
Chemistry Education: A Panacea for Self-Reliance and National Development

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Abstract

Chemistry has been the pivot of science and hence the most needed tool, scientifically, for human, capita and national development. The wheel of progress have in no small way be slow down, thereby hindering the overall development of science and chemistry education in the nation. The concept of chemistry as a science is centered on life and this encompasses the three states of matter-solid, liquid and gas in a give and take processes. The focus of this paper, therefore, is to take a further look at the derivable benefits of chemistry education with a view to repositioning it as a panacea for self reliance and national development. Among other things, poor power supply/infrastructure, poor academic foundation, poor funding and mismanagement, inadequate manpower, associated hazards, defective curriculum, lack of awareness/counseling are the noticeable factors working against the effective chemistry education in the country. All stake holders in this sector including the government at all levels are to ensure and allow chemistry and its education to take and play its pivotal role towards self-reliance and national development.

Introduction

The keywords chemistry, education, panacea, self-reliance and national development are defined accordingly as Chemistry is typically an investigative and experimental science involving the study of nature and properties of all forms of matter coupled with the changes these matter undergo under different conditions. Education is the process of training and institution especially of children and young people in school and colleges which is designed to give knowledge and develop skills. Panacea is something that provides an answer or cure to all diseases or troubles.

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Self-reliance is one being independent by relying on one's own abilities and efforts. Development implies the stepwise growth of something from low to a higher level.

According to Uwague and Ojebah (2008), chemistry is one of the naturally and well established means through which the nation's abundant natural resources can be harnessed into useful ventures for the overall economic and socio-political well-being of its citizenry. Okieimen (2007) equally asserted that chemistry is all about every thing in the world. He added that chemistry is the nucleus of science which ultimately is the foundation upon which any nation is developed. Chemistry certainly cannot be divorced from any today human activities. The N.P.E (2004) stated categorically that science, including chemistry education shall emphasised teaching and learning of science processes and principles leading to fundamental and applied research in the sciences at all levels of education.

Despite this lofty policy, it has never been complimented with effective implementation. If this trend is not checked and changed, it would continue to mar Nigeria's growth and by extension self-reliance and national development will be a mirage. This also will result in the non-attainment of the millennium goal of 2020(vision 2020). Ababio (2007) provides these under listed sectors of the economy as the various avenues for which chemistry skills can be exploited for self-reliance and national development. They include: Agricultural, Soap and detergent, Metallurgy, Petroleum, Ceramics, Plastics, Glass, Pharmaceutical, Cement, Food and drinks, Fertilizer, Educational (teaching) industries etc.

Status of Chemistry Education in Nigeria

Chemistry in Nigeria, as a subject is taken by students of the senior secondary schools being termed among others like physics, biology, mathematics etc as science subjects. It is taken either as a single or combined course for the award of NCE by colleges of Education. In the University, degrees of B.Sc, M.Sc and Ph.D are awarded in chemistry in different areas of discipline. Essentially, chemistry form the bed rock subject for all science and science related courses in the tertiary institution as any student wishing to study Engineering, Agriculture, Medicine, Pharmacy, Nursing, Optometry, Medical Laboratory, etc. and even social sciences requires a credit pass in chemistry at the ordinary level. Regrettably, chemistry and its education is yet to make any noticeable impact in the nation due to lack of commitment on the part of the government and all stake holders. Several factors have been identified to have bedevilled the development of science and chemistry in Nigeria (Ekpo, 1993). Among the various factors are:

Poor Power and Infrastructures

The place of adequate power and workable infrastructure in chemistry education cannot be glossed over. Most secondary and tertiary institutions of higher learning lack the basic infrastructure to study chemistry in Nigeria. The absence of

regular and stable power supply has makes the use of few equipment where available in the laboratories and workshops impossible. The rudiment of chemistry can only be actualised with functional laboratories/workshops. The absence of basic infrastructure has make science and chemistry education to be abstract as theories taught are not practicalized. The resultant effect of this is lack or lost of interest by both the parents and students (Onuka, 2002). Taofiq (2002) added that the lack of these formidable and essential facilities discourages teaching and learning of science and chemistry education and thus slows the pace of self-reliance and national development.

Poor Academic Foundation At the Primary School Level

Any structure built on a weak foundation is destined for doom. More so, a weak foundation begets weak development. Ordinarily, science education at the primary school level is purely elementary and the N. P. E (2004) set a goal of laying a sound basis for scientific and reflective thinking. Umoh (2007) opined that, primary school education is the bedrock of educational hierarchy in Nigeria upon which the other educational levels are built. It stated further that the teaching of science at the primary school level should be by practical, exploratory and experimental methods. Unless these goals are understood by the pupils / students wishing to study science, it is just a fairy tail. Teachers at the primary schools are not conversant with their fields while most still uses the lecture patterns instead of encouraging the pupils to participate in the learning process (Margvwat, 2001). The use of non-science bias teachers to teach and demonstrate science has grossly militated against science and chemistry education in Nigeria. All these hindered self-reliance and national development.

Poor Funding and Mismanagement

Chemistry which is at the Centre stage in the field of science and have in no small way in Nigeria schools been faced with inadequate funding. The funding of schools in Nigeria especially the tertiary institutions has traditionally been from grants, by the government and international agencies which are usually tied to specific projects (Emumejaye in Oyeshola, 2003). High level of mismanagement and corruption in the utilization of the supposedly poor fund provided by the government and other stake holders are also basic issues. This has largely hindered functional laboratories, workshops, equipments, and chemicals from being put in place. For this, there can be no meaningful self-reliance and national development through chemistry education.

Inadequate Manpower

A significant problem faced with science and chemistry education in Nigeria today is the issue of inadequate manpower. It is doubtful if Nigeria has sufficient and qualified number of indigenus science and chemistry teachers. This has in no small way hindered the growth of chemistry education and by extension affected self-reliance and national development. In most of the tertiary institutions, the number of senior lecturers with Ph.D qualifications is low. Rather, we have most of them in the

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cadre of Assistant lecturers, Graduate Assistant and lecturer III-I. These crops of lecturers are still learning the rudiments of teaching by the reason of their qualifications and training (Uwague and Ojebah, 2008, Emumejaye, 2006). Only few of those in the professional rank are available. One major reason traceable to this is as a result of “brain drain” of academic staff which can be traced to the military regime (a period of over a decade) creating a big vacuum which is difficult to fill. Poor salary scale/remuneration is equally associated with teaching job in Nigeria compared with the elected/politically appointed officers. This has led to long period of strike actions by teaching and non-teaching personnel across the educational sector. Teachers reward against all odds is often said to be in Heaven. This is coupled with unnecessary delay of promotions. Still, is the increasing work loads associated with deteriorating staff/student ratio (William et al, 2004). These are negative factors on the growth of chemistry education, self-reliance and national development. The quality of education rests more on the quality of its teachers (Akubudike, 2003).

Associated Hazards

No sane person will live his home for work and anticipate accident. The greatest inherent problem associated with chemistry and its education is hazard. Hazard effects from poisonous emission of gases / fumes, corrosive chemicals, fire burnt, explosion, obsolete apparatus, poor laboratory sanitary condition etc. are very often recorded in chemistry laboratory. Most parents evidently have discouraged their children from studying chemistry due to observed danger effects of the materials involved. In the same vein, most teachers and technologists are scared from conducting chemistry practicals with the students (Uwague and Ojebah, 2008).

Lack of safety awareness due to unsafe acts and unsafe working conditions results to accidents. Victims of chemicals or fire burnt usually present ugly scenes. Often times, large casualties are recorded when accident occur in the field of chemistry. This cannot promote chemistry education, self-reliance and national development.

Defective Curriculum

School curriculum in the pre-independent Nigeria was not for all-round development of the child as the aspects of science and technology which would have created entrepreneurial skills for self-reliance were ignored (Sabina, 2009). It rather kept on producing subservient Nigerians who were tied to the apron string of white-collar jobs viz: gardeners, stewards, interpreters, catechists, clerks and house-keepers (Etuk, 1984). All these make the people parasitic consumers rather than creative and efficient producers (Eya, 1949). The curriculum for science and chemistry education in particular is such that is over loaded with much emphasis on theoretical teaching. At the secondary school level where emphasis is suppose to be laid on practical exercise, this is not done. Practical are not well specified in the curriculum. In most cases, schools, teachers and instructors of chemistry only wait till the examining bodies send in practical specimens. This is the only time practicals are taught in a

rush, thereby subjecting the students to unwarranted assimilation. The worst is recorded at the tertiary institutions where all the practical requirements are virtually out of place. Here, the students are left to fend for themselves not minding the cost and risk implications. This is certainly a crude way of teaching and learning and can never bring about the most needed self-reliance and national development. There is an obvious relationship between development and the type of educational structures available in any country.

Conclusion

Let it be re-iterated here again that chemistry is all about every thing in the world (Okieimen, 2007). The importance of chemistry education to the nation and the world at large cannot be glossed over. If the afore-mentioned factors militating against its recognition and propagation are eliminated, Nigeria as a nation would certainly be great and ranked among the first world developed nations in the next fifteen years. All hands must be on deck.

Recommendations

From the fore going, it is quite obvious to say that if these factors among others are well tackled, Nigeria would have started laying concrete foundation towards becoming a first world developed nation.

1. Efficient Power and Infrastructure

Chemistry education requires a well-designed and equipped laboratory to achieve its primary goals of observation and investigation. A functioning laboratory is such that have the most basic facilities like power and water supply, chemical reagents and apparatus, current analytical instruments, adequate space and ventilation. The laboratory should also be manned by a highly skilled and competent technologist, for effective and rewarding application. This will enhance self-reliance and national development.

2. Primary Education

The enhanced concrete foundation should start at the primary school level. Since primary education is seen as the bedrock of all forms of education in any nation, Nigeria should not be left out (Umoh 2007). Every Nigerian child has the right to proper education and even science education. At this level, teaching should be based on demonstration and all participatory learning.

All hands must be on deck to ensure the workability of the Universal Basic Education (UBE) introduced by the Federal Government. There should also be a strict compliance of the N.P.E, especially as it affects the primary educational level. Interested and qualified primary school teachers should be employed.

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3. Funding and Management

The N.P.E (2004) quite acknowledged the huge capital involved in science education. The funding of science and chemistry education should be the concern of all and sundry and not to be left for the government alone. There should be an equitable and justifiable distribution of fund across the levels of education. Competent financial agency should be set up by the government to monitor and ensure judicious use of fund meant for specific educational projects. Nonetheless, higher premium should be given to science and chemistry education being the life wire for self-reliance and national development.

4. Quality Manpower

Science and chemistry education in particular will be meaningless for self-reliance and national development if the qualities of the teachers cannot be guaranteed. Chemistry education requires specialist, competent and dedicated teachers. To ensure self-reliance and national development, chemistry teachers should be given appropriate professional training by professional bodies. Science and chemistry teachers should be trained and retrained through seminars, workshops, and conferences on innovative teaching. Teachers themselves should aspire to acquire some professional knowledge and certificate in terms of educational training (Lapkin, 2000). Science and chemistry teachers through appropriate government educational agency should be supervised and monitored with respect to the discharge of their duties. This will enhance productivity, self-reliance and hence national development.

5. Accident and Hazards Free

No doubt that the benefits derivable from the knowledge of chemistry far outweighs the danger and hazards associated with it. Hence, an enabling environment reasonably free of conditions that might be detrimental to the physical well being of both students and teachers should be provided. Agbataekwe (2001) asserted that safety of lives and property is an essential aspect of any organization. Teachers and students are to be well educated of the need to be safety conscious especially in the laboratory at all times. Prevention is often said to be a better cure from an accident. Precaution signs should be pasted/posted at strategic positions in the laboratory. The laboratory should also be well illuminated and ventilated coupled with strategically located fire fighting equipment (Omokwale, 2007).

6. Beneficial School Curriculum

School curriculum in the sciences, particularly chemistry should be reviewed and restructured to meet up with the need and aspirations of the people. A curriculum that is practically driven and achievable should be put in place. Members of the curriculum drafting committee should be drawn from professional bodies like the Chemical Society of Nigeria (CSN), Institute of Chartered Chemists of Nigeria (ICCON), etc, to enable them restructure the curriculum with the view of meeting the present day reality

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