FOSTERING THE UNDERSTANDING OF SCIENTIFIC CONCEPTS USING INDIGENOUS INSTRUCTIONAL STRATEGIES

By
Mrs. Musilimotu T. Hassan
Biology Department
School of Science Education
Federal College of Education (Technical), Bichi
Kano.

Abstract

This paper reviewed how the teaching and learning of scientific concepts can be enhanced through indigenous learning strategies. The paper cited some scientific concepts such as motion, elasticity and fermentation and suggested materials and strategy that could be used to teach them. The paper concluded that indigenous learning strategies help students to overcome learning challenges in the science classroom. It is recommended that teachers should adopt indigenous instructional strategies to enhance teaching scientific concepts.

Key words: Indigenous practices, scientific concepts, instructional strategy

Introduction

Indigenous knowledge is referred to as the traditional or local knowledge which is embedded into a community and is unique to a given culture, location or society. It refers to a large body of knowledge and skills that have been developed outside the formal school system, to which the community owes survival (Hayatu, 2005). It is the knowledge used by the local people in order to make a living in a particular environment (Warren, 1991).

Indigenous knowledge systems are dynamic and result in continuous process of experimentation, adaptation and innovation. It has the capacity to blend with the knowledge based on science and technological efforts to solve problems associated to social and economic development. It is not systematically documented, rather it is orally passed through generations but culturally oral. Such knowledge is being considered as cultural knowledge in its broadest sense (Ojo, 1998). Also research conducted by Emery (1996), identified indigenous knowledge to include those associated with practices and technology; Beliefs, Tools and Equipments, of a given people.

The Influence of Culture in Learning of Science

The influence of cultural background in the learning of science cannot be over emphasized. Aikenhead (1996) stressed that learning of science involves negotiating meaning, comparing what is known to the new experience and resolving discrepancies between what is known and what seems to be implied by new experiences. This is more prominent in Africa where science education has been greatly influenced by cultural beliefs.

Science has more conflicts in the classroom with cultural beliefs and practices. Igbokwe (2009), said that the problem is complicated by the fact that most of the classroom in Nigeria are made up of children of varied cultural background and diverse world view. In view of the diversity in perception, it is necessary for science teachers to address the issues of languages, customs and experiences that students from different communities bring to science classroom. Science teachers are therefore faced with complex problems of creating suitable learning situation for their students with varied cultural background.

Culture is the complex whole man's acquisitions of knowledge, moral belief art, customs e.t.c which are shared and transmitted from generation to generation. It could also mean everything which is socially learned and shared by the members of the society. This includes the relationship between people in the peers or groups or cultural behavior or thought of the individual in the societies.

Culture has a lot to do with the achievement in school work, therefore it is suggested that, it is necessary to study the culture of a society before developing its curriculum. Failure to doing this could result to a mismatch between the background of the learner and what he should learn (Jegede, 1997).

Science is a cultural enterprise with its own ideology and fundamental knowledge. It should be noted that the environment of the child determines what he learns and become in later life. It is a fact that every society educates the younger generation by means of passing down the cultural heritage of its people. In Nigeria, the cultural beliefs of a child have a lot to do with learning of science in school. Science teachers should act as "gate-keeper", whose control is to scientifically store a scientific knowledge and attempt to socialize students with the culture by arguing them to develop attitudes accepted by a particulars world view (Aikenhead 1997).

Teaching of some scientific concepts using indigenous instructional strategies

Jegede and Aikenhead (2000) opined that indigenous instructional strategies have positive effect on some scientific concepts because some of these practices are in agreement with the contemporary science practices and scientific concepts. Thus, when science concept are taught with the strategies they will be more meaningful and easily conceived by students. The following are some of the scientific concepts which can be taught using indigenous instructional strategies.

a) ***Concept of Motion***: - The concept of motion involves the idea of how things move and what makes them to move. Examples of the things to use in teaching the concepts using indigenous instructional strategy is Toy-top or shell spinning game.

Materials to be used:- The materials used are snail shell.
Procedure:- Spin (play) the shell, it first moves in a rotating way because of the energy impacted by the player. As time goes on, the energy reduced gradually to the extent that the shell continues to move forward and background and later in an irregular – way until it finally dies off and falls to the ground.

Scientific Knowledge:- The shell spinning can be used to described four types of motion namely:- Oscillatory, rotational, translational and random motion. Oscillatory motion is a to and fro type of motion. Rotational motion is the movement of a body in a circle about a centre. Translational motion is the movements on a straight line from one point to another. Random motion is the irregular movement of the object with no preferred direction.

b) **Concept of Elasticity**:- This is a property which enables a body deformed by an applied force to return to its original size and shape when the force is removed. Example of the indigenous instructional strategy is the use of catapult.

Material Used:- Materials used in construction of catapult are: strip of rubber tube, leather, Y-shaped stick.

Procedure:- The catapult is stretched to gain energy and when released the stone inside the leather is forced out or released, while the rubber that has been stretched, now come back to its origin shape and size.

Scientific Knowledge:- A material that returns to its size and shape after distortion is known as elastic material. As the force applied on the material increases, the extension produced also increased.

c) **Concept – Fermentation:-**

Material used:- Millet/Guinea corn, fire wood, pot, sieve.

Procedure:- During fermentation of local alcohol, millet or guinea corn grains are washed and soaked overnight with plenty water, to remove the dirt. The water is filtered and the grains kept in a sack for two days to germinate. After germination, it is thoroughly dried and grinded to powder. The powder is diluted in water and cooked for two days; it is allowed to cool, then sieved and poured in a pot and covered to allow it to further ferment.

Scientific Knowledge:- The conversion of starch to alcohol by the action of bacteria in a chemical process called fermentation. This could be taught by using local materials as explained above.

d) **Concept of Density**:- Density is defined as mass per unit volume. The density of a substance is the relationship between the mass of the substance and how much space it takes up (volume). The mass of an atom and the size and how they are arranged determine the density of a substance.
Material Used:- Fisherman floating on a calabash.

Scientific Knowledge:- Water is heavier than the calabash, therefore the calabash floats on the water.

e) **Concept of Pressure**:- Pressure is defined as force per unit area. It is usually more convenient to use pressure rather than force to describe the influence upon fluid behavior.

Material used:- Butcher's inflation of a goat or cow.

Scientific Knowledge:- Pressure is applied by the butcher which causes the inflation of a goat or cow.

f) **Concept of Acid and Base**

An acid is any substance that increases the concentration of the hydrogen ion when it dissolves in water.

A base is any substance that increases the concentration of the hydroxyl ion when dissolve in water.

Material used:- Acids – Tamarinds and Lemon.

Base:- Potash ash

It only requires that the teacher becomes creative to explore the surrounding for relevant indigenous practices that will enable him effectively teach his subject.

Conclusion

Indigenous instructional strategy is a functional approach for science teaching. Science teachers should make use of this teaching strategy to impact some scientific concepts to the students. This teaching strategy will enable the students to understand some scientific concepts while maintaining their world view.

Recommendation

1. Science teacher should incorporate the indigenous learning strategies to provide students with functional knowledge that could enable them explore their environment, by observing relationship between what they learn in science and their environment.

2. Science teachers should be encouraged to attend seminars, conference and workshop which will educate them more on the effective use of indigenous instructional strategies.

3. Indigenous instructional strategies should be used by science teachers to solve scientific problems, manage resources, and societal problems.

4. The federal government should introduce the use of indigenous instructional strategies in teaching some concepts in science using our local products, which will become the basis of our industrial growth. This implies that science and technology can flourish better using this method.

5. Development of indigenous technology should be encouraged.

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mtnforum.mfsupprt@mtnforum.org