

Improving Science Education in Nigeria: The Role of Key Stakeholders

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ABSTRACT

The general poor performance of students in national examinations in recent past have brought about doubts from relevant quarters as to the activities of stakeholders towards improving students' performance in Science and generally Science Education. Researchers have succinctly identified causes of poor performance among students and have acted in various capacities to remediate this occurrence. However, government, teachers and students have peculiar challenges for effective and successful improvement from the status quo. Whether the roles are practicable under the current socio-economic realities in Nigeria remains a probable question. Hence, this study researched the responsibilities of government, teachers and students in qualitative development of science education in Nigeria. The researcher reviewed the global educational practices to what is obtainable in Nigeria vis-à-vis the UNESCO benchmark. Also, this study suggests plausible solutions to the peculiar problems arising from the neglect of global and international best practices in Nigeria.

Keywords: senior school, science students, stakeholders, science education

INTRODUCTION

Science and Technology play significant roles in the development of nations across the world. Hence, the need for education in the sciences and science education becomes imperative for developing countries to compete favorably with the developed. Great Nations of the world take pride in grounds they have covered in both science and technological advancement and the socio-economic wellbeing of sovereign nations is well rooted in how they have developed scientifically and technologically. Countries of the world often referred to as developed, share similar characteristics in technological advancement. On the other hand, under-developed or developing countries share limitations in scientific and technological know-how.

Science Education is an important area which shapes and molds the character of modern societies. In fact, modernity could be said to evolve science and arguably the other way around. Science education could be viewed as a process of teaching or training especially, within the school system to improve one's knowledge about the environment and to develop one's skill of systematic enquiry as well as natural attitudinal characteristics. Science education could be recognized worldwide as a pre-requisite to technological advancement and involves the study of an in-depth science and in addition, educational knowledge and concepts (Pember & Humbe, 2009).

Despite the importance of science education to national development and the role it plays in socio-economics advancement, Nigeria has not been able to live up to expectations in this field. The reason for the aforementioned are numerous but surmountable. The inadequacy of science education system to produce skilled human resources needed for transformation into national prosperity is worrisome. The implication is that most of Nigeria's development in the direction of modernization has been haphazard, leading to acquisition of obsolete technology. Sustainable science education development may represent a catalytic process for social, educational, training and public awareness of values, behaviour and lifestyles required for a sustainable future (Momeke, 2007).

The need to effectively transfer and improve the knowledge of science and technology rely on the understanding of various strata of science and technology, and the improvement in its teaching and learning. Basically, science is divided into Physics, Chemistry and Biology. These basic subjects have undoubtedly

Table 1. Candidates' Enrolment and Performance in WASSCE in Biology, Chemistry and Physics: 2007-2016

Year	Biology			Chemistry			Physics		
	Total sat	Credit passed (A1-C6)	% Pass	Total sat	Credit passed (A1-C6)	% Pass	Total sat	Credit passed (A1-C6)	% Pass
2007	1,238,163	413,211	33.37	424,747	196,063	46.16	409,449	180,797	44.16
2008	1,259,964	427,644	33.94	456,980	202,762	44.37	408,237	200,345	49.08
2009	1,259,964	453,928	33.87	456,980	203,365	43.49	444,236	222,722	50.14
2010	1,300,418	427,644	32.88	465,643	263,059	50.70	463,755	237,756	51.27
2011	1,505,199	579,432	38.50	565,692	280,250	49.54	563,161	360,096	63.94
2012	1,646,150	587,044	35.66	627,302	270,570	43.13	624,658	429,415	68.74
2013	1,648,363	852,717	51.73	639,296	462,517	72.34	637,023	297,988	46.77
2014	1,365,384	766,971	56.17	636,268	397,649	62.49	635,729	386,270	60.76
2015	1,390,234	798,246	57.42	680,357	412,323	60.60	684,124	410,543	60.01
2016	1,200,367	740,345	61.68	706,873	408,122	57.74	705,125	415,655	58.95

Source: Statistics Section of the WAEC Office Yaba, Lagos (2017)

established their importance over time in fostering Science related carriers. Understanding of physics concepts such as "electricity" and "magnetism" led to the establishment of power industry (electrical), radio, television and other means of electronic communication (Omosewo, 2009).

The effort of the governments of Nigeria had led to the establishment of science and technical school boards. These boards aimed at improving and building a foundational base for the development of science and technology among students. The broad goal of education is to prepare an individual for useful living in the society and higher education irrespective of gender, social status, religious or ethnic background. One of the objectives of establishing post basic education that includes senior secondary school and tertiary education is to equip students to live effectively in this modern age of science and technology (FRN, 2013).

The importance of sciences and technology to national development led the effort of both Federal and State governments to the improvement recorded in Nigeria after 'the 1969 Curriculum Conference'. These efforts included but not limited to the establishment of Federal and State Technical Colleges, Federal Colleges of Education (Technical), Federal Universities of Technology, Science and Technology Research Institutes, science and technical school board. The aforementioned aimed at improving and building a foundational base for the development of science and technology in Nigeria (STAN, 2012).

In line with the aforesaid efforts, it is imperative to look inward on student enrollment into external examinations in science subjects and their performances, with a view to compare the present-day hunger and how best to compete globally in terms of science and technological development. West African Senior School Certificate Examinations (WASSCE) for the period of 2007-2016 elicited the need for improvement from relevant stakeholders. Although, improvement had been recorded in terms of enrollment and performance over the slated period, though, unsatisfactory. Nigeria rely solely on both foreign technology and germane maintenance crew for space satellite activities among other areas of needs. Often imported technology and science in the health and security sectors plagued her independence as country like many others in Africa. It may be fair to conclude that our education in the sciences as well as our science education has not yielded the expected goal.

The analysis of West African Senior School Certificate Examination (WASSCE) May/June results of candidates' performance in Biology, Chemistry and Physics from 2007-2016 in Nigeria indicated both poor enrolment and performance. **Table 1** summarizes the enrolment and performance of biology, chemistry and physics students in WASSCE for the past ten years.

There is still the need for improvement in the enrolment and performance of students in Physics, Chemistry and Biology to meet the goals of vision 20-2020 and visions beyond.

CHALLENGES OF SCIENCE EDUCATION IN NIGERIA

The Role of the Government

The aim of education to any nation is self-reliance. Self-reliance connote the ability of a nation to provide its essential needs in vital areas of its security and the security of individual members of the population amongst others. In Nigeria, several attempts were made towards national competence in science and technology, but the outcome has been short of the desired. The National Policy on Education (2013) stipulated that "A greater proportion of educational expenditure should be devoted to science and technology". United Nations Educational, Scientific and Cultural Organization (UNESCO) had earlier reiterated to beneficiary nations of its twenty-six percent (26%) national budget benchmark to be devoted to education. The Nigeria Union of Teachers (NUT), as

Table 2. Nigeria's budget and percentage committed to education from 2010-2018

Year	Education Budgetary Allocation	% for Education	National Budget
2010	N234.8billion	5.10	N4.6trillion
2011	N306.3billion	6.20	N4.972trillion
2012	N400.15billion	8.43	N4.749trillion
2013	N426.53billion	8.60	N4.987trillion
2014	N493billion	10.70	N4.69trillion
2015	N392.2billion	8.91	N4.4trillion
2016	N369.6billion	6.01	N6.1trillion
2017	N448.01billion	6.00	N7.3trillion
2018	N605.8billion	7.04	N8.3trillion

Source: budgetoffice.gov.ng & nationalplanning.gov.ng

reported in Vanguard of May, 2nd 2013, also called on the federal government to honor the UNESCO benchmark in the national budget with a view to improve the state of education in the country.

Table 2 reveals the inadequacy experienced in the national budget as far as Nigeria education is concerned. UNESCO benchmark of twenty-six (26%) has never been matched in the post-colonial (after independence) history of Nigeria. It is also revealed in **Table 2** that half of UNESCO benchmark is yet to be met in Nigeria's modern history. This could only lay credence to why the field of education and science education in particular has not met or surpass its expectations.

The development of any society is adjudged by its science and technological advancement and the level of awareness of the residents (Adegun, 2003). Adequate commitment from government and other relevant stakeholders will not only improve science and technological development, but also positively affect the socioeconomic well-being of citizens. The national education scheme designed for senior secondary school science has its objectives among others, to provide basic literacy in science for functional living in the society and to acquire essential scientific skills and attitudes as a preparation for the technological application of science (FRN, 2013). Thus, for national development in technology, basic concepts and principles of science are indispensable. The teaching of science in secondary schools is intended to produce young scientists who would be able to design the technological devices that would make day-to-day activities easier and living perhaps more comfortably. The implication is that, without proper science education there may not be meaningful technological advancement in Africa and particularly Nigeria. The teaching and learning outcomes of this all-important subjects need serious attention in order to enhance a sustainable technological development in Nigeria (Ajayi, 2008a, 2008b).

Despite efforts by the Nigerian government in the pursuance of development in science and technology, the result has been both unsatisfactory and discouraging (Adedayo, 2015). The development in science and technology is poor and contributes immensely to the state of underdevelopment in Nigeria. Therefore, the need to redress and bring about a worthwhile growth in science and technology. Biology, Chemistry and Physics are the subjects at senior secondary level meant to bring about the basic development needed in technology. The effective teaching and learning of these subjects are crucial issues of consideration for all round science and technological development.

The Role of the Teachers

Momeke (2007), reported that science education and education in sciences have not been satisfactory in producing skilled human resources needed to transform Nigeria's prosperity.

The implication of the aforementioned is that, the development in the direction of technological advancement has been haphazard leading to acquisition of obsolete technology. Science education, if properly developed, will represent a catalytic process for educational training and public awareness, values, behavior and lifestyles required for a sustainable human and capital development.

Some of the challenges faced in science education includes: Incompetent teachers; as reported in Nada (2008), Modebelu (2007), and Gardner (2005); Under motivation of teachers to teach science; as reported in Okeke (2009), Okebukola (2006); Scarce supplementary teachers' training through workshops, conferences and fora alike in Bower and Pine (2009); Poor implementation of curriculum update in Gardner (2005); Inadequate science teachers, i.e. Science educators are not all science teachers in Omosewo (2005); Inadequate teaching and learning resources in Audu and Oghogho (2006), Ogunmade (2006).

Teachers and educators of science need to be up to date regarding the best practices as obtainable in the developed countries. The need to encourage upcoming teachers of science to stay and grow in the profession is important as shortage have been recorded in these fields. The resources for effective teaching and learning of

science are a necessity to the development of science in Nigeria. Workshops, seminars and conferences are also what teachers of science should avail themselves.

The Role of the Students

Surveys of why senior secondary school students are not interested in studying science revealed that students perceived science to be abstract and a difficult field. Essentially, students find science difficult because they have difficulties in problem solving. In helping students solve science problems, generic problem-solving strategies are often required. However, a deep insight into what students' specifically find difficult while they problem-solve are part of what science educators must see as a challenge. Educators of science would only be able to offer students with generic assistance if they are adequately equipped for the task at hand (Byun, Ha & Lee, 2008)

Several challenges arise from learning of science in Nigeria. Students are faced with challenges which includes but not limited to; teachers incompetence in the delivery of the subject matter, outdated laboratories, obsolete textbooks, unavailability of instructional materials, unrealistic methods of teaching, lack of requisite mathematical background for effective calculation and manipulations, attitudinal decay in science as a result of lack of mass and real representation of the subject matter among others (Amadi, 2002; Badmus, Akanmu & Akanbi, 2015; Omosewo, 2009).

Examination bodies like West African Examinations Council (WAEC established in 1953), National Teachers Institute (NTI established in 1975), National Board of Educational Measurement (NBEM established in 1992), National Business and Technical Examination Board (NABTEB established in 1992), National Board of Technical Education (NBTE established in 1993) and National Examinations Council (NECO established in 1998) all exist for the sole purpose of assessing and training students for the task ahead in science and technology related carriers. The data generated by these agencies forms the overall performance which enable for checks and balances on areas where improvement are needed and the plausible solutions for the weaknesses. Attention needs be paid by relevant agencies to the environment in which these students learn, economic inequality, individual differences and other factors with a view to give all students a level plane ground upon which fair assessment can be made.

CONCLUSION

Science education is an essential ingredient for the development of any nation and has a significant stake, if fully implemented in accelerating Sustainable Development Goals (SDG) and Continental Education Strategy for Africa (CESA) 2016-2025. Although, the multi-facet nature of the problems confronting science education in Nigeria are surmountable and none peculiar. It is hoped that if the government, teachers, students' and relevant stakeholders perform as expected in their respective duties, sustainable development awaits Africa and specifically Nigeria.

RECOMMENDATIONS

The following recommendations are made from the study:

1. Government and relevant stakeholders should provide necessary infrastructures, laboratories and facilities that will motivate teaching and learning of science.
2. Government and relevant stakeholders should motivate science teachers and reward hardworking students with adequate incentives.
3. Government agencies and stakeholders should provide monitoring and evaluation in teachers impacting and students learning system to achieve the desired outcome.
4. Adequate number of teachers should be trained and recruited to prevent overpopulated class size and laxity.
5. Science teachers training and development should be continuous to keep teachers abreast of the global trend.
6. The school system should be flexible enough to accommodate the diversity in learners.

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