ENHANCING THE TEACHING AND LEARNING PHYSICS CONCEPTS FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

By
Waperi A. Kaigama
Department of Physics
Federal College of Education (Technical)
Potiskum Yobe Stste

Abstract
This paper focused on the teaching and learning of physics concepts in physics in Nigeria secondary schools with respect to the indispensability of energy for sustainable development. It reviewed the problems militating against successful teaching and learning of this subject in our schools and highlighted some of the uses especially in the modern day technology including the refrigerator and the advancements made in Information, Communication Technology. Some of the problems militating against the teaching of physics in our schools include inadequate and ill-equipped laboratories and lack of well trained teachers as well as insecurity and corruption in the education sector. It is suggested that environmental education, training of teachers and provision of well-equipped laboratories with adequate security conditions in the laboratories, school compound should be given the necessary attention.

Keywords: Concepts in physics, energy, corruption, laboratories

Introduction

Physics offers an important additional insight to understanding of sustainable development through the appropriate application of some concepts like "energy". The concept of energy according to Goran (2009) is a property of matter that can be converted into work, heat and radiation. He stressed that sustainable development is increasingly becoming the responsibility of proper teaching of physics as a subject.

Mensah (2004), emphasized that one of the constraints to sustainable development stems primarily from schools' curriculum especially in science. He suggested that there is need to review this in line with the information age. Secondly the training of teachers in the act of teaching professionally must be addressed. Teachers should look at the issues of pedagogy and learning opportunities that are available and avail themselves of such.

It is very clear that the world we live in is constantly changing and being moved by the progress being made in the physical sciences especially in influencing technology through teaching and learning processes. This has benefited developed nations who keyed into the opportunities offered by the current phenomenal increase in physical sciences and technology in the area of Information Communication Technology (ICT).

According to Anamuah in commonwealth (2003), if physics teaching is to play its roles as primary agent of transformation for sustainable development countries like Nigeria need teachers that will help prepare learners to be involved in the transformation. However, Orelt (2014) opined that there is still an enormous deficiency of teachers across common wealth countries. He projected that by 2020, Sub-Sahara Africa alone will need about 1,295,000 teachers, if the goals of upper basic education are to be realised. Furthermore, from 2015 to 2021, the teacher education programmes should strive to equip more teacher education institutions so as to deliver effective learning opportunities for sustainable development.

The Concept and nature of Energy in Physics

One very crucial part of the physical sciences is energy. Energy is all that is required to accomplish tasks and is never destroyed. According to Anyakoha (2011), the famous relation of Einstein equation $E = MC^2$, states that matter is just a form of energy, and energy can only be converted from one form to another in different forms. In life, energy relates nature in three different forms, through fundamental sub-processes in which energy is being utilized. These processes are:

i. Production
ii. Consumption and
iii. Decomposition

These maintain the circulation of essential material substance by using the incoming solar energy in a sustainable and evolutionary way. For example green plants represent the production process, converting energy from sunlight into the energy to be used. Rich substances of biomass, via photosynthesis pass through different food chain in the ecosystems. At every tropic level, energy is consumed and decomposition organism dominates the last level in the food chain. Thus, the energy capital on earth is increasing, which is a key element in nature's process of reshaping the physical condition on earth in order to maintain the evolution of life. But the threat is that the present industrial society is built on an unsustainable resource use. Resources depletion and environment destruction occurs. Definitely these substances will unavoidably end up in the environment, Iwena, (2012).

Sustainable Development

According to the World Commission on Environment and Development (WCED) (2015), sustainable development is geared towards meeting the needs of the present, without compromising the ability of the future generation to meet their own needs. In nature, everyone wants to get what he/she needs now and forever. But this does not free the rich from dealing very concretely with the problems associated with the redistribution of current wealth to those who are in great needs. Still needs must be treated with global justice to retain its meaning. According to the commission's report, our common future is focused on three (3) pillars of human well-being. These pillars include;

a. Economic condition: such as wealth employment and technology.
b. Socio-Political condition: such as, security and democracy.
c. Environment and resources conditions: such as, the quality of air, water and the availability of capital in form of natural resources.

Furthermore, the commission added that in addition to these pillars we also need to rely on certain physical conditions of life support system if we want to reach sustainable development.

The present unsustainable situation we are facing is due to the altered physical conditions and features of the earth, in the name of development. And this is threatening the very existence of higher forms of life including human beings. Eventually we must look beyond present, religious, political and economic structures to find conditions suitable for sustainable development (UNESCO, 2015). One of the ways to actualize this is by creating adequate knowledge power that is inherent in education

Enhancing the teaching and learning of the concepts in physics remain the necessary ingredients that underlie sustainable development. This is because it touches the four aspects of human well-being as declared in UNESCO (2015) namely environment, society, culture and economy. Energy use in its various forms is one aspect of guaranteed sustainable development.

Constraints to the Teaching of Concepts in Physics

The major factors that underpin the teaching of concepts in physics include corruption, insecurity, laboratory condition, teacher's qualification, physics content and methods of delivery and the societal needs. The interaction of these factors with the learners according to Entsua (2014), affects the learner's performance especially at secondary school level.

Corruption

Corruption according to Akpan in Arelt, (2014) is the misuse of public power by elected politician or appointed civil servant for private gain. Waperi (2012) also defined corruption as the misuse of entrusted power (by heritage, education, marriage, election, appointment etc. for private gain.

Priye, (2013), described corruption as; an improbity or decay in the decision making process in which a decision-maker consents to deviate or demands deviation from the criterion which should made his or her decision making, in exchange for a reward or for the promise of expectation of a reward, while these

motives influencing his or he decision making and cannot be part of the justification for the decision. Corruption is the greatest challenge to sustainable development. And corruption has eaten deep into Nigerians blood system, it has manifested in every government organizations and non-governmental organization. For example; there is corruption in the house, corruption in the military and security services, corruption in the high ways, corruption in the business organizations and even in the religious institution, there is corruption.

No nation can move forward towards sustainable development when there is corruption syndrome. Jacob, (2013) in his paper titled "importance of physics education to suitable development states that; Nigerian today is whom you know. To be employed, it is whom you know admission at all levels are not based on merit but whom you know corruption and mismanagement have been thorns in the flesh of Nigeria's economy over the years. According to Transparency International (TI), (2011) report cited in Oyinola (2011), Nigeria ranked 144th out of 146 corrupt nations in the world, beating only Bangladesh and Haiti to second and last positions respectively.

Oyinola (2011), further reported that the menace is pervasive in education sector right from primary to tertiary levels due to corruption, money meant for infrastructural development and maintenance are often misappropriated by educational institutions leaders and those in government. Thus, making the students to be at the receiving end of not having adequate and standard infrastructure and facility for effective teaching and learning of science especially physics concepts.

Insecurity

The issue of insecurity is the whole world is worrisome in recent years. For example, the issue of Bokoharam in the north-eastern part of the country Nigeria has made people to live in fear of uncertainly of death from terrorists and insurgency. Teachers and students do not know their faith and hope in life, even when sleeping, they cannot sleep with two eyes closed because of the issue of insecurity. It is a very serious obstacle to school curriculum implementation.

No Education no Sustainable Development ESD (2014). And education for sustainable means including key sustainable issues into teaching an learning. Insecurity is a serious challenge and barrier to rearunting our educational systems in schools. For example; terror attacks on educational organizations in Afghanistan, indirect impact of insecurity one education. How insecurity affected primary school attendance in Damaturu metropolis, Yobe State. Etc.

Laboratory Condition

The role of laboratory in physics education cannot be overemphasized the success of any science subject like physics depends on the provision of well-equipped laboratory. Abdeem (2012), stressed that laboratory plays vital roles in technological oriented science curriculums and provide the students the opportunity to engage in the process of investigation and inquiry. Despite this, many schools in Nigeria are lacking laboratories while the available ones are ill-equipped. For effective science teaching. Aago (2004) stated that because of the poor nature of the laboratories in the schools, science teaching has not been thoroughly demonstrated that could aid students understanding of difficult concepts in physics.

Teachers Qualification:

Quality teachers make a great difference in every instruction. They are the single most important factor that influences student's performance. They are the ones who manage the resources, adopt appropriate delivery methods and interpret the content of the curriculum. We need talented teachers to teach physics. Those with the responsibility to nurture physics understanding and inquiry and developing innovative capacity in the youth enabling them to be knowledgeable, talented, motivated and committed. The learners should be expected to cultivate as well as the teachers the spirit of creativity, imagination, original thinking open mindedness and critical thinking. Teacher should be able to assist the students to find better ways of doing things.

Curriculum Content

According to Ameh, (2003), the only way to improve the meaningfulness of physics education to people is to allow the community culture and knowledge to contribute to its content and delivery. Science content sometimes tend to under estimate the potential of local or indigenous knowledge and practices. In many cases, the practices in schools tend to marginalize such knowledge. This makes physics abstract to students at secondary school level. Some traditional practices such as use of charcoal, fire wood, corn cobs, groundnut shells, etc for energy generation as well as use of animal wastes constitute rich source of energy.

There is also an increasing awareness of serious difficulties on the side of teachers which also result from the same factors. In real life, these constraints mentioned above are connected to other aspects of learning conditions, like conceptual difficulties as well as procedural issues which often are not sufficiently taken into account by some teachers during classroom instruction (Joseph, 2007).

The need for restructuring of the teaching and learning of concepts in physics is apt and will clear many students' misconceptions as well as increase awareness of the current situation of planetary emergency to achieve sustainable development.

Conclusion

Educational institutions have a crucial role to play in meeting and tackling the challenges towards sustainable development. This must be based on a true understanding of and practical applications of physics concepts like energy. It is a concept that offers a physical description of life-support systems as well as better understanding of the use of energy itself and other resources within the society. It gives rise to the evolution such other resources as nuclear power, solar power, crude oil, water resources and so on.

Recommendation

The development of physics education has solutions to Nigeria's social and economic problems. Teachers should be resourceful in the teaching and learning situation. Practical activities should be encouraged at all levels of education. New and abstract concepts should first be subjected to laboratory analysis and these laboratories should be sufficiently equipped.

All round security should be put in place and trained personnel must be employed to team up with the existing staff in schools and the society in general.

In-service training should be given to the teachers from time to time for better output. The philosophy and goals of education should be clearly articulated. Government should collaborate with non-governmental organizations and individuals for the attainment of sustainable development in Nigeria.

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