Traditional Practices in Plateau State that Promote the Learning and Teaching of Senior Secondary School Chemistry

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Abstract

Today, more than ever, senior secondary school chemistry teachers are being bombarded with requests to utilize the vast resources of the community to provide "real and meaningful" experiences and opportunities for early career decision making for their students. Teachers are being told that before students can generate a value system that will enable them to realize their fullest potential and subsequently contribute to a community, they must be provided with appropriate experiences. Experiences that will foster the development of positive self-concepts to the extend that students value themselves as an integral part of a community. Teachers are also told that just as everyday experiences do not occur in discrete, photon-like packets, they should not permit their students' learning potentials to be restricted by the walls of the school building. Within each specific course, outline-guides encourage teachers to provide community related "hands on experiences" and "realistic opportunities". This paper attempt to look at the learning and teaching of chemistry, and traditional practices in plateau state and their implications for the learning/ teaching of senior secondary school chemistry.

1. Introduction

Science is a systematic study of natural phenomena and technology is knowledge put to practical use in solving man's problems. Many great Authors like John Dewey (1966) said that the science of various disciplines grew gradually out of useful social occupations or human activities. That physics developed slowly out of the use of tools and machines which occurred in the course of seeking for means of accomplishing practical ends. Chemistry too grew out of processes of dyeing, bleaching, metal work and etc. Mathematics grew out of practical use of number in counting to keep track of things in measuring. Biology and agriculture grew out of man's search for health and food. Basic principles of cultivation, transplanting and the use of ashes intuitively as fertilizer were used in gardening prior to their application in modern agricultural practices. This means that functional technology develops endogenously, building upon local technical practical through application of ingenuity. What is needed in this direction therefore is to develop scientifically literate citizens who can manipulate their environment in rational terms so as to reap the fruits of their rich natural resources. Klopper (1969), suggests two components of scientific literacy as:-

1. To understand the key concepts and principles of science "survival science' which are related to ones' life;
2. To understand the relation of sciences to culture so as to understand the relation of science and related technologies on our contemporary society.

In appreciation of these two tenets of scientific literacy, the government of this country emphasized the introduction of science subjects to enable its citizens acquire the knowledge of their environment, develop problem solving skills and desirable scientific attitudes as well as increase the understanding of the role and functions of science and its application in everyday life (NCCE, 2003). The science curriculum also advocates for the use of local examples in enhancing science teaching in our schools (NCCE, 2003). This vital curricular provision has been neglected. Instructional processes in our classes today are devoid of relevant practices

from around us and are full of foreign examples, methods and ideas (UNESCO, 2004). With this, our education become consumptive instead of productive as our youth are thought to master their subject without relating them to Nigerian needs. Farombi (1997), explained that this approach makes many students shy away from science and the few that survive the rigours can not form any relationship between what they learn in the classroom and what they encounter daily. Shumba (1995), observe also that all learners in a society have rich sources of prior knowledge accumulated through various experiences that they get while interacting with their environment. He therefore opined that such experiences and cultural/traditional values should be used in teaching science, since it is believed that they influence sciences learning, its methods and values. The use of such traditional/cultural views would bridge the gap between the culture/tradition of the student home background and that of Western science which is believed to necessitate a traditional/cultural border crossing (Nichols, 1982; Muhammad, 2001). This border crossing leads to cognitive conflicts that can prevent students from effective concept formation (Muhammad, 2001). Fleer (2003), argued that when Western sciences is contextualized within traditional practices in Africa, learning outcome will be greatly improved. This piece is an attempt to agree with fleer when Western science is contextualized within traditional practices in Nigeria in general and Plateau State in particular, the learning of science in general and chemistry in particular will be improved.

2. Learning of Chemistry

Many great authors like John Dewey (1966) said that scientific knowledge grows out of human activities. For example biology grew out of the need to keep us healthy and chemistry grew out of processes of dyeing, bleaching, metal work and many others.

Pick up any secondary school statement of philosophy and you undoubtedly will read such comments as, “education is a multifaceted process”, “transfer of cognitive skills to vocational and ad-vocational settings” and “integration of learner and community” within each specific course, outline-guides encourage teachers to provide community related “hands-on-experiences” and “realistic opportunities. Thomas (1980), to achieve excellence in the learning process, the learner must be trained to use primary sources and direct participation in the learning process. He must be trained to make his own observations, designing ways of solving problems, choosing tools for investigation, carrying out investigations conceptualizing and evaluating himself (NTI, 2008). These are examples of strategies for developing individual excellence in sciences and technology education. Today, technological practices are not new as such but they are the modification of practices which have sustained society over the years. With research and new knowledge, such practices have been improved upon to suit prevailing condition and to solve society’s current problems.

3. Traditional Practices that Promote the Learning of Chemistry

The improvement of science literacy among citizens is a vital tool to economic, social and individual development in any country. In appreciation of this the government of this country emphasized the introduction of science subjects to enable its citizens acquire the knowledge of their environment, develop problem solving skills and desirable scientific attitudes as well as increase the understanding of the role and functions of science and its application in everyday life (NCCE, 2003). To achieve the scientific literacy, the sciences curriculum advocate for the use of local examples in enhancing science teaching in our schools (NCCE, 2003). This vital curricular provision has been neglected. Instructional processes in our classes today, are devoid of relevant practices from around us and are full of foreign examples, methods and ideas (UNESCO, 2004). With this, our education become consumptive instead of productive as our youths are taught to master their subjects without relating them to Nigerian needs. Farombi (1997), explained that this approach makes many student shy away from science and the few that survive the rigours cannot form any relationship between what they learn in the classroom and what they encounter daily. Shumba (1995),

observed that all learners in a society have rich sources of prior knowledge accumulated through various experiences that they get while interacting with their environment. He therefore opined that such experiences and cultural values should be used in teaching since it is believed that they influence science learning, its methods and values. The use of such cultural views would bridge the gap between the culture of the student's home background and that of Western science which is believed to necessitate a cultural border crossing (Nichols, 1982, Mohammed, 2003). This border crossing leads to cognitive conflicts that can prevent students from effective concept formation (Muhammad, 2001). Fleer (2003) argued that when Western science is contextualized with cultural practices in Africa, learning outcomes will be greatly improved.

In a developing country like Nigeria, the teaching of chemistry at the senior secondary school level has tended to be too rigid. The chemistry courses are essentially academic, their contents largely dictated by the requirements of stereotype examinations such as the West African School Certificate, the National Examinations Council and the University entrance Examination Chemistry instruction has tended to concentrate on presenting the "pure" substance of the field, perhaps on the premise that a basic understanding will endow the user with the knowledge useful for any pursuit.

The teaching of chemistry at the secondary school level in Nigeria should aim at attainment of the following objectives.

1. To create in the students an awareness of the impact and the influence chemistry has on the society, there by preparing him for a life in a technological age.
2. To equip the students with the ability to demythologize his environment and to recognize the scientific basis of some of the natural phenomena around him.
3. To develop in the students those manipulative and experimental skills necessary to make him competent and confident in the investigations of the materials around him.
4. To inculcate in the students a scientific approach to problem solving in every day experiences, a commitment to arriving at conclusions from the information knowledge and understanding available. Okwu (1980). The senior secondary school chemistry course should therefore be developed along two lines, one concerned with basic chemical theory and the other with importance and relevance of chemistry in everyday life.

To ensure continued interest in the subject, chemistry instruction should relate to basic chemical principles to the everyday experiences of the students. There are manly traditional African ways of life and customs which are based on empirical scientific processes. Although the chemical principles underlying some of these activities might be basic, these traditional techniques can provide valuable link between school chemistry and life at home. Some of these traditional activities mentioned by Ikoku (1973), Bajah (1975), Hussani (2007), Fafunwa (1983) include:-

1. Local salt production,
2. Traditional iron smelting and forging,
3. Brewing and distillation of alcoholic drinks,
4. Manufacture of local dyes and medicines,
5. Vegetable oil extraction,
6. Black soap making,
7. Tanning of leather,
8. Ash filtrate preparation,
9. Black smithing,
10. Salting, drying and smoking of food materials.

Industrialized countries have similar scientific principles involved, even though the tools used are very different. The making of African black soap for example involves the same chemical processes of saponification which is essentially lubifatty acid reacting with a base. Numerous scientific principles are observed in African society weather it is the making of bow and arrow, pottery or even with sophisticated

biological knowledge of salting, drying and smoking of food material to stop metabolic processes that may end up in the decay of food.

Most of these skills are ignored in favour of imported technology. For Nigeria to develop in a more rational way, we must be ready to develop our indigenous capacities. We must develop and accept our local ingenuity through relevant research. If we must import anything, it should be for mere purpose of imitation and subsequent remodeling and construction of products to suit our local conditions

4. Conclusions and Suggestions

Teachers of chemistry have been told that just as everyday experiences do not occur in discrete photon- like packets, they should not permit their students learning potentials to be restricted by the walls of the school building. The senior secondary school chemistry curriculum of developing country like Nigeria should be broadened to incorporate local activities which can be described as both traditional and technological. Chemistry class discussion and demonstrations which relate chemical principles and processes to the local activities which the students are familiar with will not only help to maintain interest in the subject but will also create a scientific awareness in them. They will begin to recognize the scientific bases of the processes and activities around them as well as appreciate the influence and applications of chemistry to ones every day life.

It is here recommended that student's visits to local blacksmith will offer them the opportunity of seeing a chemical principle used in their local activity in their village. Similar visit can also be organized by teacher and students to these traditional practices that have chemical principles. These could include: the palm wine tapping, fermentation and distillation industry, the local salt production field, the tanning industry; the groundnut oil extraction, the extraction and preparation of African black soap and etc.

It is recommended that further studies be carried out to.

1. Investigate the effects of the traditional practices-based instructional package on students' interest in chemistry.
2. Assess the ability of would-be chemistry teachers in identifying relevant concepts/topics that could be explained using traditional practices

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