics and Universities is predominantly non – practical in nature and does not engender functional understanding of science. Consequently, science is presented as being difficult to students and therefore learn by memorization. The ability to present science through practical oriented methods does not allow learners to become oriented in the exercise of inquiry which is the characteristics of scientific examples. As a result, learners are not exposed to the processes and ethics of science.
3. Lack of standard and appropriate text books that can promote inquiry, teaching and learning. Most indigenous text books written today and that are being used in our schools have their contents not directed to the day to day interaction with nature and experience of the learners but towards passing examinations and not those that will help to foster development of critical and creative thinking.
4. Gross inadequate funding of science and technology education. The funding as contained in the National Policy on Science and Technology (FMST, 1986) is that the federal government shall provide fund for science and technology education on a continuous basis. And the expectation that by 1990 at least 1% of the annual GDP would be expected on science and technology quest but appeared to be a mirage. No wonder, it has resulted into the poor state of the necessary teaching facilities and resources for basic science in Nigerian Secondary schools, Colleges of Education, Polytechnics and Universities. Therefore, the nature of the practical work that we embark in the laboratories do not promote the acquisition of practical skills necessary for scientific and technological advancement.
5. Lack of committed science and technology leadership and political will for policy implementation is another stumbling block in harnessing the abundant resources bestowed in Nigeria. It is worth noting that success story of Japan in science and technological field and the achievement in space science in USA (1957) were reported to be based on a well planned and well implemented science and technological education programme sustained by an intellectual tradition and enlightened political leadership (Mustapha, 2003). Nigeria educational sector is beleaguered with policies somersault formulation and implementation of policies (NCCE, 2008).

Science Teachers as Veteran Stakeholders towards the Actualization of the Seven – Point Agenda for National Development

The impact made by any system of education in any particular country depends largely on the quality of teachers. Because teachers are largely responsible for the translation and implementation of education policies, curriculum design and development, instructional packages and assessment of learning outcomes at the levels of the learners. Teachers instructional leadership roles exert a lot of influences on the character formation and the process of socialization of the children with the learning environment (Moh, 2007).

Today, no segment of human activity has been left untouched by the results of scientific thoughts. In fact, almost every present activity of human rests squarely on the fruits of science. We live in a society that is fast driven by science and technology and permeated by science and

The Imperatives of Science and Technology Education for National Development

technology based artefacts and processes. Young people seem to have an excessive willingness to use and over use the new technologies (PC's, Internet, Cellular phones, Digital sounds and Video). As Bardowell (1999) observed: “ we live in a World that is being driven by science and technology”. The rapid changes in science and their conversion into technology have dictated the development prospects of many nations.

Nigeria like any developing country rely totally on science and technology education for rapid development, the success of this will in turn depends on the quality of teachers, teachers' trainers, facilities and infrastructure of the institutions that produce the teachers for the country. Accepting the fact that “ no educational system can rise above the quality of its teachers” it follows that scientific and technological products being displayed in developed countries have their roots in the quality of teachers that operate the educational system with active support from their respective governments. While the developed countries commit significant proportion of their GDP to the development of science and technological education. In Nigeria, huge amount of money is spent on importation of finished products (Ogunwole, 1998).

If you look at Nigeria and Japan, where they have almost the same population, but in terms of GDP, every Japanese citizen is said to be equivalent to more than 30,000 Nigerians. The table below presents the economic disparity between the two countries.

Table 2: Comparison between Economic Strength of Japan and Nigeria

S/NO		Japan	Nigeria
1	Population	127 million	140 million
2	Natural Resources	Little	Numerous
3	GDP per capita	2.90 trillion	900 US
4	Electricity	948.6 billion KWH	15.67 billion KWH

Source: Daily Trust, Feb, 2005

The economic disparity between Japan and Nigeria can be traced to differences in technological capacity and adaptation. As Turaki (2005) commented, “technology is the advantage that Japan has over Nigeria”. The impact of science and technology education on the economy of Japan today has made it not only the second largest to the World strongest economy USA but a threat to it.

Leadership and Development

For a country to be an effective player in global governance, it has to be able to tap the benefits of globalization for the well being of the citizens. This can only happen if the leadership is able to measure up to global expectations in driving a dynamic economy where global partnership plays a key role in the development of human capital (Ardo, 2008). In the light of this, President Yar'adua is in the right tract. Right from his campaign manifesto up to the 2008 budget he has held on to the seven – point agenda and making Nigeria one of the twentieth economy by the year 2020 (Vision 20/2020).

Conclusion

The seven – point agenda of the government of President Yar'adua is a great visionary leap for the economic emancipation of Nigeria. I believe that if we are to achieve World class standards, we definitely need a critical mass of teachers within the profession who seen it, firsthand what they do in other countries and then apply that knowledge back in the class room. Given the political will and commitment to the study of science and technology, Nigeria will not only have functional science and technological but will consequently solve its national problems and can be classified as technologically developed. Wasagu (2007) quoted Eniefu and Akpan (2004) who pointed out that “Modern socio – economic development of a nation normally depends upon the availability of more scientists, Engineers, Technicians and other professionals with scientific training.

Recommendations

As a way forward in the attempts to actualize Vision 20/2020 and the seven – point agenda, the following sectoral reforms in education will serve as a spring board to national developments:

1. Faithful implementation of the free and compulsory UBE.
2. Review of school curricula from primary to tertiary to incorporate vocational and entrepreneurial skills.
3. Re-tooling and repositioning of technical schools to be able to address technical manpower needs of the economy.
4. Establishment of more vocational centres to encourage Nigerians to embrace vocational education.
5. Review of school curricula at all levels to incorporate the study of information and communication technology (ICT).
6. Sustain existing vocational on the job training programmes.
7. The involvement of all stakeholders and the adoption of bottom – up rather than top down approach in the formulation and implementations of development plans, visions and educational policies.
8. Governments of Nigeria should provide adequate funding to education for staff and infrastructural development as indicated in UNESCO 26% of annual budget for education.
9. The hydra – headed problem of corruption should be tackled with the strongest political will. The issues of good governance, transparency and accountability should be emphasized and vigorously promoted to provide a socio – economic environment conducive for vision and development plan implementation.
10. The teachers' salary scale (TSS) should be effected and attractive science teachers' allowance provided to attract brilliant Nigerians into the teaching profession to teach science and technology education courses in schools.
11. The roles and functions of all institutions related to teacher preparation, registration and licensing e.g. NTI, TRCN should be synchronized and coordinated to position them to work together for achievement of national educational aims and objectives.
12. Teaching and learning of science and technology education in Nigerian languages namely Hausa, Igbo and Yoruba is apposite.

References

- Abah, C.O. (1998). Science, Technology and Mathematics as catalysts for meeting the challenges of 21st century in Nigeria. *Oju Scientific and educational review*. 1 (1), 1 – 14.
- Abah, C.O. (2008). Science, Technology and Mathematics Education: A key driver to achieving the Federal Government's seven – point agenda. A lead paper presented at the 2008 Annual Conference of School of Science, Federal College of Education, Zaria.
- Ardo, G.V. (2008). Leadership, Globalization and Development in Nigeria: The Imperatives of Science, Technology and Mathematics Education. A key note address at the 2008 Annual Conference of School of Science, Federal College of Education, Zaria.
- Bardowell, M.E. (1999). Educational Technology in the popular view of Science and Technology. *CASTME Journal* Vol. 19 (1) 15 – 23.
- Federal Ministry of Science and Technology (1986). *National policy on science and technology*.
- Ikoku, C. (1989). Science and Technology Education for rural development. A key note address delivered at the 30th annual conference of STAN Held at Federal University of Technology, Minna.
- Mohammed, Z. (2007). The 2008 Budget; MDG's and President Yar'adua's Seven – Point Agenda. *Business day* 14th Nov, 2007.

The Imperatives of Science and Technology Education for National Development

<http://www.business> – day online. Com/economic – watch / 1072.htm.

Mustapha, M.T. (2003). The Impediments to utilizing Science for self reliance in Nigeria. A paper presented at the first National Conference held at Federal College of Education, Kontagora Niger state.

National commission for Colleges of Education (2008). A communiqué issued at the end of National Conference on Teacher Education and Vision 20/2020.

Federal Republic of Nigeria (2004). *National Policy on education*, Lagos: NERDC Press.

New Nigerian, 2008 budget No. 13660, Nov,9 2007. Pg 1, 3.

New Nigerian, 2009 budget No. 13935, Dec, 3 2008. Pg 1,2.

Ochioma, C. (2008). Yar'adua's seven – point agenda. A performance Assessment. <http://naija.info>. Blog spot. Com/2008/02/Yar'adua's seven point agenda performance.html.

Ogunwole, E.A. (1998). Dimension to continue professional development of Science, Technology and Mathematics teachers. A key note address delivered at annual conference of STAN held at F. C. E Kontagora.

Okebukola, P.A.O (2002). Beyond the Stereotype to New Trajectories in science teaching. Lecture at 43rd STAN conference held at Port Harcourt.

Turaki, E. (2005). Economy as it relates to science. *Daily Trust* Vol. 10(7) 34 Feb 28th.

Wasagu, M.A. (2005). Solving National Problems through Science, Technology and Mathematics Education. A Lead Paper presented at the 3rd National conference organized by Sch. Of Sci, F.C.E Kontagora.

Wasagu, M.A. (2007). Functional Science, Technology and Mathematics Education for National Economic Empowerment and Development. A lead paper presented at the 3rd National conference organized by school of science, Federal College of Education, Zaria.