

EMPHASISING THE CREATIVE NATURE OF CHEMISTRY FOR THE DEVELOPMENT OF ENTREPRENEURIAL SKILLS THROUGH EDUCATION

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Abstract

The goal of education is entrepreneurship (Iyekekpolor, 2007). This is the development of an individual who is self-reliant and self-sufficient. Chemistry is an artistic enterprise. The entrepreneurial skills are all encompassed in the process skills of science of chemistry. The acquisition of professional qualification in chemistry equips an individual with skills to get into self-employment and small business if properly grounded in entrepreneurial and/or process skills. This paper is of the view that these skills can be developed if the learners are actively involved in chemistry classes. Recommendations were made on the role of the government and the teacher in developing the entrepreneurial skills through chemistry education.

Introduction

Education is defined in the new Webster dictionary of English language (2004), as the instruction or training by which people learn to develop and use their mental, moral and physical powers. It affords the individual the opportunity to acquire knowledge and skills as well as status that will enable him to escape from dull and unpleasant occupations (Olowo-Onyanemi, 2007). Asiruiwa (2005) regarded education in science and technology as centrally and necessarily concerned with teaching or training of individuals in order to acquire systematic skills, knowledge, attitude and application of these to the society.

In spite of the benefits of education to man and the society, the educational system has continually turned out products (graduates) with skills and attitudes that are neither need in the modes of operation nor saleable in the limited industrial-commercial establishments. This, according to Olowo-Onyanemi (2007) has continually led to mass unemployment of school leavers with the attendant problem of increased economic, social and moral vices. Aggarawar (1980) declared that all knowledge a learner gains will be of no use if he or she cannot make ends meet in real life.

The goal of education is entrepreneurship (Iyekekpolor, 2007), that is, production of an individual who is self-reliant and an employer of labor. Entrepreneurship plays a significant part in employment generation in any country because it enhances self-employment or self-reliance. This paper therefore, focuses on developing entrepreneurial skills through active learning of process skills or emphasizing the practical nature of chemistry.

The Term Entrepreneur

Entrepreneur is defined by Nickel in Uzoka (2005) as a clear manifestation of effective manipulation of human intelligence as demonstrated in creative performance. Igbo (1995) viewed entrepreneurship as involving risking financial, material, and human resources in a new way in the course of creating a new business concept or opportunity within an existing firm.

An entrepreneur is a person who organizes and manages a business, undertakes and assumes a risk for the sake of profit. He or she tends to start ventures that build on specific skills they have already acquired either through formal education or in a certain occupation or industry. The

entrepreneur is the chief executive or leader of a one-man business (Ugiagbe, 2007). In other words, an entrepreneur is one that creates, founds or originates. He or she is an architect, author, creator, inventor, maker or an originator (Roget's II, 2003).

Chemistry

Science is a branch of study especially one concerned with facts, principles and methods. It is the knowledge acquired by careful observation by deduction of the laws which govern changes and conditions by testing these deductions with experiments.

Chemistry as a physical science, is the study of the material substances that occur on earth and elsewhere in the universe. It is concerned with the utilization of natural substances and the creation of artificial ones. In the words of John Holman (1995);

Studying chemistry helps you to understand how materials behave, whether they are in the kitchen, in your clothes or in a builder's yard. It helps us to understand how to make better materials, how to get the energy we need and how to protect the environment

Chemistry involves process skills which are mental tools used in the discovering and acquiring of scientific knowledge. It is conversion, making process, production, rebirth, transfiguration etc (Roget;s II, 2003).

Entrepreneurial Skills in Chemistry

Skills are natural or acquired facilities in a specific activity. It is the ability to do something well. Entrepreneurial skills are occupational survival skills (Nelson and Leach, 1981). These skills are what we call process skills in science (chemistry). The process skills in chemistry are the paths (or ways) and strategies followed by the scientists in order to arrive at the product of science.

The process skills include, observation, classification, measurement, counting numbers, recording, communication, prediction, hypothesis, inference, experimentation, research, interpretation of data, controlling variables, generalization, etc. the use of these process skills over a period of time leads to an accumulation of scientific knowledge in forms of scientific laws, principles and theories, all of which put together, constitute the products of science. (National Teachers' Institute (NTI), 2006)

Development of these process skills will lead to acquisition of the skills that successful entrepreneurs tend to use to start their ventures. Some of the entrepreneurial skills are; creative thinking, planning and research, decision-making, organization, communication, team building, marketing, financial management, record keeping, goal setting, business management. (<http://www.mvp.cfee.or/en/selfassementskill.html>, 2009) Olalekan, (1998) outlined the following as part of entrepreneurial skills –observation, determination and interpretation of market, exhibition of knowledge and mastery of skills, ability to communicate, etc. All these skills are encompassed in the process skills.

The Place of Chemistry in Entrepreneurship

Entrepreneurship occurs when an individual develops a new venture. It is a new approach to an old business or an idea or a unique way of giving the market a product or service by using resources in a new way under conditions of risks (Umar, 2006). Entrepreneurship helps to create wealth, self direction, and satisfying career and also adds value to society's well being.

Chemistry on the other hand, is concerned with the utilization of natural substances and the creation of artificial ones. It is an artistic enterprise which offers a lot of occupational opportunities in areas like; (i) goods manufacturing: goods such as pharmaceuticals, food stuffs, packaging, detergents, soap, flavor, fragrances, pulps and paper, paint, candles, metals, textiles, agricultural products, oxygen, chlorine, ammonia, sulphuric acid, etc (ii) sale of goods, (iii) Analytical and Consultancy services (iv) researching (v) laboratory services (vi) consumer education.

The acquisition of professional qualification in chemistry equips an individual with skills to get into self employment and small businesses if properly grounded in entrepreneurial and/or process skills. Functional chemistry education emphasizes on applicability or transferability of the chemical knowledge to the immediate environment. This is the purpose of chemistry education as stated in the national policy on education (2004) – “acquisition of appropriate skill and development of mental, physical and social abilities and competencies, contribute to the development of his society.”

Consequently, chemistry education like entrepreneurship, aims to equip an individual to be self-reliant.

Teaching Chemistry to Develop Entrepreneurial Skill

Developing entrepreneurial skills through chemistry will be best achieved through an active learning of the process skill.

What learners learn is greatly influenced by how they are taught. For the learners to develop entrepreneurial skills, the teachers must have theoretical and practical knowledge and abilities about chemistry learning and teaching. The decision about content that teachers make, and activities, their interaction with students, the selection of assessment, the habits of mind that teachers demonstrate and nurture among their students and the attitudes conveyed, all affect the knowledge, understanding, abilities and attitudes that students develop. There is considerable research evidence that if learner are active in the class, they will learn more effectively (NCCE, 2009).

Active learning as a teaching-learning strategy emphasizes that the planning, teaching, and assessments are focused on the needs and abilities of the learners. The learners are actively engaged in doing most of the work by using their hands and brains in the teaching and learning process. In active learning, the learners are doing, manipulating, observing, reporting, measuring, recording, communicating, handling, etc. they are involved in process and entrepreneurial skills.

There are many advantages when learners are active participants in the class room activities. The advantages include information retention, learner-teacher interaction, learner-learner interaction, academic achievement, communication skills, team work, and positive attitudes towards the subject and the motivation to learn (NCCE, 2009).

Strategies for Active Learning

There are many active learning strategies that can be used in the chemistry class room. They include: discourse, games, excursion, role playing, drama, project, demonstration, discovery, brain storming, problem solving method, and process based approach.

These methods develop in students; critical thinking skills, creativity, open-mindedness, intellectual honesty, etc. These attitudes will not only help students in developing the process skills but also their entrepreneurial skills, and their socio-economic lives. These activity-based strategies yield better quality instruction and entrepreneurial learning.

Conclusion

One of the purposes of science education is to ensure that every learner has such a grasp of science as to be ready to cooperate with understanding in the application of science to man's need. This has to be pursued through active participation of the learners.

The learners should be taught through the handling of materials. They should be taught how to observe, classify, hypothesis, communicate, report, record, and conclude. Through acquisition of the above skill, unemployment and all the attendant social vices will be highly reduced in Nigeria.

Recommendation

Entrepreneurial skills are necessary to make an individual to be self-employed, self-reliant, and self-sufficient.

To facilitate the development of these skills, active participation of the learner is recommended. In order to involve the learners actively in the chemistry class-room, the chemistry teacher should take the following into consideration. The teacher should:

- focus on and support inquiries while interacting with the learners,
- orchestrate discourse among teachers about scientific ideas,
- challenge learners to accept and share responsibility for their own learning,
- recognize and respond to learners' diversity and encourage all learners to participate fully in science learning and
- encourage and model the skills of scientific inquiry, as well as the curiosity, openness to new idea and data, and skepticism that characterize science (National Science Standard, 2005).

The government has a significant role to play in developing entrepreneurial skills through chemistry education. There should be a continued and increased government support for chemistry and science in general to meaningfully contribute to socio-economic development. this could be achieved through:

- provision of facilities for active participation of the learners,
- periodic review of science (chemistry) curriculum,
- inclusion of entrepreneurship education in chemistry education curriculum,
- establishment of business incubation centers and
- provision of soft loans to chemistry graduates as a takeoff grant.

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