

EMERGING ROLES AND RESPONSIBILITIES OF THE SOCIETY IN PROMOTING SCIENTIFIC LITERACY IN THE 21ST CENTURY

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Abstract

This paper looks at scientific literacy as one of the roles and responsibilities of the society that would enable her relate to a world that is fastly becoming more and more scientific in taught and action. More than a decade now, the infrastructural facilities required to foster scientific and technological literacy have not been adequately provided in our tertiary institutions. The view here is that, the values attached to the qualitative education should be re-attuned for the Nigerian society to attain its articulated ideals. The paper attempts to highlight on the project 2000+ declaration, scientific and technological literacy, the roles of the government/society in promoting scientific literacy and how to mobilize the citizenry for scientific and technology education in the 21st century. The conclusion and recommendations forwarded include the provision of science content that could rationalize local practices, beliefs and traditions and thus, debunk myths, stereotypes and superstitions that have damaged the dignity of the African.

Introduction

No other branch of learning has more impact on the daily affairs of people than science. Science is in everything we do: the food we eat, the cloths we wear and the house we live in. above all, science has a tremendous impact on our health. Science can be defined as the study of natural phenomena. Science can be considered as a body of knowledge derived from systematic observation and

verification of facts. Bolorundruo (1997) observed that our interaction with the other parts of the world has a great influence on our views, beliefs and values- science, and technology inclusive. This interaction may be by visits to places of interest, attendance to international conferences such as the Earth Summit 1992 and project 2000 + forum, via print media, electronic media and also with the ever changing

scientific technological gadgets- high technological equipment, computer, information communication technology, to mention a few. These emerging technologies call for the need of some roles and responsibilities of the society in the fast moving world of scientific and technological development.

Education is one of the social institutions specifically designed by society to transmit knowledge, skills, attitudes and values of society to the younger generation for that society to live on. In order to see how education relates with society, Otti (2000) opined that education is a leading out from something bad and undesirable to something good and desirable notably ignorance, darkness, primitive life, poverty, disease, slavery, superstition, pride, indiscipline, bad habits to knowledge, civilized life, comfortable living, healthy life, freedom, scientific living humility, discipline and good habits. Thus, the Nigerian society should be made to be better and become what he ought to be, to adopt the best educational philosophy for this purpose. To this effect, the Nigeria must be re-educated to recognize the existence of hierarchy of values.

This paper therefore attempts to explain why scientific literacy should be considered as one of the values the Nigerian society should embrace and give priority to in order to cope with the innovations in the area of scientific and technological developments. Chukwudum (1993) observed that our problem as Nigerians is in short, wrong or false values, wrong priorities and the

materialistic outlook which undergirds them. So from the perspective of our educational system, the Nigerian problem is easily stated as the tragic failure of the Nigerian educational system to produce right values and right priorities for Nigerians, intellectuals and political leaders alike. It is, as it were, the failure of the nation to produce a concrete, relevant and functional philosophy of Nigerian education. In order to accomplish the emerging roles and responsibilities in our society, it is the Nigerian who needs to be changed, whose values and mentality needs to be qualitatively re-attuned for the Nigerian society to attain its articulated ideals, namely, “a disciplined, fair, just human self-reliant African society” as contained in the 1999: 13 constitution.

The social structure or organization of a society may be seen as network of roles involving interaction between individuals and groups which together give the society both its unique qualities and the characteristics which it shares with other societies. It includes the process by which influence, authority and power are exerted, the interdependence of individuals and groups through segregation or integration. In sociological perspective, society is a group of human beings who have interrelationships with one another (Patrick, 2002).

To qualify to be called a society, a group must have occupied a specific geographical location for a long time and so share a lot of things in common such as culture and ways of life. A society can be seen as a system of roles each of which involves relationship between people,

patterns of behaviour, right and duties associated with a particular position. Every one has many roles. For example, one has political, religious, recreational, as well as scientific roles. In each of these, certain relationships are established based on expectations about future behaviour. The social structure of a society includes all of its roles and social organizations. An individual's behaviour in society is structured by the roles, which he fills, and the organizations he belongs to.

A child becomes a member of a society through socialization. He is taught all the things he or she needs to know to function as a member of a specific society. Scientific culture and literacy should be one of the roles and responsibilities the society should teach the children through proper and functional education as the children socialize in the society. This would enable them to function well in the modern age of science and technology.

Socialization is carried out initially by parents and kinsmen living with the family. These primary agents of socialization make the deepest impression on the personality because they provide the first training. Other agents such as peers, teachers, employers and the mass media compete for attention and build on the already established framework.

Project 2000+

Most of us would support Dakar Action Plan – a framework for Education initiative to promote global basic education for all. In order to promote sustainable development, basic education and education for scientific and

technological literacy should perhaps proceed in parallel. Moreover, basic education itself could be the vehicle for promoting scientific and technological literacy. Project 2000 + was initiated in 1993 to promote and guide the implementation of mechanisms for nurturing scientific and technological literacy for all. Its goal was that by the year 2001, structures and activities to foster scientific and technological literacy will be established in all countries, based on a partnership between UNESCO and other major INGOS.

The project 2000 + declaration pointed out that sustainable development is dependent upon a scientific and technologically literate population and called on governments, industries, public and private sector interests to review educational provision (Bowyer, 1990). Priority should be given to providing equal access for all boys, girls, men and woman to science and technology. It called for continuing provision for teacher education in this field and for task forces to be set up to foster scientific and technological literacy for all by developing educational activities designed to set science and its applications in a wider social and cultural environment. Governments were called to work together to advance the capability of countries for designing, planning and implementing programmes to enhance scientific and technological literacy for all. According to Goel & Whittle (1999:3) UNESCO is assisting countries to do this by promoting, worldwide:-

- a. understanding of the nature of, need for, scientific and

- technological literacy in relation to local cultures and values or to national, social and economic needs and aspirations;
- b. identification of issues of special importance for personal, local and national development.
 - c. establishment of suitable teaching and learning environments and structures;
 - d. formulation of guidelines for on-going professional development and leaderships;
 - e. development of effective communication, assessment and evaluation strategies and
 - f. support for non-formal, informal and life-long learning strategies.

Scientific and Technological Literacy

Scientific and technological literacy, in its broadest sense, means much more than simply being able to read, understand and write about science and technology, however important these are. Scientific and technological literacy also includes the ability to apply scientific and technological concepts and process skills to the life, work and culture of ones own society (Holbrook, 1999). It therefore includes attitudes and values enabling one to distinguished between worthwhile or inappropriate uses of science or technology, hence, scientific and technological literacy implies:-

- a. The development of scientific and technological attitudes, approaches and skills which are necessary to cope with a rapidly changing environment and which are useful

for problem-solving and decision-making in daily life;

- b. An appreciation of the nature of science and technology, and the development of positive attitudes and values relating to basic science and technology to other areas of human activity;
- c. Exposure to effective teaching strategies and relevant examples of science and technology (at primary, secondary, tertiary or adult education) either within a formal programme, or through non-formal or distance education methods); and
- d. Familiarization with process of accessing and communicating science and technology information and willingness to use it to meet personal, local or global requirements.

It follows then from the above that a person becomes scientifically and technologically literate by some involvement with applications of science or technology which interest them, or are intimately related to their everyday life or them beyond the requirement of examinations. Attitudes and confidence are usually most effectively developed by significant first hand or contrived experiences.

In the past centuries, production of scientist was seen as the major goals of science education. This carved out a niche for the scientists and made science education an elitist enterprise (Ngozika, 2003). Today, in a world whose fabrics are perused with science and technology, the notion that science is for a few elitist

individuals is not correct. The society presently requires a new kind of knowledge. It is imperative in a world where the day-to-day life of an individual amounts to the operation of gadgets and the pushing of buttons that the individual acquires skills that would enable him to do so. These are some of the expected roles and responsibilities of the society that should emerge so as to fit into the 21st century. This knowledge is embodied in a kind of literacy referred to as scientific literacy.

Scientific literacy as used here implies ability to make well-informed decisions and choices often based on the possession of a basic core of cognitive awareness of science facts, ideas, realities, principles as well as the possession of fundamental technical skills in science. From such a scientific awareness and the possessed technical skills, a scientifically literate society will be able to relate to a world that is fastly becoming more and more scientific in thought and action. Scientific literacy also deals with understanding the role of science and modern technology. We now live in a world full of the products of technology and an understanding of the concept of technology is necessary for the literacy of the citizenry. While the role of science and technology in a nation should be that of modernization, science and technological policies should be shaped first towards establishing scientific literacy. (Gbamanja, 1999). It is only when there is popular scientific literacy in this respect that the citizens would understand the essence of the products of science and technology.

Science provides knowledge; technology provides ways of using this knowledge; and our value concepts guide what we ought to do with both. If a larger portion of a society acquires these skills of inquiry and experimentation and uses them in solving the problems of the society, then scientific literacy is achieved.

The Responsibilities of the Government in Promoting Scientific Literacy.

Funding of science, technology, and mathematics (STM), education is an integral part of educational funding as a whole. It is observed that the funding profile of government is low. Similarly, the Non-Governmental Organization (NGO'S) and wealthy individuals do not attach the much desired importance to STM education by way of proper funding and training of the talented individuals. This trend should be reversed if we are to compete favourably well with our counterparts in the world of scientific education, reward system for innovators, provision of the basic infrastructural facilities such as laboratory and workshop facilities, and stoppage of lip service to STM Education among others are the responsibilities of the government, NGO's and, wealthy individuals in our society. The society's perception of science education as a waste of time and resources is rather a hindrance to the effective use of innovations in STM education in Nigeria.

A 1992 national survey of basic education in Nigeria conducted by UNICEF/FGN (1993:12) paints the learning environment and facilities in a pitiful picture, thus:

In 12% of primary schools, pupils sit on the floor, 3% of the schools, have no chalk boards. 87% have over-crowded classrooms. 38% of the classrooms have no ceiling. 77% of the pupils do not have textbooks. 36% of the pupils have no writing materials.

At the secondary level, the science teachers still rely heavily on lectures as a result of inadequate faculties in the classrooms. Though the 3-3 secondary education system is aimed at fostering science and technology education, lack of or inadequacy of laboratory and workshop facilities, overloading of STM teachers with teaching periods and shortage of qualified support personnel such as laboratory and workshop assistants further compound the problem of the school environment as not capable of engendering innovations in scientific and technological literacy. In the light of the above problems, the government should show more political will, the NGO's and wealthy individuals should also show more commitment to the scientific and technological literacy in the Nigerian educational system by way of identifying and performing concrete roles and responsibilities in order to move forward.

Mobilization of the Citizenry for Science and Technology Education

Mobilization for science and technology education in Nigeria should be a move away from superstitions and witchcraft which plague our rural areas. According to Gbamanja 1991:) mobilization of the citizenry for self

reliance, scientific and technological literacy should be to join in the fight against ignorance, hunger and disease. The establishment of the Junior Engineers, Technicians, and scientists (JETS) Clubs in Nigeria is a significant move in the right direction towards mobilizing citizenry for science and technology. Efforts should be made to strengthen this programme more at the rural level, where usable local technological materials abound but mass illiteracy is more rampant. Succinctly put, mobilizing the citizenry to achieve science and technology education should include the following strategies (Gbamaja 1999:)

- a. Strengthen science education and make it available for all.
- b. Strive to achieve scientific and technological literacy by rationalizing traditional practices, local, occupations that have made people survive over the years and also rationalizing their values and belief systems.
- c. Establish rational dialogue among the citizenry, more so among scientific communities.
- d. Strive to let people accept changes, and not fixity as the only constant.

Conclusion and Recommendations

Nigerians are creative as indicated in their art and craft. And such potentials are not being fully tapped by the educational systems. In many cases, people engage in some occupations which could be good foundation for further advanced occupations. Indeed, many of

those occupations, whether they are traditional practices, games, farming styles or other survival strategies, involve scientific principles which could be further developed through research work in Nigeria and a indeed Africa be developed from the very 'occupations' of people in the local environment. We need to have regard for our indigenous practices and build our own indigenous capacities. By so doing we shall find alternative ways to feed, cloth, and rule ourselves instead of sticking to the importation syndrome. Science writers should now focus their attention on:-

- a. designing content for applied science applicable in the rural environment and the society at large.
- b. providing the science content that could rationalize local practices, beliefs and traditions and thus debunk myths, stereotypes and superstitions that have damaged the dignity of the African.
- c. restructuring science curricula that can help demystify science and thus, develop the right kind of scientific attitude in the learner.

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