REPOSITIONING SCIENCE EDUCATION IN NIGERIA FOR SUSTAINABLE NATIONAL DEVELOPMENT

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Abstract

Science education is a catalyst for sustainable national development as a result of its contribution to the material progress of the nations. This paper is on the need for repositioning science education for sustainable national development. Highlight of importance of science education to national development were discussed. It went on to discuss the challenges ahead for the development of science education in Nigerian school system such as; inadequate funding, ill-equipped laboratory, shortage of well-trained science teachers and laboratory technologists, rapid increase of students' population in schools without the requisite facilities, inappropriate curriculum, and poor pedagogy. To improve the state of basic science from its status quo and reposition it for sustainable development in our country, adequate funding, provision of furnished laboratory, regular review of science curriculum, recruitment of more qualified science oriented teachers, as well as appropriate pedagogy were all recommended.

Keywords: Repositioning, science education, sustainable national development

Education is a veritable tool for national development. Globally, education is considered as a human right that should be accorded to all human beings. National Policy on Education states that education is an instrument par excellence for effecting national Development (FRN, 2008). Science education is an applied field which derived its authenticity from the facts that science as a field of endeavour is fundamental to human survival and hence must be seen as the right of every individual to learn. It acquaints students with certain basic knowledge, skills and attitudes needed for future work in science and science related fields.

Science and technology have become crucial factors for sustainable development worldwide because of their contributions to the material progress of nations. Generally, it is accepted that the adoption of scientific frame of mind is a prerequisite for development (Akpan, 2010). Many authors have documented the roles of science education in national development. Okeke (2007) reported that rapid and sustainable development of a country is achieved through scientific research, rational application of science and technology, knowledge and skills. Okoli and Onwuachi, (2009) revealed that science and technology are tools for economic, social, and political development of a nation. It is crucial to note that 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 like Nigeria, are yet to do so effectively (Uwaifo, 2010). UNESCO, (2007); United Nations, (2009), ranked Nigeria a developing country with low economic, social, political, cultural, and technological indicators. For Nigeria to

realize accelerated development in this 21st Century, she needs qualitative science education in her various schools. This can be achieved through restructuring of various aspects of science education.

Concept of Science Education

Science can be defined as a systematic way of acquiring knowledge about natural world (Jande and Dechi, 2007). Erinosho, (2009) defines science as an organized body of knowledge about the world, a set of logical and empirical methods for the investigation and understanding of natural phenomena and an enterprise for the application of scientific knowledge. Science has been, and would continue to be of tremendous importance because of its ability to explain many natural occurrences and the central role it plays in the world's current technology development. There is a symbolic relationship between science and technology. Science, which is a systematic search for truth provides the basis for technology. Science becomes impotent without knowledge and technology does not exist without science.

Science education is a field of study concerned with producing a scientifically literate society. Science education, has over the years gained prominence in the school curriculum worldwide. Igboegwu (2015) identifies the objectives of teaching science to include:-

- Development of basic concepts and principles in preparation of further studies;
- Stimulation of creative mind;
- Creation of basic literacy for functional living;
- Development of essential skills and attitudes towards application of science.

The ability of a country or countries to improve the social welfare of the people is known as national development. The word sustainable development implies that the development should be sustained over a period of time, builds on the present and provides enabling environment for future generations to develop and meet their needs (Okoli and Onwuachu, 2009).

Science and technology hold the key to the progress and development of any nation. Technology which is the product of science plays a fundamental role in wealth creation, improvement of the quality of life and real economic growth and transformation in any society. A developing country like Nigeria needs to advance to a better level by emphasizing science at all levels of education and re-orient the entire society towards scientific thinking. On that note, Egbogah (2012) noted that sooner Nigeria realizes that her escape from poverty is predicted on her investment in science and technology education, the better for her.

Importance of Science Education in National Development

The roles of science education in national development cannot be over-emphasized. Through science education, an individual can become self-employed (Owolabi, Akintoye and Adeyemo, 2011). Science education leads to several scientific fields and professions like engineering manufacturing, mining, and construction industries (Omosewo, 2009). Science education prepares the youths of Nigeria and other nations for fulfilling career prospects and trains their minds for employment opportunities. Science has become crucial factor for sustainable national development. In line with this, Ezeliora, (2005) documented that in a developing country, issues of science and technology education are very important, as it is a means through which the nation can achieve national development.

Science education has made significant progress in agriculture, health, energy, water and environment to alleviate poverty. Advances in scientific knowledge and its application have helped

slow the trends of high infertility, high mortality and led to increasingly better health. Therefore, science has provided the basis for the aggregate improvement in human health, certain scourge diseases have been eliminated, example (small pox) and mortality associated with everyday health-related events and infectious diseases have also been reduced.

Advances in science have facilitated higher yields and greater efficiency in agriculture. Mechanized agriculture, use of fertilizer and other agro-chemicals in the farm, have led to more food production with a reduced labour. Improved knowledge of plant biology and breeding technique have led to better seed and cultivation practices and improvement in herbal medicine. Study of some scientific courses like fisheries and aquaculture has led to entrepreneurship, thereby reducing unemployment. Generally, the problems of mass unemployment, inflation, infrastructural decay, collapse of health and educational services and many others can all be traced to inadequate attention paid to science education.

Challenges facing Repositioning of Science Education

Science education in Nigeria has not been able to rise to its full potential because of several factors hindering its development. Notable authors like Ezenwa (2002); Ezeliora (2005); OECD (2008), have identified problems affecting the teaching and learning of science in Nigerian schools as; poor laboratory facilities, students' and science teacher's attitudes towards learning and teaching of science, poor curriculum, inadequate number of useful and qualified teachers, poor finance to execute projects. However, some of the problems and challenges facing science education in Nigeria are as follows;

Inadequate funding

One of the major challenges facing Nigeria in education sector is inadequate funding by federal, state, and local government. Over the years, education has been inadequately funded in Nigeria in spite of its roles in national development. Due to the low allocation to the educational sector, educational institutions have not been receiving adequate fund for science and technology provision (Uwaifo, 2010). Unfortunately in Nigeria, the low level of funding of schools makes it impossible to properly and adequately equip their workshops, laboratories, studios and classrooms suffice it to say that the necessary facilities needed for effective teaching and learning of science and technology are not adequately available in most Nigeria Schools. This problem is even aggravated by high cost of these equipments.

Poor-equipped Laboratory

Most of the science laboratories in Nigeria schools are poorly equipped. The success of any science subject depends on the provision of laboratory facilities (Owoeye, 2000). Science laboratory plays vital roles in science education as it provides students the opportunity to engage in the process of investigation and inquiry. In spite of these benefits, many schools in Nigeria do not have standard science laboratory, while those available in some schools are ill-equipped for effective science teaching (OECD, 2008).

Shortage of well-trained science teacher and laboratory technologist

The 'teacher factor' is an indispensable determinant in the successful implementation of any curriculum. Achieving qualitative science education depends largely on the effectiveness and

competency of the science teacher in the schools (Ezeliora, 2005). This was confirmed by Animalu (2006) by stating that in most institutions of learning, science is poorly handled because of the dearth of qualified science teachers. This problem ranges from teacher's academic qualifications, knowledge of subject matter, commitment, competencies and skills, of the teacher. This of course does not only lead to poor performance of the students but also leads to low enrolment of the students into science courses. Different scholars (Ugwu, 2008; Asikhia, 2010; Akani, 2012). have shown that teachers are inadequate for science education in Nigeria.

Inappropriate Curriculum

Poorly designed curriculum affects teaching of science in schools. Effective science education requires adequate curriculum content that would be able to address the societal need. Functional education is determined by the quality of the curriculum content and its implementation (Offorma, 2005). Functional science curriculum content needs to be valid, relevant, significant, learnable, consistent with current societal realities of the country, useful and reflect the interest of the learners (Ivowi, 2009). The impediment of science education curriculum in Nigeria are; shortage of indigenous teaching personnel who are competent with sufficient practical experience, overloaded academic context, lack of standard textbooks with local background and foreign based model in terms of equipment and infrastructure (Uwaifo, 2010). Science curriculum that is poorly designed will definitely produce graduate that cannot find job in the labour market (Borisida, 2001; Okebukola, 2001).

Poor Pedagogy

Quality teaching lies on the teacher’s capacity to transform written knowledge into forms that are pedagogically powerful and yet adaptive to the students’ abilities and background (Abdullahi, 2007). Ayodele, (2006) identified the use of inappropriate, non-effective teaching methodology as a major factor hindering students' understanding and achievement in science class. Some of the science teachers teach science in abstraction, thereby making science lesson boring (Onose, Okogun and Richard, 2009). Eligible authors (Ezenwa, 2002, Etukudo, 2005; Omoife, 2012) disclose that science lessons are yet to be structured, guided and students-directed. Students and teachers are yet to be familiar with the use of internet, website, online chat in the classroom which are the current ICT learning materials and paramount for ICT skill acquisition.

Rapid Increase of Students' Population in School without the Requisite Facilities

As the number of students enrolled to study science in schools increases everyday, the facilities in place to cater for the rising population are not readily available in the schools. This is mostly experienced during practical work. The quantity of available specimen and apparatus are nothing compared to the number of students involved in the practical work.

This population explosion has an effect on students' achievement in science education. The number of students has made it impossible for effective practical even in our higher institutions. Some of them do not even see the teachers or the experiment being demonstrated. This made it difficult for teachers to know their students well, understand how their minds work, and know what motivates them or their individual strengths and weaknesses. Okebukola, (2005) lamented on this factor and stated that large class size makes monitoring of students difficult and such overcrowded classroom is already straining existing facilities like lecture room where students stand to receive lecture. Most of

the science teachers do not use Information Communication Technology (ICT) tools like loud speaker, overhead projector which will enable them audibly pass instructions to the students.

These challenges therefore, call for a repositioning of science education for a better and sustainable development in Nigeria.

Strategies for Repositioning Science Education for Sustainable National Development

Despite these challenges confronting science education as discussed above, it is imperative that the quality of science education be improved in Nigeria if the country will breakthrough in this era. For actualization of science education for sustainable national development, the following measures are suggested:

For effective teaching and implementation of science programmes, there should be improved funding of education in general which would guarantee increased funding of science education on which it depends. Both state and federal governments in Nigeria should improve budgetary allocation to science education sector. Government should explore the possibility of partnering with stakeholders and private sectors in the funding of education by donation of money. For instance, federal government should empower the National Science and Technology Fund (NSTF), and direct the science and technology-related establishments such as oil companies, industries to pay a certain percentage of their annual income to the government for promotion of science education in Nigeria.

The government should ensure that more funds are allocated for provision of some basic infrastructure, equipment and materials needed by teachers for quality instruction in schools. The relevant agencies like Tertiary Education Trust Fund (TETFUND) should also monitor the institutions to ensure that funds released for such procurement are properly utilized. Considering the importance of laboratory in science teaching, government should provide the necessary facilities and reagents needed in the laboratory, and employ experienced laboratory technologists who will be assisting the science teachers in conducting practical work. This would help to reduce the work load on the teacher and improve the efficiency of the teaching.

The attainment of goals of science education is largely dependent on the quality of teachers and the level of their understanding of the subject content coupled with the appropriate skills of imparting the knowledge. There should be proper staffing of schools in terms of quality and quantity. Due to dynamism of knowledge and continuous change in scientific concepts, there is need for proper training of the teachers at all levels and engaging in professional development through;

- Conferences, seminars and workshops on current trend in science and technology.
- Scholarship for further study
- Grants for research into innovative teaching and learning processes.
- Training on the use and application of technologies like smart board, projector, in teaching and learning of science.

Appropriate pedagogy should be adopted by teachers. Science should be taught based on our culture, drawing examples from our local environment. Good practices for effective implementation of inquiry-based science education must be identified and properly implemented. The teaching and learning of the science requires the use of discovering approach, inquiry as well as innovative methods that stimulate students' interest. Science teachers should be encouraged to integrate technological tools into their teaching to follow suit with the global crusade. This can be done through exposing the students to technological equipment such as internet, online media, computer software and multimedia presentation. Opportunities to enrich teachers' practices and competencies through in-

service training, conferences, seminars and workshops should be provided on a regular basis to help them keep abreast with recent developments in the field of science and broaden their knowledge of subject matter.

There is need for regular review of science education curriculum. Those aspects that are too lengthy should be reduced and pave ways for the current trend in science education. Emphasis should be laid on entrepreneurial subjects to enable students prepare for labour market, also be self-employed after graduating from school.

Conclusion

Science education has been discussed as a means of repositioning education for further sustainable development in Nigeria. It is pertinent to note that development can best be achieved when concerted effort is made by government in areas of science education. If Nigeria is to develop and build a self-reliant nation, emphasis has to be made continually on the development, growth and restructuring of science education in our school system.

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