CHALLENGES AND PROSPECTS IN THE TEACHING OF BASIC SCIENCE AT THE UPPER BASIC LEVEL IN NIGERIA

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Abstract

The position of Basic Science as the bedrock for all science subjects in the senior secondary school has led to its inclusion in the school curriculum. This paper has discussed the evolution of Basic Science as a replacement to Integrated Science as well as its objectives. The paper also x-rayed the importance of Basic Science and the challenges facing its teaching such as challenges of basic science teachers, lack of motivation of teachers, lack of interest among students, medium of instruction and lack of infrastructure among others. Recommendations which if properly effected would enhance effective teaching of basic science have also been discussed.

Basic science formerly known as Integrated Science is the first form of science a child comes across at the secondary school level. Basic science is a core subject in the National curriculum at the upper basic level (Kim, 2008). All students from upper basic I-III classes must offer and study the subject. Basic science is considered the bedrock of all science subjects at the senior secondary school (SSS) level. The subject prepares students at the upper basic level for the study of core science subjects (biology, chemistry and physics) at the senior secondary school level (Olarewaju in Oludipe (2012).That is why Oludipe (2012) further emphasised that for a student to be able to study single science subjects at the senior secondary level successfully; such a student has to be well grounded in Basic Science at the upper basic level. Based on this, it is

generally taught as a single science subject, until in the SSS level, and then split into specialized science subjects (biology, chemistry and physics). It is expected that those students who achieve well in basic science should be given the opportunity to study the separate science subjects at the SSS level.

According to Trustees of Princeton University (2013), Basic Science is a revolutionary new introductory science curriculum developed at Princeton intended for students considering a career in science. Basic science emphasises scientific literacy and research oriented learning (Eyles, 2009). The subject encourages exploration of student's immediate environment. As a result, basic science teachers continue to learn along with their students. The teaching of basic science is therefore, based on the philosophy of active learner-participation in the process whereby, students are encouraged to learn by constructing their own knowledge based on what they already understand as they make connections between new information and old information, guided or facilitated by the teacher (Piaget, 1956). Under this philosophy, students are encouraged and led to discover concepts and generalizations based on their experiments. Akinmade (1996) in his research rightly pointed out that, when children learn science using the process and activity approaches, they improve their ability to apply intellectual skills to solve problems, improve their language development, become more creative, master science content better and develop positive

attitude towards science and scientists. Research by Bello (2007) has shown that the above desires are not being achieved as expected. The learning environment is expected to be democratic, the activities are interactive and student-centred and the teacher facilitates the process of learning in which students are encouraged to be responsible and autonomous.

Though the curriculum of basic science specifies "hands-on" and "minds-on" activities and skill acquisition, most students are not exposed to these real situations in the schools (FRN 2004). Emaikwu (2012), in his research discovered that basic science is generally taught using conventional strategy which does not follow the theories put forth by Kolb (1984) and the theory of learning process. The problem therefore is; what are the challenges that confront the effective teaching of basic science at the upper basic level? This directly leads to the following questions which form the basis of this discussion.

1. How did basic science education evolve?
2. What are the objectives of basic science?
3. What is the importance of basic science in everyday life?
4. What are the challenges confronting the teaching of basic science?
5. What are the prospects in the teaching of basic science at the upper basic level?

How did Basic Science Evolve in Basic Education

Basic science is a concept in science teaching in Nigeria that came to replace integrated science. A study by Chukwuneke and Chinkwenze, (2012) revealed that the scientific, vocational and technological aspects of education are not effectively implemented in the school system. Based on this, basic science curriculum review became a necessity. This led the Federal Government of Nigeria to take the decision to introduce the 9-year of basic education and the need to attain the Millennium Development Goals (MDGs) by the year 2015 together with the need to meet the critical target for the National Economic Empowerment and Development Strategies (NEEDS), summarized as follows; value reorientation, poverty eradication, job creation, using education to empower the people among others (FRN 2004).

As documented by Chukwuneke and Chinkwenze (2012), it became necessary for the existing curriculum for the upper basic level to be reviewed, restructured and realigned to fit into the 9-year basic education programme. With this, the National Council on Education (NCE) therefore in her meeting in 2005 directed the NRDC to ensure the review which also approved the new curriculum. This restructuring and curricular review took effect from September 2007 (Duada & Udofia, 2010). It was during this restructuring and review of curricular that basic science replaced integrated science.

During this time, human rights education, family life, HIV/AIDS education, entrepreneurial skills, globalization, ICT were fused into the 9-year basic education curricular (FRN 2004) while the following themes were fused into the Integrated Science curriculum to form the Basic Science curriculum:

- Environmental education
- Drug abuse education
- Population and family life education
- Sexually transmitted infection (STI) including HIV (FRN 2004)

Basic science is basic training in scientific skills which are required for human survival, sustainable development and societal transformation (Chukwuneke & Chinkwenze, 2012). Basic science is expected to make Nigerians scientifically literate.

Objectives of Basic Science

There are various objectives of basic science as identified by Bilesanmi-Awoderu & Oludipe, (2012), which are the reasons for which Nigerian government started Basic Science teaching in Nigerian upper basic level:

i. Basic science provides students at the upper basic level, a sound basis for continuing science education in single science subject.
ii. It enhances the scientific literacy of the citizenry.
iii. It allows students to understand their environment in its totality rather than in fragments.
iv. It allows students to have a general view of the world of science.
v. The processes of science serve as unifying factors for the various science subjects.

Importance of Basic Science in Everyday Life

The importance of basic science in everyday life can never be over emphasised. It serves as the bedrock which provides the required training in scientific skills to meet the growing needs of the society. It is the fundamental knowledge acquired through basic science at the upper basic level that leads to the transformation of the world through dramatic advances in almost all fields including medicine, engineering, electronics and aeronautics among others (Guyana Chronicles online, 2009).

The application of scientific knowledge acquired through basic science, as reported by Guyana Chronicles (2009) that helped many countries like China and India to transform from poor feudal type economies to become economic and industrial power houses and in several ways compete effectively with developed countries. Basic science is of great importance because early experiences in science help students to develop problem-solving skills that empower students to participate in an increasingly scientific and technological world (Guyana Chronicle, 2009).

Basic science is the type of science which provides unique training of students in observation, reasoning and experiment in the different branches of science; it also helps students to develop a logical mind (Prakash, 2012). Basic science enables students to be systematic and enables them to form an objective judgement. Basic science, if taught according to its philosophy, equips students with the necessary introductory scientific and technological knowledge and skills necessary to build a progressive society. This forms the bedrock on which scientific and technological studies rest, Adejo and Idachaba in (Ochu & Haruna, 2014)

Challenges Confronting the Teaching of Basic Science in Nigeria

Though Basic Science has been of great value both to individuals and society globally, students have been performing poorly in the subject especially in Benue State (Ochu & Haruna, 2014). This poor performance might be because of the following challenges:

- **Basic Science Teacher Challenge**
The teacher as the curriculum user has been identified as the most important factor in curriculum delivery. His/her level of competence and teaching strategies is very important. It is because of this that a lot of blames on the poor performance of students in basic science have been put on the basic science teachers. Ogunleye (1999) and Balogun (1995) in their research gathered that teachers agreed that students should be actively involved in the teaching-learning processes, but this is not reflecting in their teaching. In most cases lecturing, note-giving and taking predominate their lessons. Ogunleye in his study found that many science (Basic science inclusive) teachers are deficient both in academic and professional

aspects of their education. As a result they find it difficult to facilitate basic science students to construct their knowledge because the use of constructivist based strategy is time-consuming; it requires intensive planning and dedication on the part of the teacher.

Many basic science teachers cannot guide their students to apply what they learned in the classroom to real life situation. They ignore this aspect completely, it has been observed that some science teachers (basic science) lack training in instrumentation to enable them to detect and repair faulty instruments (Ogunleye, 1999). Many basic science teachers are not yet computer literate. Many basic science teachers are hardly creative in terms of exploring the environment for the purpose of identifying and using resources for teaching basic science. Instead they bombard these students with facts using lecture method and overload the students with copying notes and assignments. Most basic science teachers are not dedicated to their jobs. This could be as a result of the issue of salaries.

The issue of salary is a peculiar challenge, where the income is insufficient to live reasonably, teachers are no longer motivated to teach, some teachers lack interest in the job, which can lead some to leave the profession (Danmole, 2011).Lack of motivation occurs as a result of lack of salaries. Danmole (2011) observed that teachers of basic science in Nigeria are ill-motivated and often of low morale. It is interesting to note that teachers' salaries are not adequate and not paid on time. Teachers do not enjoy regular promotions as at when due. It is because of this that Hamza and Mohammed (2011) lamented that this situation is not supposed to be the case because of the role and importance of the teachers, especially in basic science where good teaching should take place in order to produce quality students that could pursue higher education in future.

Wasagu in Wushishi and Kubo (2011) identified some factors that pose challenges to the teachers of science (basic science) to include adequate exposure to teaching practice, poor classroom management and control, poor computer skills, inability to communicate effectively, lack of self reliance, entrepreneurial skills and poor attitude to work.

- **Students**

One of the most striking challenges in the teaching of basic science is lack of interest in basic science among students. It is well known that learning is an activity which the learner must personally engage in (Ivowi, 1999). And in order for success to be achieved, the students must develop interest in the activity. This lack of interest in science (Ivowi, 1999) causes students not to make efforts for learning to occur. They develop negative attitude to science learning. This poses a big challenge to the successful teaching of basic science.

This students' negative attitude to science learning, according to Ogunleye (1999) may be due to the fact that teachers are not satisfying the aspirations of students. This could be due to the abstract nature of science concepts which cannot easily be assimilated if their teaching is not in the constructive way.

- **Medium of Instruction**

Communication is the medium of instruction in the teaching of basic science. On this issue, it is observed that many science teachers cannot speak fluently or loud nor express themselves clearly. This makes students to get more confused and lose important information and consequently dislike the subject. Eriba (2004) supports this expression where he said that inexperienced teachers always sound complicated above the comprehension of the students during their lesson delivery.

- **The challenge of infrastructure:**

The issue of non-availability of infrastructure in Nigerian schools is a great challenge to the teaching of basic science at the upper basic level. The modern system of education (basic science) in Nigeria today is the one that is to equip students with knowledge and skills to strive well in the present society. It has been reported that the present infrastructure in all levels of the education system, (upper basic level inclusive) is a mockery of vision 2020 and Millennium Development Goals (MDGs) (Wushishi & Kubo, 2011). The authors in their report further stressed that Nigerian schools lack classrooms, laboratories and other modern structures necessary for effective teaching and learning of basic science concepts.

Inadequate supply of infrastructures jeopardises the effective teaching of basic science. Insufficient supply of electricity power generation is the major problem for most of the schools, especially where there is no stand-by generator. Electricity that would have been used for the equipment in the laboratory or workshop for effective use of electrical equipment is not readily available (Odu, 2011).In the same vein, Aderounmu (2006) also observed that lack of facilities and teachers were some of the factors contributing to poor performance of students in science (basic science).

Due to lack of materials and infrastructure in Nigerian schools, it has been observed that in most schools candidates who enter for science subjects enter the laboratories only when their schools got instructions for practical examination bodies (Aderounmu, 2006). The author further lamented that even the teachers of these subjects including basic science did not know the use of most laboratory equipment and chemicals until the practical examination.

Recommendations in the Teaching of Basic Science

Based on the above discussion, the following recommendations to ensure the effective teaching of basic science are made;

1.   Teachers of basic science should be trained and retrained to enable them to be abreast with the use of constructivist-based teaching strategy. This capacity building should be systematic and continuous through the organisation of basic science seminars, workshops, orientation courses; this will help basic science teachers to facilitate learning instead of lecturing during teaching.

2.   Basic science teachers must be supported by timely supply of teachers' guide, and handbook for effective teaching of basic science.

3.   For effective teaching of basic science, stakeholders and government need to build well equipped science laboratories for each school. Basic science teachers should be supported financially and encouraged to be computer literate.

4.   Basic science teachers should be highly motivated. To achieve this, prompt and regular payment of salaries and promotions as at when due must be ensured. For this can boost their morale and cause them to produce quality students. The issue of science allowances for science teachers should also be revisited.

5.   It is vital that teachers of basic science should increase the interest of students in science by introducing constructivist-based teaching strategy where students are exposed to construct their own knowledge. With this, students would no longer view science as something abstract but something that should be connected to real-life.

6.	The use of simple words to explain the most complex concepts during lesson delivery in basic science should be encouraged.

7.	For effective teaching of basic science, the use of instructional materials that are found in the learners' immediate environment should be encouraged; for this would facilitate the student to understand those concepts that seem to be complex to understand.

8.	Experienced basic science teachers should be delegated to take part during curriculum decision-taking. This would enable basic science teachers to see their science teaching profession as an enterprise in which they can exercise their creativity.

9.	For successful teaching of basic science, the teachers should increase the use of out-of-school/ outdoor activity in the teaching of basic science. This encourages exploration of immediate environment for the teaching and learning of the subject.

Conclusions

The position of basic science as the bedrock for all science subjects in the secondary school cannot be overemphasised. The challenges facing the teaching of basic science have been identified as lack of motivation of teachers, lack of interest in basic science among students, medium of instruction and lack of infrastructure among others, the prospects of basic science will be achieved if the following are implemented such as regular training and retraining of basic science teachers, timely supply of teachers' guide and handbook for effective teaching of basic science, provision of well equipped laboratories and motivation of the basic science teachers, through regular payment of salaries and science allowances among others.

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