

**REPOSITIONING SCIENCE AND TECHNOLOGY EDUCATION FOR SUSTAINABLE DEVELOPMENT
IN THE 21ST CENTURY: NIGERIA'S CASE**

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ABSTRACT

That science and technology education is sine qua non to a nation's development cannot be overemphasized. In Nigeria, issues such as: poor academic performance of students, low quality of graduates, inadequate funding, lack of/ill equipped laboratory and workshops, quota admission policy implementation, low quantity, quality, and commitment of teachers, inappropriate curriculum, student unrest, cultism, and corruption, are prevalent in science and technology education provision in Nigeria. To improve the state of science and technology from its status quo and reposition it for the 21st century, adequate funding, provision of and furnishing of laboratory and workshop, curbing student unrest, cultism, and corruption, provision of scholarships and bursaries for students, regular review of science and technology curriculum, recruitment of more qualified science and technology oriented teachers, as well as motivation of science and technology teachers, are recommended.

Keywords: Reposition, Science and Technology, Education, Science Education, Technology Education, Sustainable Development, 21st Century, Nigeria

INTRODUCTION

The roles of science and technology in national development cannot be overemphasized. Any nation which fails to pay attention to science and technology education has planned to be left behind in all spheres of development. Okeke (2007) admitted that rapid and sustainable development of a country can only be achieved through scientific research, rational application of science and technology knowledge and skills. According to Okoli & Onwuachu (2009), science and technology are tools for economic, social, and political development of a nation. Worthy of note also is that in all aspects of human endeavour such as health, agriculture, food security, communication, economy, transportation, science and technology are applicable. Presently, countries in the world are categorized as: developed, developing, and less/under developed. The difference between the developed, developing, and underdeveloped countries however rests on the ability of the developed countries to convert scientific ideas to usable technology while the developing and underdeveloped countries are yet to do so effectively (Uwaifo, 2010). Presently, Nigeria remains a developing country with low economic, social, political, cultural, and technological indicators (UNESCO Institute of Statistics, 2007; United Nations, 2009). In recognition of the impact of science and technology development to the overall national development, federal government of Nigeria has been supporting it through policies, actions, and programmes. Specifically, science and technology is inculcated in National Policy on Education (2004) while there is National Policy on Science and Technology (1986) which is prepared for a 25-year time and whose philosophy emphasizes Nigeria's commitment to the creation of independent, integrated, and self-sustaining economy with the Policy itself serving as the framework for effort towards the fulfillment of the commitment. Presently, Nigeria can also boast of educational institutions such as technical colleges, colleges of science and technology, polytechnics, monotchnics, research institutes, as well as specialized universities of science and technology, for provision of science and technology education for the citizens.

THEORETICAL FRAMEWORK

This paper will be guided by the modernization theory. The theory which emerged in 1990s as an explanation of how the industrial societies of North America and Western Europe developed is used to explain the process of modernization within societies. The theory argues that for a country to become modern, it has to undergo evolutionary changes in science and technology which would lead to increased standard of living for the citizens. According to the theory, factors such as illiteracy, traditional attitude of, lack of communication and infrastructure etc, are responsible for under-development. Consequently, a change of these factors is the strategy for development. It also looks at the internal factors of a country while assuming that, with assistance, traditional countries can be brought to development in the same manner more developed countries have done. It attempts to identify the social variables which contribute to social progress and development of societies and seeks to explain the process of social evolution. It stresses the process of change and responses to that change. It also looks at internal dynamics while referring to social and cultural structures and the adaptation of new technologies.

SCIENCE AND TECHNOLOGY EDUCATION, SUSTAINABLE DEVELOPMENT: MEANING

Science education is a kind of education that aims at producing scientifically literate citizens and potentially scientific and technology manpower while technology education leads to the acquisition of practical, applied skills, as well as the basic scientific knowledge (Okonkwo, 1996).It is designed to develop skills, knowledge, abilities, attitudes, and work habits

needed for self-reliance. The term 'sustainable development' means the development that can be sustained over a period of time. The Report of the World Commission on Environment and Development (1987) sheds more lights on it. It describes it as the development that meets the needs of present generation without compromising the ability of the future generations to meet their own needs. According to Ballara (1991), cited by Eboh, Okoye and Ayichi (1995), it is the human's ability to survive by means of rational use of renewable resources, by their restraining from disrupting the ecosystem or over-exploiting natural resources and by refraining from activities that destroy cultures, societies and instead allow them to reach their potentials. Taking into cognizance these definitions, sustainable development can also be described as the development that builds on the present and provides enabling environment for future generations to develop and meet their needs.

POLICY THRUST FOR SCIENCE AND TECHNOLOGY EDUCATION

In Section 39 of National Policy on Education (2004, p.29), it is stated that science education shall encompass the teaching and learning of science process and principles which will lead to fundamental and applied research in sciences at all levels of education in Nigeria. Its goals shall be to:

- Cultivate inquiry, knowing and rational mind for the conduct of a good life and democracy;
- Produce scientists for national development;
- Service studies in technology and the cause of technological development; and
- Provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life.
- As also indicated in Section 40, technical and vocational education shall:
- Provide trained manpower in the applied sciences, technology and business particularly in craft, advanced craft and technical levels;
- Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and
- Give training and impart the necessary skills to individual who shall be self-reliant economically.

In pursuance of the goals of science and technology education, special provisions and incentives shall be made for the study of sciences at each level of the national education system and for this purpose, the functions of all agencies involved in the promotion of the study of sciences shall be adequately supported by government while government shall popularize the study of sciences and production of adequate number of scientists to inspire and support national development. In the case of technical education, the main features of the curricular activities for technical colleges shall be structured in foundation and trade modules; for effective participation of students in practical work; the teacher-students ratio shall be kept at 1:20; trainees completing technical college programmes shall secure employment either at the end of the whole course or after completing one or more modules of employable skill; set up their own business and become self-employed and be able to employ others; pursue further education in advance craft/technical programme and in post-secondary (tertiary) institutions such as science and technical colleges, polytechnics or colleges of education and universities.

ISSUES IN SCIENCE AND TECHNOLOGY EDUCATION, IN NIGERIA'S CONTEXT

In Nigeria, many issues are at stake in science and technology education such as:

Inadequate Access: There is inadequate access to science and technology education at different levels of the educational system (Uwadiae, 2004). At the primary level, primary science is offered as a subject by a pupil which does not really expose them to the rudiments of science but merely introduce them to it. At the secondary level, many students run away from science and technology subjects due to their perceived difficulties (Okeke, 2007). The science and technology policy in Nigeria sets enrollment targets for science and technology in tertiary institutions. In the case of conventional universities, science and technology/non-science and technology enrolment ratio is 60:40%. In case of the polytechnics, it is 70:30% and 80:20% in the case of federal universities of technology. This admission policy is aimed at bridging the gap observed in science and technology as well as non-science and technology courses in terms of access and outputs. In spite of this, both enrolment and outputs in tertiary institutions still favour non-science and technology disciplines.

Table 1: Graduate Outputs of Universities in Nigeria (Undergraduates and Postgraduates)

DISCIPLINE	2000/2001	2001/2002	2002/2003	2003/2004	2004/2005
HUMANITIES					
Administration	14847	14078	19513	12893	8530
Arts	6656	7645	8743	6692	3829
Law	2927	4398	5896	3877	1681
Social Sciences	11689	18909	17355	14122	7283
Total	36,119	45,030	51,507	37,574	21,323
SCIENCES					
Agriculture	2247	2966	3012	2869	974
Engineering/Tech	5852	6497	7227	5808	2012
Environ Sc.	1787	1811	2187	1822	1502
Medicine	1921	2665	2895	2644	732
Pharmacy	355	494	417	710	42
Science	9174	9060	11308	8353	6702
Dentistry	41	68	97	79	2
Veterinary Med	119	205	254	118	61
Total	21,496	23,766	27,397	22,403	12,027
Science: Humanitie Ratio	37.31:62.69	34.55:65.45	34.72:65.28	37.35:62.65	36.06:63.94

Source: Compiled from Statistics of Education in Nigeria: 1999-2005

As indicated in Table 1, outputs in humanities were 36,119 in 2001 but increased to 45, 030 in 2001/2002 and to

51,507 in 2002/2003. In 2003/2004, it decreased to 37,574 and further to 21,323 in 2004/2005. Outputs in sciences were 21, 496 in 2000/2001 but increased slightly to 23, 766 in 2001/2002 and further to 27, 397 in 2002/2003. It decreased to 22, 403 in 2003/2004 and further to 12, 027 in 2004/2005. The table further reveals that in 2000/2001, science: humanities outputs ratio was 37.31:62.69, 34.55:65.45 in 2001/2002, 37.35 : 62.65 in 2003/2004 and 36.06 : 63.94 in 2004/2005.

Gender Gap: A major characteristic of science and technology education in Nigeria is that there is gender disparity in favour of male against female students (Okeke, 2001; Uwadiae, 2004; Njoku, 2000). At all levels of the educational system, male students in science and technology based programmes outnumbered the female. It is worthy of note that female students prefer the less difficult courses to the hard science and technology courses (Okeke, 2007). At the secondary and tertiary levels where the provision of science and technology education is distinct, more male are into it than female (Njoku, 2000; Uwadiae, 2004). Many female students are afraid of choosing science and technology career because of the belief that they are difficult. Data in Table 2 show the outputs in some selected courses in the universities in Nigeria from 2002 to 2005 while Table 3 contains data indicating the outputs of polytechnics in year 2004.

Table 2: Outputs of Universities in Nigeria (Bachelor’s Degree only) by Discipline

Discipline	2002		2003		2004		2005	
	Male	Female	Male	Female	Male	Female	Male	Female
Agriculture	1,381	705	1,366	873	1,268	828	299	167
Engineering								
Technology	4,558	679	5,425	800	4,182	689	1,061	116
Environmental								
Science	1,079	395	1,201	560	940	368	643	243
Medicine	1,538	613	1,489	903	1,219	721	359	230
Pharmacy	312	138	186	144	320	235	12	10
Science	4,461	2,840	5,839	4,347	4,390	2,581	2,190	1,379
Dentistry	45	22	67	30	48	21	-	-
Veterinary								
Medicine	99	47	155	54	47	21	30	6
Others	1,059	457	879	401	617	214	273	209
Total	35,989	22,316	41,252	29,109	30,105	20,314	15,327	10,715
Grand Total	58,305		70,361		50,419		26,042	

Source: National University Commission, in 2009 Abstract of Statistics

Table 3: Outputs of Polytechnics by Programme, Sex, and Level of Study in 2004

National Diploma			Higher National Diploma		
Male	Female	Total	Male	Female	Total
33,166	17,719	50,885	15,137	8,546	23,683

Source: National Board for Technical Education, in 2009 Abstract of Statistics

As indicated in Table 2, there were 35, 989 male as against 22, 316 female graduates in 2002. Male graduates in 2003 were 41, 252 while female graduates were 29,109. In 2004, there were 30,105 male as against 20,314 female graduates. As at 2005, male graduates were 15, 327 as against 10,715 female graduates. In Table 3, it is also indicated that the total male outputs in polytechnics for the Ordinary Diploma (OND) programmes were 33,166, as against 17,719 females. As regards the Higher Diploma (HND) programmes, there were 15,137 male outputs as against 8, 546 females.

Inadequate Funding: Over the years, education has been inadequately funded in Nigeria in spite of its roles in national development. Statistics (Central Bank of Nigeria, 2010) revealed that federal government’s allocation to education sector between 2000 and 2009 was not more than 13.0% of the annual budget. Due to the low allocation to the education sector, educational institutions have not been receiving adequate fund for science and technology education provision (Uwaifo, 2010). Data in Table 4 show the detailed allocation to the education sector between years 2000 to 2009.

Table 4: Federal Government’s Expenditure on Education in Nigeria: 2000-2009

Year	Fed. Govt. Annual Budget (₦ Billion)	Alloc. To Education (₦ Billion)	Edu, All as % of Total Budget
2000	664,734.30	67,508.10	10.16
2001	918,028.60	59,744.60	6.51
2002	1,188,734.60	109,455.20	9.21
2003	1,308,287.90	79,436.10	6.07
2004	1,321,580.70	93,767.90	7.10
2005	1,547,272.80	120,035.50	7.76
2006	1,842,600.00	151,723.50	8.20
2007	NA	137.480	6.07
2008	NA	210.00	13.00
2009	NA	183.360	NA

Source: Central Bank of Nigeria Statistical Bulletin (2010)

Table 5: Expenditure on Education as % of GNP for Selected Countries in Africa: 2006-2009

Country	% of GNP allocated to Education
Ghana	6.9
Tunisia	6.2
Ghana	6.9
Botswana	10.3
Malawi	6.2
South Africa	8.5
Namibia	5.9
Uganda	8.2
Nigeria	5.8
Togo	5.9
Rwanda	9.0
Gambia	6.0
Guinea Bissau	6.1
Sierra Leone	13.1
Sudan	7.3
Niger	6.1
Burkina Faso	6.4
Liberia	13.2
Congo	9.5

Source: United Nations Development Programme (2011). Human Development Report

As indicated in Table 4, between 2000 and 2009, allocation of federal government of Nigeria to education was between 5.90 % and 13.20% of the total budget. Data in Table 5 also shows the funding pattern of education when compared to the situation in selected African countries. As indicated in the Table, Nigeria recorded the least allocation to education among the countries while Liberia allocated the highest allocation to education during the period which is an indication that among these countries, Nigeria gives the least priority to education. This was even against the UNESCO standard that at least 26% of the Gross Domestic Product of each country in the world should be allocated to education. With respect to funding of science and technology education, federal government remains the principal source of its finance, although parents do contribute to it. Unfortunately, issue of gross underfunding of science and technology education in Nigeria, abound in literature (Omiko, 2012). Worthy of note also is that lot of research institutions in Nigeria are not adequately funded which has been militating against effective research efforts. Report (Maduka, 2003) indicates that India invested over three billion dollars in 1985 in some 1,300 research institutes working on electronics aeronautics and space, atomic energy, etc. In 1985, Report also

indicates that India spent 1.5% of her GNP on research and development compared with about 2.5% spent by the US. Nigeria's highest allocation figure for research was 0.43% in 1983 which went down to 0.05% in 1992 and 0.23% in 2003. This is very sad for a sector whose responsibility is to research into areas that will enhance development in the country.

Lack of/ill-Equipped Laboratory and Workshop: The roles of laboratory in science and technology education provision cannot be overemphasized. As buttressed by Owoeye (2000), the success of any science subject depends on its provision. Daramola (1985) also stressed that laboratory plays vital roles in technological oriented science curriculum and provides student the opportunity to engage in the process of investigation and inquiry. In spite of the benefits that can be derived from the use of laboratory and technical workshop, many schools in Nigeria are lacking these while those available in schools are ill-equipped for effective science teaching (Nwadiani, 1999). Because of the poor nature of laboratories and workshops in educational institutions in Nigeria, teaching of science and technology education has not been thoroughly demonstrated that could aid students' understanding of the difficult concepts in the curriculum.

Inappropriate Curriculum: Adequate curriculum content is germane for effective science education provision. Offorma (2005) agrees that functional education is determined by the quality of the curriculum content and its implementation. Ivowi (2009) also stated that functional science curriculum content must be valid, relevant, significant, learnable, consistent with current social realities of the country, useful and reflect the interest of the learners. In spite of the importance of curriculum in education provision, much had been said about the inappropriateness of curriculum of education in Nigeria (Ige, 2011; Balogun, 2009). Of particular focus is the curriculum of science and technology education which has been adjudged to be defective (Uwaifo, 2010; Udele, 2009; Ugwu, 2008; Udofia & Salami, 2012; Ogunkunle & Mbedele, 2008). According to Uwaifo (2010), the problems of curriculum of science and technology education in Nigeria are that:

- They are based on foreign model evolved under ideal conditions (Staff, equipment, infrastructures, and training opportunities);
- Shortage of highly competent indigenous teaching and support staff with sufficiently wide practical experience of technology;
- There is basically lack of textbooks in this area while most of the available ones are illustrated with examples from outside local environment which are irrelevant to the country;
- Too academic and overloaded with intellectual context in pure science and Mathematics at the expense at basic Engineering.

It is thus worthy of note that due to defective curriculum, many graduates of science and technology education cannot find job in the labour market (Ibeh, 2009; Dabo, 2008; Borisade, 2001; Okebukola, 2001) while many among those employed are finding it difficult to cope with the demand of work (Dabaleen, Oni & Adekola, 2000)

Low Quantity, Quality, and Commitment of Teachers: The roles of teacher in the education process cannot be overemphasized (Ibukun, 2009; Achimugu, 2005). In spite of the roles, statistics and reports (Federal Ministry of Education, 2007; Asikhia, 2010; Akani, 2012; Ugwu, 2008; Ogunkunle & Mbedele, 2008) indicate that teachers are

inadequate for science and technology education in Nigeria. It is even unfortunate that many teachers of science and technology disciplines are unqualified for the job because they don't possess the basic teaching qualification which is Nigerian Certificate in Education (NCE) according to the National Policy on Education (2004) (Federal Republic of Nigeria, 2009b; Central Bank of Nigeria, 2010). Data in Table 6 show the number of qualified teachers in Physics and Chemistry in secondary schools in Nigeria in year 2006 while in Table 7, the student-teacher ratios in federal universities in Nigeria from 2001 to 2006 is indicated.

Table 6: Analysis of Qualified Teachers in Physics and Chemistry, in Secondary Schools in Nigeria as at 2006.

S/N	SUBJECT	No.	Qualified%	Not Qualified %
1	Physics	386	32.4	67.6
2	Chemistry	632	40.4	59.6

Source: Ndefo, Alani & Fagbamiye (2006), in Okorodudu, R.I (2011): Innovations in Teaching and Learning Experiences. *The Educational Psychologist*, 5(1): 2-12

As indicated in Table 6, out of 386 Physics teachers, only 32.4% were qualified while 67.6 were unqualified. Also, out of 632 Chemistry teachers, only 40.4% were qualified while 59.6% were unqualified.

Table 7: Student/Teacher Ratio in Federal Universities in Nigeria: 2001-2006

DISCIPLINES	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	NUC STAN DARD
Engineering/Tech nology	24	27	24	30	30	30
Medicine	15	13	14	15	12	30
Environmental Science	16	18	12	25	20	30
Pharmacy	23	14	21	14	12	15
Science	19	19	23	32	25	15
Veterinary Medicine	12	9	14	10	10	30

Source, National Universities Commission, in Social Statistics in Nigeria (2009). National Bureau of Statistics

NOTE: *NUC guideline implies Students/Teacher Ratio (as Standard)

It is indicated in Table 7 that except in the case of Engineering/Technology in year 2004/2005 and 2005/2006, none of the selected science and technology programmes met the stipulated NUC standard during the period which is an indication that the number of teacher relative to students were very low which will have serious implication on the quality of education in the universities. The inadequacy of teachers has been worsened by the issue of 'Brain drain', particularly in tertiary institutions. Timilehin et al (2010) reported that between 1988 and 1990, over 1,000 lecturers left the federal universities while as at 2007, over 10,000 Nigerian academicians were in United States of America (USA). As a result of brain drain, tertiary institutions in Nigeria have been depleted of brilliant scholars who apart from ensuring quality teaching, suppose to serve as role models to students. Unfortunately, many distinguished professors, doctors, and other academicians in the areas of Science and Technology are now in the corridor of power as commissioners, local governments' chairmen, senators, special advisers, among others, because of the desire to make quick and easy money. Consequently, young, inexperienced, and less experienced lecturers now dominate the tertiary institutions. The issue is seriously affecting the science and technology programmes, many of which now rely on lecturers on 'sabbatical leave', part time' and; contract' to provide relief. The commitment of teachers in educational institutions in Nigeria also leaves much to be desired. At both levels of the educational system, many teachers had turned their appointments to part time instead of the legal full time. Serious teaching is becoming history in the campuses. Production and sale of poor quality and self-published/hurriedly produced textbooks, has taken centre stage in many campuses and has replaced serious teaching in classes (Nwadiani, 1999).

Poor Academic Performance of Students: The issue of mass failure of students in public examinations has been a major concern of government, parents, and other education stakeholders in Nigeria. This is because of the huge expenditure being incurred on the training of the students in educational institutions as well as the expectation from them at the end, in terms of what they can contribute to the society. Over the years, there has been mass failure in examinations, particularly in the external such as the Senior School Certificate Examinations (SSCE). Data in Table 8 and 9 shows the performance of candidates in selected subjects in both the WAEC and NECO administered Senior Secondary Certificate Examination during the period 2004 to 2008.

Table 8: Students' Performance in Selected Subjects in WAEC Senior School Certificate Examinations (SSCE): 2004-2008

Year	Number				
	2004	2005	2006	2007	2008
Mathematics					
Total Sat	1,019,524	1,054,853	1,149,277	1,249,028	1,340,907
Total Passed	633,594	670,582	829,999	917,868	1,086,031
Total Failed	351,512	363,055	286,823	302,774	229,021
Biology					
Total Sat	1,005,894	1,051,557	1,137,181	1,238,163	1,332,737
Total Passed	624,647	689,677	852,171	810,564	798,341
Total Failed	348,890	338,491	261,200	402,148	506,089
Physics					
Total Sat	321,499	344,411	375,824	418,593	453,173
Total Passed	248,849	244,979	305,224	320,969	311,823
Total Failed	61,940	89,150	62,119	88,480	124,420
Chemistry					
Total Sat	327,503	349,936	380,104	422,681	456,993
Total Passed	207,580	243,773	257,093	298,964	319,760
Total Failed	107,318	95,495	114,475	111,322	116,892

Source: West African Examinations Council

Table 9: Students' Performance in Selected Subjects in NECO Senior School Certificate Examinations (SSCE): 2004-2008

Year	2004	2005	2006	2007	2008
Mathematics					
Total Sat	873,989	838,012	897,791	961,455	1,092,215
Total Passed	508,425	557,079	634,605	699,966	939,460
Total Failed	302,242	215,058	188,360	201,753	90,204
Biology					
Total Sat	863,771	835,012	890,866	980,337	1,082,262
Total Passed	601,112	552,454	652,493	743,297	929,820
Total Failed	223,152	228,383	178,245	195,189	94,518
Physics					
Total Sat	271,539	266,913	288,051	327,669	360,102
Total Passed	243,958	207,038	216,682	258,067	317,112
Total Failed	16,305	45,458	56,505	57,539	24,095
Chemistry					
Total Sat	277,383	270,828	291,344	333,303	344,766
Total Passed	194,622	46,422	206,874	259,755	302,553
Total Failed	68,810	81,969	67,739	61,019	25,595
Agricultural Science					
Total Sat	703,279	714,541	688,173	732,054	807,878
Total Passed	496,495	588,569	485,112	565,031	645,309
Total Failed	185,834	92,844	158,869	119,837	128,975

Source: National Examinations Council (NECO), in Federal Republic of Nigeria (2009).

Annual Abstract of Statistics

Low Quality of Graduates: Ordinarily, the worth of an educational system can be measured by the quality of its outputs. It is thus expected that the graduates of educational institutions would be able to display quality skills and knowledge at their respective places of work. While it cannot be contested that educational institutions in Nigeria had produced graduates in different fields of science and technology, many of the graduates are of poor quality. Scholars (Nwadiani, 1999; Dabaleen, A., Oni, B., & Adekola (2000); Ajayi & Shofoyeke, 2003; Saint, Hartnett & Strassner, 2003; Udele, 2009) had criticised the quality of education at the three levels of the educational system in Nigeria, where all point to the fact that there is declining quality in such education. To the extent that the employers of labour are complaining over the inability of those employed to perform. Many public and private establishments are thus spending huge money to train and retrain their employees in order to meet standard. Presently, graduates of tertiary institutions in Nigeria must pass aptitude tests before they can be employed. Those seeking admission into tertiary institutions for

further studies at national and international levels, are either denied admission or subjected to tests due to loss of confidence on their quality.

Frequent Closure of Tertiary Institutions: Educational system in Nigeria has in the past years enmeshed in crises, including staff strikes, student unrest, and cultism (Baikie, 2001; Ige and Olowolabi, 2010). A peculiar consequence of the crises in tertiary institutions is the frequent closure of institutions for several weeks and at times indefinitely which has been causing the disruption of academic activities. It is worthy of note that when closed institutions are re-opened, academic calendars are compressed while examinations are hurriedly taken thus limiting the period for teaching of students.

Quota Admission Policy: Over the years, educational gap, particularly between the southern and northern parts, has been a contending issue in Nigeria. To bridge the gap, federal government has instituted the ‘Quota Admission Policy’ at the tertiary level which allocates 45% of vacancies to candidates on merit; thirty five percent (35%) for catchment areas while the remaining twenty percent (20%) for candidates from educationally disadvantaged areas. The implementation of such policy has resulted to the recruitment of low quality candidates into tertiary institutions, which has also culminated in the reduction of the quality of tertiary education students and outputs.

Wrong Choice of Career: In Nigeria, a good number of students offering science subjects in secondary schools are not supposed to offer these. This cannot be divorced from the influence of some parents in the choice of career for their children without taking into cognizance, their academic ability. Many parents in Nigeria are fond of forcing their children to offer science and technological subjects in schools so as to take after them in life. Iwu (1999) linked academic performance of students to peer influence. In this case, some students do imitate their peers to choose science and technology subjects particularly at secondary school level.

Corruption/Mismanagement of Fund: Corruption has been a thorn in the flesh of Nigeria’s economy over the years. According to Transparency International (2011) Report, cited in Oyinola (2011), Nigeria ranked 144th out of 146 most corrupt countries in the world, beating only Bangladesh and Haiti to second and last positions respectively. Oyinola (2011) further reported that the menace is pervasive in the educational system, from primary to tertiary levels. Due to corruption, money meant for infrastructural development and maintenance are often misappropriated by educational institutions leaders and those in government thus making the students to be at the receiving end of not having adequate and standard infrastructure and facilities for effective teaching and learning.

STRATEGIES FOR REPOSITIONING SCIENCE AND TECHNOLOGY EDUCATION IN THE 21ST CENTURY

It is imperative that the quality of science and technology education be improved in Nigeria if the country will breakthrough in this area in this decade and beyond. To achieve this however calls for concerted efforts from the education stakeholders. In this regard, the following measures are suggested:

Adequate Funding: For effective implementation of science and & technology programmes, there should be improved funding of education to meet the 26% of GDP standard already set by UNESCO. Adequate funding of education would guarantee increased funding of science and technology education on which it depends. Private sector should assist government in the funding of education, particularly through the provision of facilities and donation of money, libraries, laboratories, and workshop for educational institutions.

Recruitment of and Training of Teachers: In view of the role of teacher in science and technology education provision and the shortage that characterized this in schools, more academic staff in the areas of science and technology should be recruited by the tertiary intuitions; science and technology teachers should be committed to the job and be motivated through improved conditions of service.

Motivation of Science and Technology Teachers: Government should encourage teachers in the area of science and technology to be able to perform better. At the primary and secondary level, government should give special science and technology allowance to teachers.

Admission by Merit: In view of the negative effect of the implementation of this policy, particularly on the quality of graduates, Government should make it a standing policy that only those that qualify should be admitted to tertiary institutions.

Construction of Laboratory and Workshop in Schools lacking these and Furnishing the available Ones: In view of the importance of laboratory in science and technology teaching, government should equip the laboratories and provide or employ laboratory assistants who would have the knowledge of laboratory work. This would help to reduce the work load on the part of the science teachers and improve their efficiency

Regular Review of Science and Technology Curriculum: Although Government has not relented in its effort to produce better curriculum for educational system in Nigeria, it is imperative that government should review secondary education curriculum particularly the aspects that concerns science and technology. Those topics that had been adjudged to be too lengthy should be reduced so that they can be covered by teachers within the time frame.

Improved Commitment of Science and Technology Teachers: Teachers of science and technology in educational institutions should be committed to the job and shun acts that are capable of undermining their duties in the institutions.

Curbing Student Unrest, Strikes and Cultism in Tertiary Institutions: It is not a gainsaying that strikes, student unrest and cultism have over the years been causing delay in the graduation of students as well as reducing the period of training of students in tertiary institutions owing to the usual compression of academic calendar, it is thus imperative for Government to continue to dialogue with students on the need to shun the involvement in these acts which have been

detrimental to the development of education in tertiary institutions. Institutions' administrators should be alive to their responsibilities and exert much effort towards nipping these crises in the bud in their respective institutions.

Poverty Eradication/Alleviation: It is obvious that poverty has been the bane of education in Nigeria. It thus behooves on Government to encourage students from the less privileged homes towards studying science and technology, through the provision of scholarships and bursaries to students. Private sector and Non-Governmental Organisations (NGOs) should however complement government efforts in this area by instituting scholarships and bursaries for students in science and technology fields.

Science and Technology/Non-Science and Technology Enrolment Ratio Enforcement Government should implement strategies to reinforce the science: arts enrollment policy. Government might, for instance, reward institutions for their achievement of the goal or target scholarships at students in particular disciplines.

Recruitment of More Guidance-Counselors: Government should recruit and posted more Guidance-Counselor to schools, particularly to those schools without any. The guidance counselors in schools should however be alive to their responsibilities and ensure effective guidance of students in the choice of career.

Curbing Corruption in Educational System: In view of its negative effects, Government should curtail corruption in educational institutions. Those caught in the act should be reprimanded to serve as deterrent to others. Government should however continue to institute measures aiming at preventing the misappropriation of money meant for science and technology in educational institutions and at the elms of government.

Adequate Training of Pupils in Primary Schools to Imbibe Science and Technology Culture: It needs not be overemphasized that the background of a child plays influential role in the academic performance at other levels of the educational system. In is thus imperative for adequate and thorough training to be provided for pupils at the primary level so that they can build on the foundation at the secondary and tertiary levels.

Modernization of Science and Technology Teaching: Science and technology teaching methods should be modernized to bring life back into it. To do this, a policy on standards of professional development of teachers should be implemented, requiring teachers to maintain a reasonable level of pedagogical content knowledge and skills. Also, Computer Aided teaching should be emphasized in schools by government in line with global crusade.

Removing Gender Barrier in Science and Technology Education: Removing gender biases in instruction and instructional materials and the positive presence of female role models are strategies to keep in university S&T programmes once they are there. Special programmes and scholarships should stimulate girls who want to enter S&T programmes.

Summary and Conclusion

The roles of science and technology in national development cannot be overemphasized. In all aspects of human activities such as health, agriculture, communication, food security, transportation, among others, science and technology are applicable. In spite of the effort of government in Nigeria at promoting science and technology education, many issues are at stake that serves as barriers to the accomplishment of this feat. This paper thus examined how issues such as inadequate funding, inappropriate curriculum, lack of/ill equipped laboratory and workshop, low quantity, quality and commitment of teachers, poor academic performance of students, low quality graduates, frequent closure of tertiary institutions, among others, are affecting science and technology education in Nigeria. Judging from the fact that Nigeria is a developing country which needs to move forward in the area of science and technology development, it is imperative for these issues to be tackled. To achieve this, improved funding of education, curbing examination malpractices, student unrest, and cultism in tertiary institutions, among others, were recommended. It is thus hopeful that quantitative and qualitative science and technology education will be achieved in Nigeria if these measures are adopted which will however play roles in the nation's development.

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