

REINFORCING FUNCTIONAL CHEMISTRY EDUCATION IN NIGERIAN SCHOOLS: A STRATEGY FOR ECONOMIC REHABILITATION

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Abstract

Functional chemistry education is an important vehicle in the achievement of economic rehabilitation. To this end, this paper has critically examined the concept of functional chemistry education and economic rehabilitation. Effective teaching-learning techniques in achieving functional chemistry education and its role in economic rehabilitation were critically analysed. The paper then finally examined the factors militating against actualizing functional chemistry education and strategies for reinforcing functional chemistry education in Nigerian schools.

Introduction

The reinforcement and advancement of functional chemistry education in Nigeria is a leverage for the creation of a firm foundation for the development of chemical technology. Zhavoronkov (1980) views chemical technology as the science of the most economical methods and process for the manufacture or production of various substances, products and materials, physical effects or their combination. Functional chemistry, which is a precursor to chemical technology that has been developing as science under the influence of production requirements, determines the progress of modern industry to a very large extent and hence economic rehabilitation.

Functional chemistry education in order for it to be more development-oriented requires more than teaching facts and imparting information rather it has to be a development of inquiry based learning through group work, project work and small scale research as methods of achieving breakthrough in areas of chemistry which will be of economic value to the Nigerian society.

The aim of the researcher is to see to how economic rehabilitation can be achieved through the reinforcement of functional chemistry education in Nigerian schools. Schools in this work refer to secondary, post secondary, tertiary and vocational schools.

Concept of Functional Chemistry Education and Economic Rehabilitation

Functional education is based on the natural need of the student to enquire, to know, observe and to work. Functional education in a nutshell trains students toward a practical mastery of the subject, it also makes the students to experience firsthand with studied subject by do-it-yourself work and experiment. In this vein, Abdullahi (2004) opined that functional education is a type of education which is concerned with practical application of knowledge based on the experience of the learner. Functionalism in education should not be associated with acquisition of non-academic skill jobs that can lead to quick and easy money making, wealth and prestige, which is a parochial view of functionalism.

Moses and Ohenhen (2004) view chemistry as an instrument of synthesis and analysis, being an aspect of science which deals with the study of substance composition and relates the behaviour of the substance to their composition. Against this backdrop, functional chemistry education implies the practical teaching and application of chemistry as an instrument of synthesis and analysis based on the natural need of the students and the experience gathered by the students in the different areas of chemistry. This points to the fact that functional chemistry education is not a theoretically based learning but a learning which includes more teaching of practicals and less theory.

For our educational system generally and chemistry education in particular to be functional, relevant, meaningful, qualitative and quantitative, it has to conform with the following measures as put forward by Njoku (2003):

- (i) Education should be directly related and relevant to the basic needs of the communities, the

- (ii) country and individual citizens of the society, Every individual should be able to contribute in the social, practical and economic development of his or her society through education,
- (iii) Human and economic resources wastage, minimization through a unique manpower and educational plans.
- (iv) The education system's input-output measures should be able to give rise to productivity and efficiency in all sectors of the society.
- (v) Education should be able to give the nation a status of self-reliance,
- (vi) The consumer of the educational system should see Diplomas, Certificates, and Degrees awarded by the official authorities to have the same value and significance.

In addition to the above six measures, our educational system should emphasize indigenous technology as well as services and maintenance of foreign industrial goods as against the current provision where emphasis is laid on foreign technology and foreign industrialized technology production without the corresponding foreign cultural background nor the local background - a phenomenon which makes us end up as white collar job chemists.

Economic according to Hawkins (1995) refers to that which is "enough to give a good return for money or effort outlaid" and rehabilitation as the restoration to a normal life or good condition. In this vein, economic rehabilitation can be seen as a situation whereby a country or an individual regains or improves on its production capacity in the areas of goods and services and its uses. If a country's or an individual's production capacity is going up and down or fluctuating, its economy is said not to be developing and hence needs to be rehabilitated.

Economic rehabilitation therefore refers to both the quantitative improvements in the general standard of living of the whole populace and to structural changes in the distributive input and output system of the economy. For there to be an improvement in the general living standards of the Nigerian citizens, rehabilitation should serve as a change process characterized by increasing productivity, equalization in the distribution of the social product and the emergence of indigenous institutions whose relationship with the outside world, and particularly with the developed centres of international economy, are characterized by equality rather than dependence and subordination.

Effective Functional Chemistry Teaching- Learning Techniques

In order to achieve the stated objective as it concerns functional chemistry education, it will not be out of place to discuss the techniques by which we can teach and learn functional chemistry so as to allay the fears associated with chemistry as a subject and a discipline. To this end the following teaching - learning techniques have been examined.

1. Experimentation (laboratory method): This is a learning situation whereby students are engaged in experimental study involving testing, analysis and preparing chemical substances. The concept of experimental problem solving is an integral part of chemistry. In other words, laboratory method of training utilizes a problem solving approach to learning, that offers trainee opportunity for supervised, individualized and direct experience in the testing and application of previously learned theory and principle and the refinement of specific skills or complex, capabilities.
2. Research (case studies): This technique of learning facilitates finding of solutions to observed problematic situation that occurs either in professional or daily life. This technique helps the learner to develop reflective thinking by defining the problems to be solved, discussing relevant data and various sides of the issues and verify facts to make judgments leading to a decision on the situation. This technique requires preparation both by the resource person and the participants. All available information must be presented. The role of the facilitator who must be skillful in the use of seminar technique, is to elicit options to keep the discussion without forcing a preconceived outcome on the group and to summarize the on-going discussion as necessary to keep it centred on the problem.
3. Participatory Observation: This technique allows the learner to be an active member of the

- system he is observing. The method of observation may be no concealment/intervention observation or conceal/intervention observation. The advantage or value of this technique is that it gives the participant a clearer and deeper insight into the situation being studied.
4. Apprenticeship (guided practice): This method of learning is carried out in demonstration and participation phases. In the demonstration phase, the trainer shows the participant how things are done and in the participation phase, the participant performs the functions under the instructions and supervision of the trainer. This is commonly experienced in organized chemistry workshops either formally or informally.
 5. Modeling: In this technique of learning, a simplified representation of reality is constructed; this helps the learner to become familiar with all aspects of the things without actually seeing or touching the thing. The advantage of this is that when the learner eventually comes into contact with the real thing it will not surprise the students.
 6. Excursion: This is a learning technique in which an abstract knowledge is made concrete through visitations that expose the participant to situations he has studied or is about to study. The art of seeing something may also make one to change one's attitudes toward the thing.
 7. Films: This technique uses films as teaching and learning techniques. This film, be it audio or video are used to pass information to teach skills and to change behaviour and attitude.

The above teaching - learning techniques are some of the techniques elicited by Oyibo (1998), which the researcher has observed relevant for functional chemistry education. In addition to the above techniques, the researcher elicited the use of information and communication technology especially the use of Internet in the teaching and learning of functional chemistry. This modern technique in the learning of functional chemistry include the use of different search engines such as, www.yahoo.com www.google.com etc which are used to search for new knowledge in the area of functional chemistry. The advantage of this technique is that it facilitates the quick learning of idea anywhere in the world no matter how recent, through down loading of facts from the Internet with the aid of the computers.

Roles of Functional Chemistry Education in Economic Rehabilitation

Chemistry plays vital role in our daily activities. In other words, chemistry in one form or the other is all around us. This implies that we feel it, see it and partake in it. In this light Moses and Ohenhen (2004) observed that the fields in which chemistry are applicable include food science and technology; medicinal and pharmaceutical; cleansing and disinfections; agricultural; petrochemicals, cosmetics, colour and dyes, dairy products, to list just few. The role of functional chemistry education in economic rehabilitation include:

- (1) Enhancement of small and medium scale entrepreneur: A well-grounded functional chemistry education is an impetus for the sustenance and enhancement of small and medium scale entrepreneurs in the Nigeria economy system. Functional chemistry education being a gateway to the production of several economic goods, it is a very important tool in the rehabilitation of our economy and also serves as a bridge in the development of manpower in this direction.
- (2) Poverty alleviation: Some of the very essential products of functional chemistry such as soap making, bleach production, shampoo and other cosmetic goods etc can be learned through guided practice (or apprenticeship) technique and this will in turn lead to the empowering of the Nigerian citizens and thereby economically boosting their status in the society and of course living a life above poverty. In other words, this will improve the living standard of rural people and reduce the occurrence of human trafficking, which is an evil vice caused by poverty.
- (3) Technological advancement: Enforcing the learning of functional chemistry in Nigerian schools is a necessary springboard for launching Nigeria into a new dawn of technological advancement hence contributing immensely to the rebuilding of our ailing economy. There are so many economies of the world, which rely on chemical technology; Nigeria can be one of these

countries, if functional chemistry education is enforced thereby reducing our dependence on oil for the survival of our economy.

- (4) Self-reliance/eradication: Functional chemistry education is a panacea to the eradication of youth preference for white-collar job. Once the youth have been empowered through the learning of functional chemistry, they become self-sufficient and self-fulfilled thereby reducing youth restiveness and ultimately making the youths to be self-reliant.
- (5) Improved currency value: One factor which contributes to devaluation of the Nigerian currency (the Naira) is over dependence on importation of goods. There are several goods which are imported into this country which with a proper foundation in functional chemistry education can be produced here, thereby discouraging importation of such goods and encouraging exportation of such goods through proper manpower development
- (6) Increased source of revenue for Government: Reinforcement of functional chemistry education in Nigeria schools has a very useful end product in the increment of the revenue yield of the three tiers of government in Nigeria. This results from an increased number of empowered populace hence increasing the number of people who pay tax and other revenue into government coffers, thereby boosting the country's economic base.

Factors Militating Against the Actualization of Functional Chemistry in Schools

1. Information and communication technology base: Insufficiency and inefficiency in the use of information and communication technology (ICT) facilities in the teaching and learning of functional chemistry is one of the greatest factors militating against the advancement of functional chemistry education in Nigeria.
2. Inadequate practical session: In the teaching of chemistry in this part of the world, more time is devoted to theoretical session and about ten percent (10%) of chemistry learning session is devoted to practical session. Functional chemistry education is a more practical oriented thing than theory. This boils down to improper allocation of time for the teaching and learning of functional chemistry.
3. Inadequate basic infrastructure: For a functional chemistry education to be successful, there should be provision of basic infrastructure and establishment of adequate chemistry laboratory. If we sincerely look around us, it is very glaring that the basic infrastructure required in our laboratory are not available.
4. High cost: The high cost of learning chemistry both at the secondary and tertiary levels discourages the government in funding chemistry and also discourages the individual in taking up chemistry as a course in the tertiary level and hence leading to a reduction in manpower development and subsequently leaving a wide gap between Nigeria and the developed world in chemical technology.
5. Attitudes of teachers and students: The attitudes of many teachers of chemistry are nothing to write home about. Some of these teachers while teaching do not see it as a point of duty to teach their students, those things which they see as functional rather these teachers take delight in teaching what is abstract and making the course look as if difficult thereby discouraging students and sending signals repulsive to students who intend taking up chemistry as a course.
6. Non-functional chemistry research: Some project supervisors in our tertiary institutions do not encourage students into carrying out researches which are functional, this does not in any way promote the enforcement of functional chemistry education rather it serves as a barrier.

Strategies for Reinforcing Functional Chemistry Education in Nigeria Schools

1. Adequate funding: The funding of chemistry education should not be a thing of the government alone, judging from the importance of this course. The private organizations and multinational organizations present in the country should as a matter of fact and urgency play contributory role at adequately financing and properly equipping of chemistry vis-a-vis our laboratories.

2. Establishment of Information and communication Technology units in chemistry department: Information and communication technology units should be established in every chemistry department by government and private organisations and the unit should be completely equipped with the basic facilities for information and communication technology.
3. Theory-practical time allocation: For efficient and effective teaching of functional chemistry there should be an appropriate allocation of time for theory and practical sessions. A time allocation of 60% to practical and 40% to theory should be adopted.
4. Encouraging Functional researches: project or research supervisors should encourage functional researches works by chemistry students. This will to a great extent make up for the losses in lesser practical sessions.
5. Re-orientation of teachers and students: Teachers and students alike should be re-orientated on the relevance of functional chemistry education and the reason why an atmosphere for teaching and learning of functional chemistry is necessary.
6. Functional chemistry curriculum development/implementation: Chemistry curriculum which will spell-out functionality should be defined as a matter of policy to serve as a base for the effective and efficient take off of functional chemistry education.
7. Special incentives to chemistry teachers and lecturers by government through granting of car loan, housing loan and research grants to lecturers; paying appropriate risk allowance, this will give the best of comforts and prevent brain drain.
8. Professionalisation of chemistry: Chemistry as a discipline should be professionalised and made commensurate to professional science disciplines such as pharmacy, medical lab science, medicine, engineering etc.

Conclusion

The neglect of functional chemistry education has been the bane in the achievement of advance chemical technology. To this end, the government should use the enforcement of policies, which is directed toward the teaching of functional chemistry in our school, and also promulgate policies, which will further reinforce it.

To achieve a stable and enduring economy in this country the reinforcement of functional chemistry education is an important strategy.

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