

IMPEDIMENTS TO SOUND SCIENTIFIC EDUCATION FOR NATIONAL DEVELOPMENT

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Abstract

The paper surveys the impediments to sound Scientific Education for National Development. It x-rayed the policy stand on different issues as it relates to science education in Nigeria. The problems and impediments that hinder the development of sound scientific base for nation building were identified and discussed. These include the methods of teaching science, the learner, the teacher, the provision of facilities and equipments and the control of quality. Attempts were made at recommending and proffering solutions to the problems.

Introduction

The National Policy of Education (NPE 1978) is full of government pronouncements of its good intention to initiate, promote and sustain good science education to all and sundry in the educational system through well-reasoned aims and objectives.

At the primary level, there are five general objectives of education, that lean for science education, these are:-

- inculcation of permanent literacy and numeracy, and ability to communicate effectively;
- laying of sound basis for scientific and reflective thinking;
- developing the ability to adapt to a changing environment;
- giving opportunities for developing manipulative skills to function effectively in the society within the limits of his capacity; and
- providing basic tools for educational advancement

At the secondary level, there are four objectives that direct science education in Nigeria; these are:

- preparation for useful living within the society;
- preparation for higher education;
- diversification of curriculum to cater for differences in talents, opportunities and roles posed by or open to students after their secondary school course; and
- equipping students to live effectively in our modern age of science and technology.

From the foregoing, the National Policy on Education had a sound base for the development of the science process skill which is needed for the development of the individuals in scientific manipulative skills. In spite of the sound objectives stipulated by the NPE, Science education in Nigeria still faces some problems that deplete sound foundation for national development. This can be attributed to the implementation of the curriculum which depends on some issues, these include methods, learners, teachers, facilities and equipment and quality control, the above mentioned result either in low or high achievement of the curriculum as it affects developing a sound base for national development.

Impediment To Sound Science Education For National Development Scientific Methods

Science is often regarded as a body of organized knowledge; which is full of concepts principles, information and posse a language of its own. In essence, in teaching it one must bear in mind the learner, his reading culture and mastery of language. The NPE stipulated that the teaching of science should be through inductive, deductive and inquiry method, which ought to blend to make for good science learning. This is based on the fact that the present science curricula are activity oriented and it means that students are supposed to do a lot of science and so the teaching method should be basically the guided discovery blended with the other approaches.

Unfortunately, what we discover in our schools is quite different from the policy stipulations, that is why the problem is attributed to 'implemented curriculum' rather than 'planned curriculum'. In most cases, the method employed by the teachers is the lecture method which is very deficient in the development of the science process skills. According to Ojaitan and Agusiobo (1981) who opined that, the use of the lecture method is limited by the passivity of the students, minimal feedback, reliance on the hearing sense, and the limited retention of knowledge given in this way. It is unsuitable for teaching students to think for themselves or to solve problems. This portrays the negative aspects the methods mostly used by teachers, the use of which may be attributed to other factors, like lack of equipment and facilities. Mkpia (1987) said that the problem of lecture method include the possibility of regarding the learning of facts as ends in themselves; the risk of destroying learners' initiative and unreasoning acceptance of the teacher's views as final. He further stated that certain affective and skill learnings are not properly taught by the lecture method; it all boils down that with the teacher using this method the development of manipulative skills to function effectively in the society will ever be negated; leading to graduates without a solid scientific base, which will eventually undermine the national development.

The Learner

The curriculum guidelines from the Federal Ministry of Education have taken care of the learner, in the area of his cognitive readiness by making sure that the lower order science process skills are achieved at the primary school level and Junior Secondary School level, while the higher order process skills are for senior secondary school students.

The contents of the curriculum are also ordered in hierarchical manner of increasing cognitive demands, this was achieved by adopting spiral curriculum for each level. All these are aimed at assisting the learner to learn and acquire science concepts step-wise. In addition, other learner issues have been addressed in the science curriculum, these include the use of the Nigerian environment as the learning base, the curricula not being location biased, etc all these efforts are to take care of the learner's interest and attitude. Despite all these the interest and attitude of most learners to the development of sound scientific based is still questionable.

For the sound science curriculum to work in our society, teachers and learners must show maximum interest in the teaching learning process. Emphasizing the students' interest as a pre-requisite for the acquisition of the science process skills, Albert and Pilts (1975) said that the best teacher and nicest books are to no avail, unless the interest to learn is in the students. They affirm that students with positive attitude towards instruction perform better than students with negative attitude. Hence according to Okoye (1982) "attitude works hand in hand with the candidate's will to succeed". This can be attributed to some factors such as the traditional background of the learner which form the bedrock of the learner's belief and clashes most of the time with the scientific view, this is heightened by the fact that most teachers are incompetent, presenting scientific facts without necessarily exposing the learners to the basic processes of science, this usually result to the fact that learners do not have clear scientific information to use as basis for comparison with their already established view of nature and natural phenomena.

Consequently, the learners have hazy ideas about the process and products of science, perceiving modern concepts in science as the Whitman's mysteries which are beyond the comprehension of the African mind. Consequently this will result to lack of solid scientific base which will undermine the national development.

The Teacher

A very important issue in the establishment of sound scientific base for national development is the issue of the teachers. Teachers are interventionist and catalyst who excite learning by creating proper environment. This relates to the quality and quantity of the teachers. According to Agbebi, (1985) who opined that good teachers are a critical factor of development, quality education can only be attained by quality teachers". This means that emphasis should be laid on the training of the teachers to produce quality teachers.

For instance, many practicing science teachers do not have the unified view of science due to what can best be called weak and fragmented speculation, which they got during training. This results that most science teachers cannot teach integrated science. As Okechukwu (1984) noted, the success of any educational programme is largely dependent on the quality of its teachers. Teachers who are occupationally qualified and competent in their subject areas can contribute immensely to the success of any educational programme.

Ukeje (1976) in pointing out the essence of quality training for quality teachers was of the opinion that for teachers to educate others, he must be first educated. If teachers are not properly

educated, there is no way they can educate their students properly. He noted that the defect of Nigerian educational system is partially the result of poor teaching resulting from poor quality teachers. AM (1983) in emphasizing the need for proper training of the teachers proposed that for science teachers to be effective in teaching science, he must be well prepared by possessing the necessary skills that are required for recognizing individual differences and abilities among students as well as being able to clearly thoroughly explain laboratory works.

Concerning the quantity of the teacher. Burnett (1990) in his book "Teaching Science In The Secondary School observed that the critical manpower shortage in science include severe shortage of competent science teachers. It was observed by the implementation committee on National Policy on Education (1992) that because of the shortage of graduate teachers, NCE teachers teach science subjects even in senior secondary classes. In it was also observed that there are exodus of teachers to other more lucrative jobs due to lack of improved conditions of service. A large number of our teachers, are ill-equipped, ill-prepared and poorly paid for what the society requires of them. As observed by Giamatti (1981) in his view of the roles of teachers, teachers, whether in primary, secondary or tertiary institutions, have never truly been cherished in a way that is equal to the importance the country so clearly attaches to them. Science teachers should be adequately compensated and remunerated for (he role they play in laying a solid scientific foundation for national development.

Facilities And Equipment

The quality of education depend largely on the scale of equipment and the use to which they are put; lack of it undermines the nice intentions of the science curriculum. The teaching of science in schools demands an increased number and varieties of equipment, models and charts; these had always been in short supply in most schools. Most science laboratories in schools are ill-equipped. The procurement of laboratory is as essential as equipping the laboratory with materials needed for practical purposes which is the foundation, for the formation of the science process skills. Hence Nwana (1976) said that effective science teaching demands experiment which cannot be done in isolation, hence laboratory apparatus should be supplied and justified. It is most unfortunate that most science teachers are compelled to work under a number of constraints, which is caused by the state of the economy leading to high cost of importing science equipment and the current exchange rates making importation near impossible. Besides, some imported equipment are not relevant to our needs, many are not descriptive of our environment and some can breakdown easily due to change in weather condition. All these make the utility very difficult and so are not within the reach of the science teachers hindering the inculcation of the necessary skills.

Quality Control

Science education in Nigeria is facing a crisis due to lack of quality control. The quality control in education can be both internal and external. The NPH (1998) clearly stipulated that for quality control there should be continuous assessment. In most schools, test and examinations are adopted for internal control while formal external examinations, survey by parents and guardians, standardized tests, evaluation by higher institutions are meant for external quality control.

It is unfortunate that the quality control of most science teachings in most schools are nothing to write home about. Researchers have not yet mastered the techniques and procedure of continues assessment which have been stipulated for the working of the 6-3-3-4 system of education. Tests and examinations

are not properly sequenced, the processing and utilization of tests and examination results have no! been fully understood. Currently not much have been done on continuous assessment of practical skills which is so important if meaningful teaching and learning of science subjects are to take place. That is why maduagwuna (1987) said that the calibre of teachers needed to implement the system of assessment in terms of moral and professional competence is still lacking in our educational system. It was noted by ohuche and Akeju (1977) that most teachers who administer tests and examinations lack skills in development and scoring. Stressing on the lack of skills on the part of most teachers. Obioma (1985) pointed out that most teachers assess themselves as not being competent in all skills required for continuous assessment. They show their highest incompetencies in the area of test analysis, analysis of learners performance, scoring, grading and weighting, it was also observed that even where teacher assess, they only do that in the cognitive domain, neglecting the psychomotor and affective; because of lack of training. Mkpa (1987) maintained the same ground that because teachers are not very well trained, they cannot test pupils on psychomotor and effective domains. When this is the situation evaluation of the extent of the development of the scientific skills are neglected leading to production of graduates that have learned science but cannot do science, thereby affecting scientific development of She nation.

A very crucial issue in quality control of our science education is the issue of schools supervision and

inspection which for some time are not carried out accordingly, this might be attributed to the fact that there are relatively few experienced trained inspectors in the area of science. Most often supervisors that are sent to schools in this area are not specialists. All these are issues in the quality control of science education which if not properly handled will affect the scientific base of any nation.

Based on the above premise, sound scientific education for national development is still far fetched as far as these problems linger. It is my own opinion that the planned science curriculum may be sound, the problem lies with the implementation of the science curriculum and the solution to the attendant problems may make for solid scientific foundation to meet the demands of national development.

Recommendations

In respect of the above the following suggestions are made: conscious effort should be made by teachers to adopt the methods of teaching science that will foster the inculcation of the science process skills. It should also be realised that the effective use of these methods like the discovery and inquiry methods, there should be adequate provision of materials, facilities and infrastructure, moreso. teachers should be drilled on the use of the methods.

The teaching and learning process of science education should be made interesting so as to stimulate the learners' interest, this will increase their ability in the acquisition of the basic science skills that are needed for national scientific development. Teaching methods and available facilities should be such the will affect the beliefs and attitudes of the learner.

Proper training of the teachers in science courses is necessary, to provide them with good foundation, the teachers cannot give what they do not have. The teachers are to be prepared in the area of use of infrastructure understanding of the contents and construction of reliable and valid objective test items. To tackle the mass exodus of science teachers enhanced salary is preferred for them and restoring the teachers' glory in the society.

Provisions should be made of the necessary infrastructure, facilities, equipment, laboratories and workshops. This will enhance practicalization of all the scientific concepts.

There should be infusion of more quality control measures into the school system to check the workability of the system. Assessment and inspection should be done as stipulated.

Conclusion

In conclusion, the scientific development of any nation is based on sound scientific education, which serves as a basis for the development skills needed in transforming the state of our national economy and tackling the problems of unemployment, if only the impediments are taken care of as suggested in the paper.

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