Chemistry Education and Entrepreneurial Development in Nigeria: Issues and Challenges

By

BILYA ABDU
Department of Chemistry
Federal College of Education, Katsina.

Abstract
Entrepreneurship is one of the drivers of the economy for any nation over the world. Entrepreneurial development leads to economic, political and social development. Chemistry being an investigative science which deals with the procedures and processes of making things has a role to play in providing the basic chemical knowledge and skills required for the active management of industries one of the entrepreneurial initiatives in any society. This paper focuses on the issues and challenges in chemistry in relation to entrepreneurial development. Suggestions and ways forward have been proffered.

Chemistry is the study of matter and energy and the interactions between them (Helmenstine. 2010). Chemistry has also been defined as the scientific study of the structure of substances, how they react when combined or in contact with one another and how they behave under different conditions (Hornby, 2005).

Chemistry is used in most fields of human endeavour: sciences, engineering and medicine. It is closely related to physics and biology (Helmenstine, 2010). Qualitative functional chemical knowledge is practical and useful i.e. chemistry-taught in such a way that it reflects on our immediate environment and developmental needs (Suleiman. 2010).

Formal education in Nigeria has not provided school learners with functional education rather, it has continued to turnout half baked graduates with mere certificates that are almost useless in most labour markets and industries (Jatto. 2004). There is much discrepancy between formal curricular and the present day market and industrial demands. The basic ideal which has been set to guide the educational system in Nigeria has been the principle that education is
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good only if it is primarily for the sake of developing the individual; that is the mission of education is to teach the individual how to think and act and how to develop and perform skills of his choice for his own benefit and for the benefit of the society. Entrepreneurship, according to Hisrich. in (Lankford, 2003), cited by Abdu (2010) is "the process of creating something different with value by devoting the necessary time and assuming the accompanying financial, psychic and social risks, and receiving the resulting rewards of most personal satisfaction". It is about self-reliance, which involves identification of a market and mobilizing necessary resources to serve that market through a business outfit. It is essentially about someone creating a market from his own resources.

Entrepreneurship education will helps to redirect the minds of youth towards world of business and independence, increase innovative and creative spirit thereby increasing the number of employer, than employees as well as ensuring stable national growth, development and sustainability. Deng (1993) in Uduma (2009) described education as intellectual yeast that ferments all spheres of national development. Skills development is synonymous with the best mode of science learning; that is learning by doing, for it is only by practice that skills in doing things develop in individuals. It is however sad to observe that in the early period of their education, youth find themselves in an environment not fully prepared for teaching and learning practical skills due to lack of adequate teaching and learning facilities.

**Issues in Chemistry Education and Implications to Entrepreneurial Development in Nigeria**

Although Nigeria is rich in human and natural resources, it is still one of the poorest and underdeveloped countries of the world. The climax is that there are so many graduates of nation's education system who are roaming about the streets as unemployed or job- seekers Nwachukwu (2009) cited by Matazu (2010). This is contrary to the aims and objectives of Nigerian education as contained in the National policy on education, which stresses the development of self-reliant nation. This shows that the policies and the practices in the schools have some wide gaps of form a (2005) in Matazu (2010). In reality products from chemistry ought to have acquired sufficient skills that would make them self reliant, prepare them to
enter into jobs and make progress in them. Chemistry education should prepare individuals to be self-employed in various enterprises.

The teaching of chemistry should be practically oriented; the practical relevant to the development of skills needed for entrepreneurial development and at the same time required for movement from lower to higher level of education, but it is mostly theorized because of lack of competent teachers or lack of equipments to enable that. Hence, students graduate without hands-on skills and minds-on experience (Offorma. 2005). This trend tends to make the relevance of chemistry education in the development of skills necessary for self-reliance. In another development Oriafo (2002) cited by Matazu (2010) argued that science education including chemistry education in Nigeria is grossly characterized by inadequacy of content and ineffective methodology by teachers, paucity of facilities, equipments and materials in our laboratories, as well as dominated socio-cultural lapses. These lapses have to be properly tackled for our science-education to produce individuals with sufficient skills for self-reliance. The present trend of mass unemployment in Nigeria shows that the science education including chemistry education being taught in schools do not prepare Nigerian graduates to function well in the nation undergoing transition from rural economy to modern economy (Nwachukwu. 2009). The course which should be taught as hands-on and minds-on experience practical course is basically taught theoretically; this makes the learners not to benefit maximally from their education. Hence, development of useful skills necessary for self-reliant living is lacking.

Challenges in Chemistry Education and Strategies for Improvement

Today's children will inherit a world of high technology, and they will probably spend less of their lives in paid employment than the previous generations. While at work, however they will need to be more efficient and more productive than ever before. In work and in leisure, their well being will depend on their knowledge, skills and creativity (Jatto. 2004).

The history of chemistry education in Nigeria is interwoven with the history of science education as chemistry education along with biology; physics, mathematics, geography etc constitute science in the curriculum.
Objectives of Chemistry Education in Nigeria

National Curriculum for Senior Secondary Schools Science (1985) cited by Mohammed (2009) stated that chemistry curriculum is aimed at:

• Facilitating a transition from secondary to tertiary level of education in the use of scientific concepts and techniques acquired in chemistry.
• Providing the students with basic knowledge in chemical concepts and principles, through efficient selection of content and sequencing.
• Showing chemistry in its relationship with other subjects.
• Showing chemistry and its links with industry, everyday life, hazards and benefits.
• Providing a course which is complete for its pupils not proceeding to higher education while it is at the same time, a reasonably adequate foundation for a post secondary course.

It is the position of this paper that the chemical knowledge imparted to learners; mastery of the scientific methods and the acquisition of scientific values and attitudes could tremendously help towards the development of entrepreneurial education for subsequent industrial sustainable development in Nigeria.

The provision of basic chemical knowledge and skills to children in schools is facing so many challenges which include:

• Lack of adequate and trained teachers; Manpower shortage is a challenging problem facing chemistry education in Nigeria. The demand for qualified personnel in chemistry especially at the secondary level is very high but few are seen in the class because majority of them prefer to go to industries and oil companies and other greener pastures. Teachers who are occupational!}) qualified and competent in their subject areas contribute immense!)} to the success of any educational programme (Adeifo. 1993).

• Lack of equipped laboratories; It is sad to note that secondary and tertiary institutions of learning are badly hit by poor infrastructural facilities such as unequipped laboratories with poor or lack of water and power supply, workshops and uninhabitable classrooms.

• Apathy on the part of practicing teachers due to unattractive condition of service.

• Lack of proper funding of the education sub sector; Science based courses chemistry inclusive are capital intensive and need adequate funding in order to function effectively. (Ulinfun, 1996) noted that funds are required for workshops, laboratories equipments and their maintenance.
• Gap between the acquisition of knowledge, skills and attitudes so acquired in chemistry and the application of these to societal needs vis-a-vis the existing chemistry curriculum.

Strategies for Improvement

The strategies for addressing the challenges of science education, chemistry education inclusive in Nigeria as suggested by John (200) in Yusuf (2010) are:

• Ensuring adequate provision of infrastructure, laboratory facilities for effective teaching and learning.

• Establishing a sound program of manpower training and development that will ensure regular updating of skills.

• In order to retain the qualified teachers in schools, condition of service should be improved for the teachers.

• Constant review of chemistry curriculum to meet the challenges and demand of the nation industrial and or entrepreneurial development.

• Involvement of science teachers and or chemistry teachers in the education and industrial or entrepreneurial development.

Role of Chemistry in Entrepreneurial Development

Chemistry being a course that touches the live of the citizenry through utilization of industrial products in agriculture, medicine, household cooking and cleansing materials, building, road constructions etc. could provide various job opportunities to the unemployed graduates with the basic skills needed in production using available local materials and could therefore serve as an avenue for entrepreneurial development in the country. Chemistry have cut across almost all fields of human endeavours and could therefore be utilized to meet the needs and aspirations of the teaming unemployed graduates in the area of job creation, since there are abundant opportunities which include the following (Dahiru, 2010):

• Enhancement of increase food production through sourcing for composts manure, production of fertilizer from local raw materials.

• Insecticides and pesticides production from local raw materials like neem tree seeds, sweet pepper and other plants materials used in grain storage etc. Chemical knowledge foundation could greatly assist in the search for more plant materials to be used as insecticides, herbicides, pesticides etc for boosting agricultural production and storage.
• In water treatment, use of Moringa seeds and other plant materials as coagulants exploits chemical knowledge to solve the problem of turbidity in drink ins water.

• In leather works and dyeing, some plant materials are used to formulate the colors used in dyeing clothes and also in tanning leather.

• In soap production and perfumery, chemical knowledge provides the basic skills.

• Environmental chemistry knowledge could offer one the information regarding the hazards of some chemicals to human health, the release of which should be safeguarded/minimized e.g. old batteries both wet and dry, smoke from exhaust, chimneys etc. The use of Iron scraps, old plastics, iron materials, t i n cans, polythenes etc for recycling and reuse, also provide jobs to self-reliant individuals.

Conclusion

Relevant and functional chemistry education is the bedrock of chemical knowledge and skills required for the effective and adequate utilization and application of the relevant practical knowledge that could be acquired by the students during their training in the various levels of education in Nigeria. This relevant and functional chemical knowledge however is not being given the necessary attention it deserves for the development and sustenance of entrepreneurial opportunities available in Nigeria. If this trends or attitude should be changed especially by reviewing the curriculum of chemistry and bringing out in it. the relevance of some content to entrepreneurial initiatives and the practical aspect of the chemistry curriculum, then we will be hitting the nail on the head at right angle and therefore helping the learners at various levels of education where such training is undertaken to develop the skills and potentials for entrepreneurial initiatives and subsequent development.

Recommendations

1. Government should encourage and sponsor students” physical projects that have relevance to local manufacturing in order to instill in their minds the love for entrepreneurship.

2. Emphasis should be given to practical knowledge that has relevance to production of materials when designing the chemistry curriculum.

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3. Schools should provide entrepreneurial training through mini projects by students of chemistry using the available materials.

4. Schools should encourage industrial trips and excursions for the students to avail themselves with methods of production and some industrial processes.

5. Use of improvisation techniques during teaching and learning should be improved in order to make the students develop interest in production of materials and facilities for use in their learning activities; this could help them develop the skills for manufacturing hence their entrepreneurial initiatives.

6. Relevance of some theoretical and practical chemical knowledge to day-to-day activities and also entrepreneurial opportunities should be pointed out when implementing the chemistry curriculum.

References


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