SCIENCE EDUCATION CURRICULUM: RETROSPECT, NOW, THE FUTURE, PROBLEMS IN NIGERIA

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ABSTRACT

The paper examines the position of the science education curriculum in the Nigerian context. These include the place of the science curricula in retrospect, what it is like in the present dispensation and what is expected in the near future. Efforts were made to identify the existing problems in association with the science education curriculum in Nigeria. Among other bodies that has helped to promote science education curriculum are the Science Teachers Association of Nigeria (STAN) and the Nigerian Education and Research Council (NERDC) whose responsibilities has been that of providing in-service training in science, workshops, research and that of scientific equipment to promote the science curriculum in Nigerian Secondary and Primary Schools. Some of the problems highlighted include inadequate science text-books, qualified professional science teachers, funds etc. The paper revealed that despite the existing problems, there are still same prospects as far as the science education curricula were concerned. These prospects can be identified in the present status of science education curriculum today. The paper also suggested what the science education curriculum should be like in the future.

INTRODUCTION

Science education in Nigeria, according to Ivowi (1997) has undergone strains and stresses. The efforts so far made can be witnessed by the co-operative arrangement between the Science Teachers Association of Nigeria (STAN) and the Defunct Comparative Education Study and Adaptation Centre (CESAC) now merged into the Nigerian Educational Research and Development Council (NERDC). These bodies heralded the first national effort at science curriculum development to improve science education in Nigeria in 1968. This led to the emergence of two major projects, the Nigerian Secondary School Science Project (NSSSP) and the Nigerian Integrated Science Project (NISP), These were later followed by the National Project Science and Mathematics Project (NPSMP). They, thus provided a science curricula that took care of the primary and secondary schools in Nigeria.

The innovations introduced by these projects centred on the integration of theory and practical in the student - activities - based science curricula for schools. Two major undertakings were embarked upon in order to ensure success. The first was a massive in-service training of science teachers through the annual long vacation science courses and the master trainers' courses organized at different centres in the country. It was intended that the master trainers would organize similar training courses at state and local government levels to produce a multiplying effect. The philosophy, objectives and content of the curricula as well as improvisation featured most at these courses.

The second undertaking was the development of a standard list of science equipment, as the minimum required for the teaching and learning of science in schools. The prevailing inadequacy of science equipment in schools and the in-service training courses which stressed on improvisation, the federal government set out to establish two science equipment manufacturing companies at Enugu and Minna. State and private companies also established outfits to produce the needed science equipment for use in schools (Ivowi, 1997).

Government made policies aimed at encouraging science teaching and learning at all levels. Despite concerted efforts employed to boost and improve science education particularly at the secondary school level, research in science education however have shown very few studies in science teaching and learning difficulties. These are issues that need to be properly

addressed in order to ensure progress in science education in the next millennium (Ivowi, 1990 &Ogunleye, 1994).

In this paper, discussion will focus on curriculum for science teaching in retrospect, the curriculum now and the future, problems and prospects in the next millennium.

CURRICULUM FOR SCIENCE TEACHIGN IN RETROSPECT

Government of the Federal Republic of Nigeria had made some frantic efforts in the area of policies as well as material and human resources in science education.

The government policies on science education have been satisfactory. Presently science is taught at all levels of education - primary, secondary and at the tertiary level, as general studies for all students. This is compulsory both at the primary and secondary levels.

As a part of government policy, materials needed for science teaching and learning are made available in schools. In this regard, science equipment was standardized to ensure that a list of minimum equipment for school science was available to every school. From this, schools based their requirements in furnishing their laboratories. At the same time, the federal government established science equipment manufacturing companies at Enugu and Minna. That at Enugu is already in full production. Some states and universities also have centres that produce science equipment. Examples include Plateau and Enugu, and the University of Ibadan and Delta State University. To add to these are other private companies that already manufacture some science equipment in Nigeria. Notable among them is the Naafco and Labstock at Ota, and Finlab in Lagos. All these are efforts geared towards ensuring easy access to facilities for the teaching and learning of science education in Nigeria.

The provision of enough science equipment for use in schools is still a problem despite the efforts so far made. Apart from Federal Unity Colleges and Private Secondary Schools most of our secondary schools still face the problem of inadequate science equipment. In many cases too, laboratory infrastructure are far from satisfactory. The problem has been compounded by the excessive cost of supply of science equipment.

Besides, the provision of science equipment, the preparation of personnel for science teaching and learning, have taken place under the pre-service and in-service training scheme. To add to these, government established colleges of education, polytechnics and universities to engage in training of teachers to provide professional manpower for science education. Other professional associations, notably the Science Teachers Association of Nigeria (STAN) had provided in-service training for science teachers. It also organizes annual national workshops for science teachers in the various science subjects in addition to teacher vacation courses organized by both federal and state governments. These in-service programmes are known to provide insufficient needs of science teachers.

The National Teachers Institute (NTI) has as one of its responsibilities of providing in-service centres for the training of science teachers for the continued professional development of teachers. But unfortunately, other functions it engages itself with tend to subsume this noble objective. And that has to do with the upgrading of primary school teachers and Nigerian Certificate in Education (NCE) by distance learning system. The annual science vacation courses organized by the Nigerian Education Research and Development Council (NERDC) through 1976 - 1984 could not maintained despite its usefulness. Efforts to revive the scheme in recent years have been met with difficulties owing to high cost of running such a programme.

THE SCIENCE CURRICULA NOW AND FUTURE

Since 1968, the science curriculum has received good attention. Areas where achievements in science curriculum have been made include philosophy, objectives, content, method and evaluation (Odunusi, 1993; Oraiifor, 19933 and Obioma, 1993). Since then in the school system, the philosophy of science education appears to be very apt and appreciated. Learners are to "do" science and not just "read" science. Since then theory and practical has been the fundamental approach in the teaching and learning of science. This has paved the way to creativity and contribution towards improvisation of science equipment where there are inadequacies. Our science programme has been student activity based with a suggested guided discovery method of instruction. The various curriculum development documents of STAN

and the defunct Comparative Education Study and Adaptation Centre (CESAC) and the Nigerian Educational Research Council (NERC) now merged into the NERDC amplify the details and rationale of this stand. Various reviews of the science curriculum projects have maintained this philosophy.

The objectives of science education have been also articulated and maintained. These include the following:

(1) Basic literacy for functional living in;
(2) Basic concepts and principles as a preparation for further studies;
(3) Essential skills and attitudes as a preparation for application of science for development;
(4) Stimulation of creativity.

These objectives or elements have permeated the entire subjects of biology, chemistry, physics and mathematics at the senior secondary school and integrated science at both primary and junior secondary schools.

The structure employed involved the conceptual approach to content selection and the thematic approach for integrated science. The advantages of each approach have been documented in Ogunniyi, (1985) and Ivowi, (1995). For content organization, the spiral approach has been retained since its inception. As explained in Ivowi (1995), the concepts which permeate the entire content are organized in definite sections because of the few number of major concepts and the need to improve spiral organization of selected content. Otherwise, the concepts could stand distinct on their own in the content organization. As argued further, the sections into which the science curriculum contents of physics, chemistry and biology have been organized could easily be adjusted to reflect themes. By such action, themes could subsume concepts and provide an easier avenue for the application and interaction of concepts and principles within society.

Thus, as stated by Ivowi (1995) the obvious trend is towards the use of thematic approach in content selection. This would ease problems such as:

(1) Overloading of content due, for instance, to directives and dictates for new school programmes;
(2) Inadequacy in pedagogically associated issues; and
(3) Curriculum invalidity in terms of teachability and learnability

This will be complemented by the orientation and training of teachers for new programmes and the continued practice of guided - discovery method of teaching.

The major focus of implementation of science curriculum has been then insistence on the practice of guided - discovery method of teaching. In this regard, many activities, have been built around concepts and principles and encouragement given to both teachers and learners. NERDC organized school visits to pilot schools for many years to ensure that

teachers put into practice what they learnt at the orientation and long vacation science courses. Such visits were only resumed in recent years and restricted to fewer schools because of high running cost. After the initial free supply of science equipment, emphasis shifted to improvisation and use of locally available alternatives to ensure that learners have the opportunity to indeed practice guided discovery approach.

In the area of educational technology not much could be done and so implementation of the curriculum in this regard has been very unsatisfactory. Appropriate textbooks were developed and have been very relevant to the curriculum content and the learners' environment. But other teaching aids have not been developed to complete the range of curriculum materials needed for full and successful implementation of school science programmes.

But it needs to be said that some efforts were made. The National Educational Technology Centre (NETC) and the National Television Authority (NTA) had run educational television programmes in science, technology and mathematics as part of their

school-broadcasting programme. A few schools avail themselves of this opportunity and the videos tape produced are expensive to enable many schools purchase copies and show to students.

In light of the above, it is pertinent to note that despite the efforts so far made in science education in the Nigerian situation, a few other issues need be clarified in future. These are to include:

(1) The issue of overloaded content, which we have suggested could be adequately addressed by the use of thematic approach to content structuring;
(2) The issue of expressed doubt concerning the suitability of the curriculum content with respect to the cognitive level of our students;
(3) The need to overhaul our assessment procedure to provide for core and electives in the examination syllabus as well as improve on the reward system to be fairer to students than it is at present;
(4) The need to popularize science by the use of mother-tongue which up till now has not been given its proper place in the science education curriculum. It is the authors wish that this aspect is lucidly tackled in the science curricula for primary and secondary schools in the nearest future; and
(5) For the purpose of relevance now and in the future, the science curricula should reflect both contemporary and emerging needs of the diverse cultures. The development of various science and technology curricula (rather than just one) with different emphasis is a step in the right direction.

PROBLEMS FACING THE SCIENCE EDUCATION CURRICULUM

Experience has shown that the present form of science taught in Nigerian schools does not prepare pupils to function well in a society undergoing transition from a rural economy to a modern economy. Thus, in Nigeria are catalogues of problems that bedevil the science education curricular. The problems range from lack of adequate textbooks; lack of funds to purchase scientific equipment, over crowded classrooms/laboratory/time table, lack of co-operation by administrators, the pressure of external certificate examination, etc; lack of proper monitoring and feedback mechanisms, poor preparation of teachers who teach the new programmes, lack of motivation among teachers, and the rapid rate in which teachers are transferred from one school to another or out of the profession. Other problems include the use of archaic teaching methods, poor implementation procedures, overwhelming number of activities demanded by the new curricula, shortage of qualified science teachers, lack of clear

cut goals, scanty research reports on the performance of the programmes etc. Another important item that is missing in the development of science education in Nigeria has been the conspicuous absence of an active involvement of the scientific community. There is also a well informed opinions and research evidence to show that the type of science being taught in our institutions provide at best ready made knowledge isolated from our cultural background (Weaver, 1964; Ogunyemi, 1969, Bajah, 1975; Ogunniyi, 1986 and Okoye, 1996). And yet the professional scientists pay very little attention to this problem. The consequence of this is the production of the reversal on Mountaigner's classic phrase "a well packed mind" rather than "a well informed mind" (Okoye, 1997).

Another bedeviling problem in the realization of science education objective in Nigeria is in the area of planning and implementation. It is not the provision of the learning facilities or even the wise use of them that is important but the socio-political context in which they are used (Ogunyemi, 1996). The scientists, the intellectuals and the science teachers are not accorded a high social status. This according to Okoye (1997) has led to low morale, brain drain within science and technology experts and massive drift among prospective scientists and science teachers to other areas of more rewarding occupations.

PROSPECTS

The science education curricula can be improved with the adoption of the following measures:

(1) The problem of suitable textbooks, scientific equipment and laboratories. In the area of provision of scientific equipment, the Federal Government had established science equipment manufacturing companies at Enugu and Minna. Besides, some states and universities also have centres that produce science equipment, like as mentioned earlier, states like Plateau and Enugu and Universities of Ibadan and Delta State assist in the provision of scientific equipment. Some other private companies like Nasfco and Labstock at Ota and Finlab in Lagos also manufacture some science equipment. In area of textbooks, the Science Teachers Association of Nigeria (STAN) have helped in the provision of science projects like the Nigerian Integrated Science Project (NISP) and the Nigerian Secondary Schools Science Project (NSSSP) for the Junior and Senior Secondary Schools in Science. There are other professional bodies that have assisted in the provision of varying texts in use both in the primary and secondary school levels in Nigeria.

(2) The provision of qualified trained professional personnel for science teaching is another area science education programme in Nigeria had made an appreciable impact. This has been in form of pre-service and in-service training scheme. The government
established Colleges of Education, Polytechnics and Universities that engage in the training of teachers to provide professional manpower for science education. To add to this, other professional associations like the Science Teachers Association of Nigeria (STAN) help in the provision of in-service training for science teachers. It also assists in the organization of annual national workshops for science teachers in the various science subjects. The National Teachers' Institute (NTI) also provides in-service training centres for science teachers but unfortunately this noble objective have so far not been realized. It is therefore the authors' desire that the government should have a

re-think of this objective in the next millennium. When this is done more qualified science professionals will emerge.

(3 Research in science education aimed at improving the science curriculum have received some desired results. Many of such studies have contributed to the teaching and learning improvements and general appraisal of effects in science education. The Nigerian Education Research and Development Council (NERDC) has the mandate of commissioning of research in education on the basis of agreed priorities. The Council has, however, made little efforts through collaboration with individuals and groups due to the lack of fund by the government. This financial handicap has deterred research development in science education in Nigeria. Much progress would be made in this direction if the government can make money available to the council.

CONCLUSION

From the foregoing, efforts have been made by the government and other professional bodies in the realization of the set goals and objectives of the science education curriculum in Nigeria. A highlight of review of the Science Education Curricula in retrospect, now and future will no doubt help in resolving some of the disputes that abound in the science education curriculum. Among other, the paper heralded the problems facing the science education curricula and prospects so far availed in the science education programme in Nigeria. The paper revealed

that though much has been made by government and professional bodies in the realization of the science education curriculum, much is still left undone. There is a call for the relevance of the science curricula to reflect both contemporary and emerging needs of the Nigerian diverse culture. Some of the prospects unveiled include the provision of suitable texts, scientific equipment, the training of qualified science educators and varied scientific researches in the field of science education in Nigeria.

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