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Review Article

Scientific Literacy: A Critical Examination of the Extent to which it has Been Achieved in Nigeria

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Abstract

This paper x-rays the meaning of scientific literacy and compares it to how science is taught in Nigeria schools, in order, to know how Nigeria has fared in making her citizens scientifically literate. It was concluded that science teaching in Nigeria schools were meant for students to pass examination and not to feel the impact for societal growth. The consequences are that most farmers do not want to use fertilizers, graduates in science and applied science are highly superstitious, people do not know that brakes can fail, that sickle cell disease is genetic and not from evil spirits e.t.c Therefore, the impact of science is not felt. It was recommended that science curriculum should emphasis on why science, organize workshop for teachers on linking science to the society, so that the people would feel comfortable knowing what science is all about, even though they do not know much about science.

Keywords: Scientific literacy; Scientific literacy and the public; Scientific literacy in Nigeria.

INTRODUCTION

Why should science be required of all students? What should the science curriculum be comprised and how should it be taught? [1-3]. Historically, sprinted debate has ensued among educators, philosophers, scientists and social scientists regarding the relative merits of the humanities versus the sciences as the focal point of the educational enterprise [1]. In 1859, Herbert Spencer reminded educators that one of the fundamental questions of schooling is "What knowledge is of most worth?"

Basically, today task entails the provision of an education which makes it possible for young people to understand today's world and at the same time be prepared to meet the unknown challenges of tomorrow [3]. According to Adeyemi, most science courses are being criticized because they are seen as fixed body of content, learned in a rote manner and out of context with the inquiry processes generating the scientific knowledge. In the traditional science courses, the mind of the student is treated as a storehouse to be filled with knowledge, rather than one to be viewed as an instrument for thinking.

Science is built upon reasoning, problem solving and change; science in a way, can be said to be a future-oriented discipline; it grows upon the revision and cumulation of knowledge; scientists have always endeavored to make effort to refine old ideas, to improve models and theories- science the endless frontier" [4].

A modern curriculum in science must, therefore, as of necessity, be one that makes it possible for people to have access to new knowledge, to expect change and to behave rationally and creatively towards the problems generated by change, and to ensure that change will mean progress [3]. She adds that since scientific knowledge is becoming more complex with time, it means that there is a need for a total reassessment of the curriculum and the restructuring of the science curriculum in such a way that it is in harmony with the complexities of a modern scientific-technological industrialized society.

Scientific Literacy

Unfortunately, Shamos [5] notes that there is no consensus among science educators to the meaning of scientific literacy. Further, the average citizen's knowledge of science is far as today than at any other time since science became a part of the school curriculum. Shamos [5] asserts that science educators have not been very successful in achieving the ill-defined and elusive goal of scientific literacy for all, primarily because science educators have never, really, defined what is meant by scientific literacy. Until there is a consensus as to what constitutes scientific literacy,

it will be difficult to ascertain the degree to which its goals has been achieved in any society.

However, Shamos [6] proposes a new scientific literacy, which emanates from these guiding principles.

- Teach science mainly to develop appreciation and awareness of the enterprise; that is, as a cultural imperative, and not primarily for content,
- focus on technology as a practical imperative and
- Teach science for developing social (civic) literacy and emphasize the proper use of scientific experts.

On the basis of these principles, scientific literacy would mean

- having an awareness of how the science/ technology enterprise works,
- having the public feel comfortable with knowing what science is about, even though it may not know much about science,
- Having the public understand what can be expected from science and (d) knowing how public opinion can best be heard in respect to the enterprise [6].

Scientific Literacy and the Public

Fortunately, recent conversations have moved well beyond the issue of whether the humanities or the sciences ought to be the focal point of the curriculum; the present debate, however, must focus upon the following questions; what constitutes literacy, in both the sciences and humanities, as we prepare students to lead fulfilling lives in the 21st century? How should we assess whether students have acquired the knowledge and skills associated with citizenship and social responsibility? And of particular concern among science educators: How can we ensure that students develop the scientific and technological literacies for self- and social empowerment? How can we ensure that students ultimately utilize their acquired literacy as adults in society [1].

The public ought to be able to expect answers to these questions. Science educators ought to be able to equate school science literacy (the science acquired by the students in elementary and secondary schools) with adult literacy in science; after all, the true manifestation of successful schooling is not how well students perform on in-school assessment; how citizens think, what they value, how analytical and critical they can be, how they question and reflect. These are among the true measures of successful schooling. The most valid measures of the effectiveness of today's school science experiences might not be available for 20 or more years [7]. Finally, it also seems reasonable to expect that the public would share science educators' beliefs that (a) they ought to be literate in science, (b) the curricular expectations are reasonable and (c) we have been effective in communicating science literacy to them [1].

Scientific Literacy in Nigeria

Urevbu [2] asserts that if the citizens of a country are literate, scientifically, it makes them less at the mercy of their environments. Besides, the knowledge and skills for the manipulation of electrical, plumbing, human first aid, driving, etc will be in abundance.

Are the goals of scientific literacy achieved in Nigeria? This question should be looked at from the following angles:

- Science teaching in primary and secondary schools,
- Enrolment of sciences in the senior schools certificate,
- Workshops for science teachers;
- Allowances for science teachers and
- Researchers in science education.

The 6-3-3-4 educational system in Nigeria has science curriculum with the following objectives:

- Motivation of the citizens to explore the natural world,
- Enabling the students to understand the processes of science and
- Aiding the students to make empirical judgment. These objectives, when achieved help in the improvement of scientific literacy of a nation.

In Nigeria, science courses with fixed body of content are taught in our schools; these science courses are learned in a rote manner and out of context with inquiry processes generating the scientific knowledge [4]. Science education in Nigeria has not kept pace with the following: (a) the nature of contemporary research in science, (b) the increasingly more holistic view of science, (c) the influence of technology upon science and (d) the integrated nature of science and technology [2]. According to Adeyemi [3], there is concomitant failure of science education to keep pace with changes in society, including how citizens both acquire and use knowledge in Nigeria. All is required by the science teachers is to teach science as comprehension and the students to have the ability to regurgitate largely undigested scientific concepts just to pass examinations. If school science courses are taught in this way, how then would graduates of such schools know that brakes at times fail when they are applied, that machines can break down if enough lubricant oil is not in it, etc. The consequent of this is graduation of literate students who turn out to be scientific illiterates as adults [6].

In spite of the importance of science in nation building, the enrolment of students in sciences over the years has not been encouraging.

For example, records available in West African Examinations Council show that enrolment in science (particularly the physical and chemical sciences) is on the decline. There is little doubt that science education is unattractive to many students and this is a poor advertisement for science [2]. According to Adeyemi [3], Nigeria as a country does not know exactly what she wants; so, her emphases has been on what and how science instead of why science. That is, the country is confused and so, products of this country need to be scientifically confused.

Nigerian science teachers are hardly sent on workshops. Those over teaching in our schools are not competent to teach the sciences. The teacher is the person which is in direct contact with the students or pupils in the classroom during the teaching and learning processes [8]. It is through him/her that objectives of the curriculum in schools are achieved [9].

The teacher usually has the advantage of a course of study and practice to prepare him to carry out his role; he is expected to be a person of above average in general academic ability, with interests, ideas, abilities and experiences that can be used for the benefit of his pupils/ students [10]. Having known the importance of a competent teacher, it would be proper for any nation to expose teachers to workshops and refresher's course so that they would be in line with the new curriculum. This idea is often absent in Nigeria and that is why most science teachers resist changing from conventional science education which emphasizes on what and how science to science education processes to which lay emphases on why science.

The cost of new programmes could be a source of worry for school and ministrators and adopters of the new programmes since it is usually assumed that anything new surely costs more; if funds are not adequately pumped into the implementation process of an innovation, then problems will arise [3]. In most courses, Nigerian science teachers are not paid since allowances; they feel cheated when they compare their salaries with their counterparts in other establishments – oil companies, hospitals, etc. So, that spirit of impacting knowledge for the good of the society is no longer there.

Researchers in science education in Nigeria are more in what science and how science. None for now is on why science [2]. Even if there is any, researches in science education are based on inaccurate data collection. So, the findings from these researches in Nigeria are due to lack of scientific literacy. Today, we still have over-chain, researches in our society because of large number of science products who are not scientific literate.

CONCLUSION

In conclusion, scientific literacy education constitutes : (a) having a awareness of how science/ technology enterprise work, (b) having the public feel comfortable with knowing what science is all about, even though it may not know much about science, (c) having the public understand what can be expected from science and (d) knowing how public opinion can best be heard in respect to the enterprise.

Besides, most Nigerians are scientific illiterates, because they still believe in superstition.

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