MAJOR ISSUES IN NIGERIAN PRIMARY EDUCATION PROGRAMME: IMPLICATIONS FOR SUSTAINABLE SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT

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Abstract

Nations all over the world, whether developed or developing, have in recent time recognized the significance of science and technology education in their development. This recognition is predicated on (he belief that the nation's industrial and technological development can best be actualized through effective teaching and learning of science at the grassroots level.

This paper examines major issues in Nigerian primary science education programme with the intention of ascertaining how the emerging issues arc affecting the national goal of achieving sustainable scientific and technological development through science education, the paper also proffers recommendations on how to redress these emerging problem areas.

Introduction

One area in which there has been a lot of curriculum development activities the world over, has been primary school education. University teachers complain about the entrants to the universities and point fingers at the secondary school teachers. The secondary school teachers complain about entrants to secondary, how inadequate their preparations have been and they in turn point fingers at the primary school teachers (Bajah, 1982). The National Policy on Education (1981) aims at bringing about a revolution in our educational system. This means that already a political will has been manifested. The policy is emphatic on promoting science. Improving science education has to start at the grassroots, thus, the philosophy 'catch them young' for science. According to the policy, in order to lay a sound basis for scientific and reflective thinking, as well as development of manipulative skills, science education should amongst others enable the child to:

- Observe and explore the environment.
- Develop basic science process skills.
- Develop a functional knowledge of science and science concepts and principles,
- Explain simple natural phenomenon.
- Develop a scientific attitude, including curiosity, critical thinking and objectivity.

The above attributes relate to scientific problem solving procedures (Akubuilo, 1995, 1997). The essence of science teaching, among other things, is to enable the learner develop scientific concepts for problem solving. Scientific and technological development has their basis on the problem solving ability of beneficiaries of science education at the primary, secondary and tertiary levels of our educational system.

The problem of under-enrolment in science related courses and the general dismal performance in, especially, the physical sciences (lvowi, 1999) is, an indication of a malaise at the foundational level of science learning, which is the primary school. In a bid to improve science teaching and learning, Peacock (1995) compared the primary science curricula of fourteen (14) Asian and Pacific countries, and eight (8) African countries, lie concluded that (here were problems in the teaching of primary science, and these problems cut across many of the countries. Previously Rosier (1990) found that Nigeria primary school performed poorly in science. Jegede (1996) observes that the unsatisfactory performance of students in science is as a result of poor leaching methods, lack of incentives, salary, laboratories and other leaching materials as well as too much teaching loads for the teachers.

Jegede (1996) argues that if Nigerian children do not have excellent understanding of science concepts, achieving the goal of scientific and technological growth will continue to be a mirage. T he question is: flow can the Nigerian child understand science concept? The

science curriculum must be part of our culture. This is because science is an integral part of mans daily activities in the society. Therefore the knowledge a child acquires in the process of "doing" is a product of the "activity context" and culture in which it is developed and used. Cosson (1993) feels that children should be

given the opportunities to experience science by doing science, using varieties of learning resources such as charts, models, pictures, audio and visual materials, audio-visual aids etc. The sole u the emphasis on science at the primary school level as Bajah (2002) opined in his book "Scicncing with children: A solid foundation for our future scientist" is for education in science to help children to develop the understanding and habits of mind they need to become compassionate human-beings, able to think for themselves and face life head on. Science at this level should also equip children to participate thoughtfully with fellow children and citizens in building and protecting a society that is open, decent and responsible. Children, we are often reminded, are the leaders of a greater and challenging tomorrow. To this effect, the primary science programme, which lays the requisite foundation in science and technology for the Nigerian children, must be well articulated. When science teaching and learning is faulty at this level, the implication for sustainable national development are far-reaching.

Issues In Nigerian Primary Science Programme

The overall aim of primary education is to produce a scientifically and technologically literate citizenry that is capable of faking responsible decision about crucial problems and issues and taking personal action that can bring about development in the society. It is necessary that the primary science programme, which is the child's first contact with formally presented science, be well articulated. Major issues, which require serious attention, therefore include:

Training of Primary Science Teachers

The training of the primary science teachers came to the forefront because it would sharpen subsequent discussion on the issues in the implementation of the primary science education programme. By the late 1960s and early 1970s, the Teachers Grade II certificate awarding colleges were the major source of training teachers for the primary schools. The government at this time had realized the crucial need of the teaching of science at the primary school level, but the study of science by pre-service primary school teachers remained optional until 1986 when a pass in integrated science was made compulsory for the award of TC.ll certificate. Consequently, with the seeming abstract nature of science, especially for students most of whom are without previous background in science, most primary school teachers who qualified before 1986, avoided the study of science in training. A large proportion of these pre-1986 TC.ll holders are product of Universal Primary Education (UPE) "crash programme" - a good number of whom are school dropouts that got into teacher training colleges form their market stalls and farms, and who therefore had no previous knowledge of science. In other words, most of the currently serving teachers in our primary schools have no adequate knowledge in content and methodology of science even though the leaching of science in primary school is compulsory to them. Whether this calibre of teachers will be able to lay the foundation for a comprehensive qualitative science education for the nation is indeed doubtful.

Most of our teachers (even the after 1986 group) feel they lack the formal knowledge and confidence to teach effective science. And so, if they must teach science, they approach it with fear, praying that no one look over their shoulder in the process of teaching. Because of the lack of confidence, the science taught is second best, lacking all the challenges which science can pose to any one, especially children. Such teachers perceive science as difficult, complicated, dangerous, uninteresting, requiring a laboratory before it can be taught. While some science educators have classified the above perceptions as misconception (Ivowi and Oludotun, 1984), especially when the science in question is meant for children, there are still prevailing views, and according to Okebukola (1998), that we should all join forces to break down such barriers that prevent good science teaching and learning. Science in general should be rightly perceived as a way of finding out information about

Primary Science Curriculum:

The present primary science curriculum was developed by a panel of experts in science education pooled from ministry the everyday things and happenings around us, in our environment.of education, universities, colleges of education and the Nigerian educational research and development council (NERDC). From the point of view of the calibre of designers, the primary science core curriculum can be regarded as adequate. For each of the topics in the curriculum, corresponding relevant activities, equipment/ materials and evaluation approach arc

recommended. The essence of this addition is "to make the curriculum explicit and easily comprehensible to the average Nigerian primary school teacher (FME, 1984). In spite of the effort in ensuring good quality and easy use of the curriculum, it is evident that many primary school teachers are not familiar with most of the topics (Ezc, 1995). Such teachers, he maintains, rely on the science programme in the old diaries/scheme of work, some of which may have remained in the school for 20 years as the source of science they leach.

This implies that the content of primary science taught by most teachers is obsolete and thus defective considering the recency of the development of the current primary science curriculum and its subsequent revision over the years. So long as the primary science content is defective, the entire science education programmes at other higher levels are bound to be similarly affected. Thus, the dream of achieving qualitative science education that will lead to production of scientifically and technologically literate citizenry capable of taking responsible decisions about crucial problems and issues may become utopian.

The truth however is that the concept of curriculum in all fields not just science is always changing because human society and its problems, which the curriculum serves are constantly changing. This being the case, it is clearly useful to always prepare teachers who are the implementers of a new curriculum for the change. Some of the ways of re-training the in-service teachers arc through training workshops, demonstrations, seminar/ conferences as well as short/ part time training programmes. The question is, how many of these in-service teachers are encouraged by their employers to undertake these re-training programmes.

Teaching Strategies Employed by Primary Science Teachers

Science teaching requires a special approach known as the scientific method. The method according to the National Policy on Education (1981; 18) stipulates that primary science teaching "de-emphasizes the memorization and regurgitation of facts, encourages exploratory and experimental methods. This implies learning through activity. Science when taught with the activity/ inquiry approach encourages retention and transfer of facts learnt.

In practice, the method favoured by primary school teachers in the teaching of science seems to be that de-emphasized by the national policy on education (Bajah, 2002); Abdullahi (1980) observed that by their training, primary school teachers lack the skill in observational, practical, investigation and inquiry aspects of science. Similarly, Oguniyi (1981; 120) refered to the style of teaching primary science as "mainly informational and memory question". Eze (1995) observed that evaluation of science teaching in our primary schools is often by use of objective test items- while assessment of practicals, of experiments or projects are rarely used. The use of this simple approach, apart from its known shortcomings in assessment, assesses mainly the lower cognitive outcome and thus is unsuitable for the affective and psychomotor evaluation of primary science outcome. Implied from the above therefore is that the method of teaching and evaluation of science in our primary schools falls short of the expected objectives of the science education programme.

Improvisation in the Teaching of Primary Science

Improvisation has been seen in many ways. It is important and interesting to note that some scholars in Science Education, Maduabum (1996), Fajola (1992) and Eyetsemitan (2000) among others, have examined the meaning and need for improvisation of science teaching equipment and materials. Maduabum (1996) asserted that improvisation in teaching and teacher education refers to the act of using alternative materials and resources to facilitate instruction whenever there is lack or shortage of specific first hand giving aids. Fajola (1992) described improvisation from the levels of creativity involved. These levels are use of mere substitutes, creation of substitutes and original creation. The substitute is expected to take the place of the real or original material with as high precision as time, money and other facilities and factors permit. Eyetsemitan (2000) describes improvisation as something concrete, tangible representation of an existing physical object or an abstract phenomenon, often so called concepts.

The facilities **for the teaching of primary science in schools are in very short supply. It is therefore obvious that for** primary science to be taught as a practical subject as it is meant to be, then improvisation has to be the other of the day. In line with this, Cifat and Hill (1996) in Eyetsemitan (2000) assert that one should r ' ' wdr at the paucity of available equipment and money, but that

science teachers should rather use their skills to improvise equipment for as wide a variety of practical exercise as possible. In Nigerian primary schools, improvisation is necessary when we consider the inadequacy of science teaching resources: grossly inadequate school finances, most especially for the purchase of science equipment; galloping inflation; rising enrolment of pupils; general downward trend in the nations economy; poor maintenance culture and at times, attitudes of some school heads towards science and science equipment supply. The question is, has our teacher education, especially at the TC.ll level, provided our science teachers with the required ability for creativity, curiosity and adventure required for effective improvisation? The answer obviously is No. It seems therefore, it is training in the acquisition of such skills and attitudes that all agencies generally interested in producing effective science teachers ought to invest in.

In-service Programmes in Primary Science

An effective and efficient practice in every profession demands frequent participation in in-service programmes. In most cases, these arc organized by the professional associations or by the government for practitioners in a given profession. Programmes as these provide fora for the practitioners in the same profession to up-date their knowledge with respect to innovations in their profession. In addition, problems encountered by the practitioners are presented and possible solutions collectively sought.

Unfortunately, in-service programmes seem to be a neglected feature of primary school teacher education programme in Nigeria. What appears to be a professional association for Nigeria primary school teachers, the Nigeria Union of Teachers does not seem to address itself to such activities as the organization of conferences, seminars and workshops as the government appears to be nonchalant over such programmes. Without any source of such in-service programmes; the .quality of teaching of the primary school teachers becomes highly reduced in terms of the currency of fact. This is more grievous in science considering the rate at which the scientific innovations, which ought to affect the content and methodology of science education at all levels, including the primary, are evolving.

Implications For Sustainable Scientific And Technology Development

The primary school level is the foundation of formal education. Without sound science education, which provides the basic elements of the latest science and technology ideas, it will be difficult for children to pursue secondary science and technology education. Curriculum development and leaching should be geared towards preparing a child to live a useful life for himself and the society. Since science education is one of the weapons for leaping into the unknown, and maximizing potentials for empowering the people towards bettering their lots, attention has to be focused on that vital facet of education.

Efforts at science/ technology education curriculum development in Nigeria are rife but if these efforts will have meaningful impact on sustainable national development, certain issues have to be revisited. The curriculum content of science and technology for this millennium has to reflect completely the current capabilities, handicaps and needs of the learners with reference to changing society. The curriculum contents should help the learner come to terms with the realities of his environment and the problems that need to be solved for life and survival. This means that in addition to enabling the learner acquire life long skills, it will also help re-orientate their frame of mind towards national development.

Knowing fully that scientific and technological knowledge are imparted through science and technology education whose two main aims are those of the production of the scientifically literate society and the development of potential science and technology manpower, a well concerted and structured science and technology curriculum will fail if those to implement it at the grassroots level are not adequately prepared to move with the changing trend. Science teacher education should prepare teachers to teach students how to access, interpret and use information they encounter more so now that we are in information and communication technology age. The realization of quality science and technology education lies in placing high premium in the professional development of the science teachers to be recruited (Baike, 2000). Such teachers, he feels, should be guided by attributes and ethics such as honesty, curiosity and perseverance.

The use of local materials in our immediate surroundings or communities in the teaching and learning of primary science are indispensable to good science teaching. In fact, improvisation gives knew concept of things outside the change of ordinary experiences to the learners and makes the learning last long in them. Learners' interests are stimulated when improvised materials are used effectively. Improvisation provides very rich visual experiences, to the learners, affording them the opportunity of exploring their creative ability and imagination by touching and manipulating the materials during their production and use. With inadequate finances for purchase of science equipment, the galloping inflation and the general downward trend in the nations economy, improvisation allows for minimization of cost and provision of inexpensive method of widening the scope of inquiry, thereby ensuring effective teaching and learning of science and technology in our primary schools. Therefore, the primary science teachers will be willing to improvise teaching material with their students.

Conduct and dissemination of results of educational research in primary science is another area that requires serious attention if education in primary science will be sustainable in scientific and technological growth of the country. The attention in primary science is due to the fact that by their training, the primary science teachers can hardly carry out any research directed towards investigating problems emanating from classroom or reporting such in professional publications. The NUT as professional body and the government are not helping matters by not organizing in-service workshop and seminars to upgrade the level of operation of the science teachers. In view of the rate of development and changes in social values occasioned by advances in science and technology, the likelihood of primary science education programme without adequate research efforts on one hand and appropriate in-service training on the other, becoming qualitative as to result in sustainable scientific and technological development is vague.

Recommendations

For the Nigerian primary science education to result in sustainable scientific and technological development, the following recommendations are sine-qua-non:

1. The National policy on education stipulates that Nigerian Certificate in Education (NCE) should be the minimum qualification for entry into teaching profession in Nigeria. Many Colleges of Education and NCE awarding institutions do not offer specialization in primary Education, knowing full well that the bulk of teachers they produce will end up leaching in primary schools. Primary Science/ Integrated Science should be made compulsory for all students specializing in Primary Education.
2. Curriculum offerings in primary science should incorporate modern technologies, taking cognizance of global integration and the acquisition of global experiences in science and technology. Learning by doing (activity method) is the effective method to develop global skills. Nigeria endeavors should not end with development of dynamic science curricular at the various levels. For such curricular to be effective and equip the people for sustainable development, implementation strategies will have to be taken seriously.
3. Curricular development efforts in Primary Science should be backed with current and suitable resources. Apart from the conventional laboratory equipment and materials both acquired and improvised, library and reading materials should be provided. The Internet offers a new pattern of globalized electronic contact, which operates at a very fast rate to consolidate learners' access to current information. A lot of new demands will be placed on tbe primary science teachers, which means revisiting equally the curriculum of teacher education to equip the teachers with new skills and also take care of their personal social development.
4. For in-service teachers, appropriate re-training programmes need to be put in place by the government/professional bodies and attendance to such courses made mandatory for primary science teachers. Schools can also on their own organize in-house training (workshops/seminars) for primary science teachers. Such workshops should appropriately use the right resource persons.

Conclusion

Science and technology involves people in searching, investigating, inquiring and seeking Veritable knowledge which results in new discoveries, insights and information. The primary science

curriculum, which is the child's first formal contact with ideas in science and technology, should reflect this ever emerging new scientific and technological information.

Methods of presentation of science and technology education to the pupils have a lot of influence on attitude towards the subject. Primary science teachers both pre-service and in-service should be prepared to be able to face the challenge of making their subjects attractive by bringing the principles and practice to the level of understanding and physical realities of the pupils through the use of various activity oriented methods of teaching.

Research, special methods of evaluation and techniques of improvisation of equipment and materials in primary science should be an integral component of the science curriculum taught to both the pre-service and in-service primary school teachers. The sole aim of these efforts is to ensure that primary science education results in sustainable scientific and technological development of the nation.

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