PROBLEMS AND PROSPECTS OF REPOSITIONING SCIENCE EDUCATION IN NIGERIA FOR RAPID NATIONAL DEVELOPMENT

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Abstract

This paper addresses the problems and prospects *of* repositioning science education in Nigeria for rapid national development. The ultimate aim of National Development must be to bring about sustained improvement in the well being of the individual and society. Some problems associated with repositioning science education in Nigeria in relation to teaching and learning of sciences in Nigeria were examined. They are as follows: method of science teaching, training of science teachers, the teachers and the teaching factor, the older science teachers and their experience, me f curricular factor, transfer of technology, compartmentalization of sciences. Again the prospects of science education in relation to the above problems were discussed.

Introduction

One of the most important goals of education is for it to be functional and utilitarian,; preparing the individual for life in the community and reforming the society for relevance, adequacy ' and competitiveness in the world. Education is known to be the key to the economic, political, sociological and human resources development and well being of any society. The concept of science education adopted in this write-up is that which can provide those essential requirements that make ' life comfortable and worth living. The bottom line of science education is to put man on the high way towards accomplishing some of those basic tasks that keep the society healthy, productive and progressive. (Oriaifo, 2002).

The goal of science education at school level in the past appeared to be that of making students acquire the knowledge of science in order to pass external examinations such as the West African Senior School Certificate Examinations (WASSCE) and National Examinations councils Examinations. (NECO). The results of these examinations were used in selecting candidates for admission into universities and other higher institutions of learning. Although in addition to the acquisition of the knowledge of science, learners were also expected to acquire an understanding of the nature as well appreciate science as a field of disciplined inquiry. These two goals were hardly given any emphasis.

There were several problems associated with the teaching of science purely for acquisition of knowledge because it leads to a misrepresentation of science. Teachers taught the knowledge (facts, concepts, principles of science in a dogmatic fashion).

Schwab (1962) pointed out [hat to teach science as dogma would misrepresent the facts about the nature of scientific enquiry. This approach also created an undesirable tension between science as it is practiced and science as it is presented in science textbooks. (Siegal, 1972). The teaching of science mainly for the acquisition of knowledge has also led to the development of passivity, docile learning and dependence on teachers and textbooks instead of active learning in which teachers and textbooks are challenged.

At the rate science is developing, it seems impossible to teach students all the scientific information they will need. Instead Booth (1981) suggested that children should be given opportunities to discover, invent and gel caught up in the rapid expansion of science and technological information. *It-is* more appreciative to teach students how to learn, lo have them acquire on their own and to provide them with a foundation of skills and attitudes for acquiring and processing knowledge so that they will be adequately prepared to deal with challenges in future.

Nigeria cannot attain any reasonable level of development without meeting the vital demands of development particularly, in area of science and Technology Education, for factors that influence development are based on human ability to explore, invest and utilize the natural endowment available.. Development is associated with modernization, material advancement, industrialization, scientific and technological progress, the emergence of nuclear energy, electronic and biological revolution, new knowledge about man and universe. It means urbanization, socio-cultural transformation, mass literacy, vertical and horizontal mobility, employment opportunities and the emergence of specialized and

independent occupational roles (Aghenla, 1988). If Nigeria is to develop and build a self-reliant nation, emphasis has to be made continually on the repositioning of science education in Nigerian school system.

Science Education and National Development

Science is a body of knowledge and process studied for the possibilities it offers for the[1] development and advancement of technology. It is a way of providing explanation for certain events, occurrences and phenomena in nature using acceptable laws, theories, principles and practice. The aims of science according to the National policy on Education (2004) are as follows:

(i) " To inculcate a positive attitude towards science in our youths.

(ii) To-produce Nigerian who can man our economy, like taking care of our mines, factories etc.

(iii) To ensure a sound foundation of the basic principles and facts of the society as scientists and technologists.

(iv) To ensure that every person has such a grasp of science as to be ready to co-operate with understanding in the application of science to man's need. In fact there cannot be a meaningful development without science. According to Mbuk (1995) the developed nations are where they are today because they realized this fact early enough and designed the science curricular in their schools to meet their aspirations. Science is imperative to economic development.

Problems and Prospects of Repositioning Science Education in Nigeria

There are numerous problems to the teaching and learning of sciences as it is supposed which if identified, and solutions found, science education will be properly repositioned which will invariably led to rapid national development. The problems and prospects are discussed here as follows

Methods of Science Teaching

Before the problems of science teaching can be identified, we must first know the best method for teaching the subject. If any science is to be taught well, it should be taught practically. Each student should be able to perform necessary experiments, use certain tools, produce some equipment, make and record accurate observations as the case may be. This is the laboratory method of teaching. The laboratory method is in general the ideal method for science teaching but there are various problems, which have made the application of this method difficult. This is because science equipment, materials, chemicals, glassware's, models, gadgets and specimen are grossly inadequate or in bad state of repair.

Again schools and colleges in the country use the syllabuses prepared by West African Examinations council. The syllabus are not detailed enough because, in most cases, details of experiments and materials to be used are not indicated in the syllabus. These details and explanations are not included because the syllabuses are examination syllabuses. It is the teaching syllabus that should contain all these details and it is the responsibilities of the teachers in our secondary schools to get together and write teaching syllabus out of the examination-syllabus. It is therefore suggested that the state ministries of education and experienced science teachers in our institutions should co-operate to produce the teaching syllabus which will help the inexperienced science teachers in our schools.

Training of Science Teachers

For the training of science teachers the pre-service secondary school science teacher needs some professional competencies in order to function effectively. These include ability to demonstrate, proficiency in the skills of handling apparatus, collecting and preserving specimens, preparing strains and other reagents for practicals and improving instructional materials. These skills are part of the UNESCO (1986) inventory of science teaching competencies.

Unfortunately, however most of the science teachers in our schools and colleges have not been adequately prepared for science teaching. These teachers even include the graduate teachers who did not read Education as part of their course in the university. They have been taught only the pure academic of the subject. Aspect of how to use, service and repair many science equipments were not taught. Where and how to collect specimens are not part of the course and also many teachers do not know how to prepare most of the preservatives, reagents and strains. The reason is that when they were doing their courses, the specimens were provided for them and preservatives were also prepared for them. This shortcoming in the

course work or preparation of would-be-teachers become glaring to the teachers when they are employed as teachers in schools and they find themselves to be alone without the guidance of any experienced science teachers in the school. Thus in many schools there are some equipment purchased before the arrival of the new teachers and the teachers may not be able to handle, services or repair them because they have not been so trained. This point was highlighted by T_L. Green in 1965 when he wrote:

"Universities are concerned with the teaching of various science subjects rather than with the preparation of teachers for their career. Courses are designed to meet requirements of the subject not those of a particular profession. The result is that young graduates may have a considerable knowledge of their subject, but lack much of the background knowledge so important to the teacher.

The university authorities should take in this point and modify the course content of science subjects who are in this predicament in order to correct the shortcoming mentioned earlier. Invariably most of these graduates go into the teaching profession, and those who do not, will still benefit from the richness and fullness of the course.

Our government should also see the need of expanding university institutes of Education and Colleges of education so that in few years to come, all teachers will be professionally trained and qualified to teach sciences effectively.

The Teacher and the Teaching Factor

The role of the teacher in the school teaching - learning system is enormous. The effect of the effort goes beyond the classroom. Sigla (1983) most comprehensively described it by saying that our responsibility as teachers is to produce intellectually competent students and citizens. Yet, at the same time, we must teach, self discipline and discipline the mishaving. We are asked to feed the hungry, aid the disadvantaged, teach values, help students with personal problems, prepare them to enter the job market, teach them sportsmanship, teach them to think and so on. The teacher is also needed in the effort to improve performance in SSC examinations. It goes without saying that as operator of the syllabus the teacher holds in his hand success or otherwise of the syllabus. To make science subjects attractive, practical and concrete, the teacher will have to make special effort to present, illustrate and exploit each principle. The primary focus of the teaching must move from the mastery of facts for examination purpose to concern for the person of the student. This means that the student must be taught in a way that will enable him recognise, the process and discriminate the stimuli that fit — Formular or principle (Bugelski 1971).

Unfortunately, most science teachers adopt teaching approach that does not aid comprehension and skill acquisition. Lecture method is predominantly used and classes are often two large. Some of the science teachers have little experience in teaching and time allocated to science subjects is "small. The activities teachers engage in arc not creative and most of the teachers are not even familiar with the concept of creativity.

It is then suggested that the science teachers must be clear of his goal. He must not just keep on adding topics on topics. Rather he must have a clearly stated objective, which must guide his" teaching. Laboratory experience is guaranteed to make science subjects attractive, practical and' concrete.

The Older Science Teachers and Their Experience

Even though many science teachers are not initially given the adequate training to enhance teaching of practical, it is discovered that with experience in the classroom, the technicality is acquired. But unfortunately the experience having been acquired is denied of the students. One finds that these days, many secondary schools and colleges are opened yearly. When a new school is opened, automatically, a principal must be appointed for them. The appointment of principal is always through seniority, thus the experienced science teachers join others to become principals and they leave classroom for administration in the principal's office where they always appear too busy to give any help in the classroom as teachers. The situation is worsened by the appointment of two principals per school (Junior / senior school principal).

The author suggests that principals should be made to regard their appointment as teachers primarily. They should therefore have at least eight to ten periods per week as their teaching load. This will put the experience of these principles (some of whom are science teachers) at the disposal of the students.

The Curricular Factor: It must be accepted that the WAEC Biology syllabus has survived the passage of time. Over the years it has charged in some ways. But according, to Asun, (1986), it has remained

a content oriented syllabus. This has transferred into the classroom teaching where much of what is done is the passing on of information and facts. The laboratory practical work is very much the cook-book type. Most of the laboratory experience is confirmatory in design. Tests are performed to confirm that there is more transpiration on the lower side of the leaf, that starch turns iodine solution blue-black that the photosynthesizing spirogyra will release a gas that will rekindle a glowing splint etc.

Also it is examination conscious. It has not paid sufficient attention to the student as an individual who needs to be motivated.

Another problem with the curriculum is that the approved curricula, which represent the planned curriculum, differ greatly from the implemented curriculum, which depends on the opportunities such as trained teachers in each school, is low. What the students have learnt fall short **of expectation** and' this is reflected in the now endemic overall poor achievement in the sciences (Agbebi, 1992). The problems have lingered for so long as a result of inadequate formative evaluation of the science curriculum as a means of ascertaining the worth of emergent curricular.

It is suggested here that the curriculum should place the students at the center of its attention. Teachers bear witness to the change in the attention and interest which students show when the topic of the lesson is about them (their interest, activities, health etc-). The curriculum should place more emphasis on exploratory and problem solving elements of teaching and high level interpretation from data. So that the laboratory work will not be too confirmatory in design.

Transfer of Technology

The problem accrued from the so called transfer of technology, are not far fetched. Indeed some sophisticated scientific tools and other machinery may be necessary to enhance studies in the-science at advanced level and also for some technical work. But when this importation syndrome is given priorities over the improvement of local ingenuity, then problem arises, for transfer of^ technology is so expensive that not many third world countries can afford it. Besides, technology in j general has been found to consist of cultural and socio-economic frames of reference, giving it coherence and meaning in relation to descried development goals. In this regard, the problem of the unsuitability and 'standardization of equipment sold by different manufacturers or even the multiplicity of expertise invited for the same problem many create competition and jealousy. The . refusal of materials and equipment manufactures or even other experts to enter into partnership with either African Government or Local business people for local production of equipment and other material development area is in fact one major hindrances to progress in many African countries.

Therefore emphasis should be placed on the improvement of local ingenuity to alleviate the problem of high cost and unsuitability of the imported equipments.

Examination Oriented Programmes

This concerns the using examinations primarily as a criterion for college entrance, which creates curricular and syllabuses based materials and criteria that are examination oriented but not necessarily usejful for the individual or for society. It also obstructs the presentation of science as an exciting way of looking at phenomena and accounting for events in rational terms. The study of science as'an exciting discipline in solving everyday problems is not advocated by the school curricular.

It is therefore suggested that students' interest and that of the society to which they belong should be given topmost priority in designing the curriculum.

Compartmentalization of Sciences

Obviously, there is necessity to extend the present junior level integrated science programme to the senior secondary level. But one of the major constraints is the West African Examination Council (WAEC), whose syllabus forms the major curriculum for the upper secondary school. West African Examination Council (WAEC) forms one of the unifying factors for the countries of West Africa and its political backing makes it difficult to be displaced entirely. The science disciplines are separated and the students must pass them in order to progress academically. This is disturbing because the whole collection of

textbooks which are maintained and believed to be the best books for passing the West African Senior School Certificate (WASSC) Examinations and used over the decades has serious limitations. These books are written by foreign authors and as such they lack local background and examples. As a result, there is need to extend the present junior secondary integrated science to senior secondary. The problem with its implementation is that, it is a new programme and so the books, equipment and method will be different from the status quo in order to meet up with the objectives of integrated science.

It is therefore suggested that curriculum designers should place greater emphasis on the use of viable methods of teaching, materials/resources, which the integrated science experts recommend. Again the common objective of the senior secondary level o? education (which is to pass WAEC) should be charged to be more functional and Government should intensity move towards the training of integrated science specialists in order to extend the integrated science programme to senior secondary school.

Conclusion

Having identified some of the problems and prospects of science education in Nigeria, what remains is the implementation. To implement the recommendations enumerated above, all hands must be on deck. The Teachers, Students, Science Association, School Authorities, Curriculum Planners, Governmental and WAEC should co-operate in the interest of science education for National" Development.

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