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Review

Classroom science with everyday life: A means for improving performance in sciences and national development in Nigeria

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Science is a body of knowledge about the natural world (the environment) that is testable, verifiable or falsifiable by using organized scientific methods and skills. It has been generally asserted that the rate of development of any nation depends on the level of her citizens' scientific literacy and competence in science process skills. The methods of teaching/learning science in Nigeria have hardly provided for the acquisition of these literacy and skills. There is also a reported dwindling in performance and enrollment in science. For Nigeria to be able to move forward and achieve sustainable development, more needs to be done in terms of scientific literacy and process skills of individual Nigerians. This paper posits that the dwindling performance and enrollment in science is as a result of the disconnection between classroom science and everyday life which makes the science learning uninteresting and irrelevant to the student. There are common phenomena in the student's environment that can be connected to classroom science by several planned and organized activities by the teacher. To promote meaningful learning, and thus empower the individual for national growth, this paper recommends a bridge of the disconnect (gap) between classroom science teaching and everyday life.

Key words: Everyday life, classroom, science, connecting.

INTRODUCTION

Science and scientific literacy has been acknowledged as the bedrock of development of any nation. Reports have it that there is a low enrollment as well as poor performance in science. This has been attributed to a number of factors including a disconnection between the science as taught in the class room and the practical problems a child faces in the home, market places etc. (Oloruntegbe, 2012). This paper proposes a bridge between classroom science and science in the home as a means of improving enrollment and performance in science in Nigeria. The paper takes a look at the meaning and importance of science, problems of science teaching in the classroom, scientific phenomena in the environment, the disconnect, and the way forward.

Meaning of science

The term science has been defined variously by several authors. According to Staver (2007), science is a way of knowing, a method of learning about nature. It is a body of knowledge in which human quests to understand natural phenomena and respond to challenges are conducted through processes by which the knowledge is

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testable, verifiable, or falsifiable. It comprises concepts and facts which are subsumed in laws; the laws being subsumed in theories (Eshiet, 2004). Alozie (1996) defines science as “a systematic process of obtaining knowledge through experimentation and empirical testing of speculations’. It is a “conceptual framework of interpreting the physical and its manifestation in terms of testable, falsifiable statements and theories supported by evidence and data” (Alozie, 1996).

According to Miller and Levine (2007), the goal of science involves investigating and understanding the natural world, to explain events in the natural world and to make useful predictions from the explanations. “Science is an organized way of using evidence to learn about the natural world”. It can also refer to “the body of knowledge that scientists have built up after years of using this process” (Miller and Levine, 2007).

Generally speaking, science is concerned with finding out about our environment and how the various components relate with one another (Agogo, 2017). Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence. According to Science Council (2017), science involves a number of procedures known as methods or methodology which include: Objective observation (Measurement and data, possibly although not necessarily using mathematics as a tool); evidence; experiment and/or observation as benchmarks for testing hypotheses; induction (reasoning to establish general rules or conclusions drawn from facts or examples); repetition; critical analysis; verification and testing (critical exposure to scrutiny, peer review and assessment).

According to How Kids Learn Science Best (2017), real science is learning about the world through hands-on observation, experimentation, and discovery. Doing real science starts with a question, followed by activities to explore and to seek an answer. Real science is not just for the classroom but is part of everyday life. Real science develops skills, ability, and capacity, not just knowledge. Science therefore, from the various definitions, is a body of knowledge about the natural world (the environment) that is testable, verifiable or falsifiable by using organized scientific methods

Importance of science

The rate of development of any nation depends on the level of her citizens’ scientific literacy (Ador, 2017). Science education is very important to the development of any nation; that is why every nation must take it very serious in all institutions of learning. Many of the developed worlds were able to achieve so much in science and technology because of science education (Kola, 2013).

According to Samiksha (2016), development is linked to technology which can only take place by advancement in science. In other words, science and technology go together for development in an individual and the nation. Science gives rise to technology and technology forms the basis for development or under-development. Any nation therefore, whose citizens lack scientific knowledge is in danger of under-development (or remaining under-developed) because without proper science education, technology cannot advance (Kola, 2013). In fact, “a scientifically unsophisticated society means an under-developed nation in all sectors” (Samiksha, 2016). The advancement of a nation should manifest in the methods and equipment used in all sectors including medicine, agriculture, communication, textiles etc. Science, if properly taught (or learnt) in schools, can equip an individual enough for self-reliance (thus creating employment) in areas such as fishery, ceramics, chalk making, soap making etc. (Kola, 2013). In fact, in the 21st century, the word ‘science’ means ‘solutions’; it is the solution for all the world’s material problems (Oduor, 2013). Staver (2007) summarizes the purpose of science education into three as follows: Preparing the individuals to study science at higher levels of education; Preparing the individuals for the employment; and Preparing the individuals to become more scientifically literate citizens.

The disconnection problem

Learning is mediated by highly articulated tasks and activities in the social contexts of day-to-day living. Patterns of activity from school often do not fit the more articulated activities that children observe or in which they participate outside school. This disconnect can lead learners to perceive school learning as separate from life learning (Bouillion and Gomez, 2001). More so, up till today many teachers still hold onto the chalk and talk method of teaching which has been condemned as not appropriate, and cited as one of the reasons for Nigeria’s backwardness (Ushie and Anake, 2015). Consequently, the learners do not see science as it affects their everyday life and the teacher makes no effort to connect the concepts with the students’ everyday life. Thus the student’s interest is diminished which in turn affects performance.

Oloruntegbe (2012) confirms that there exists some tension between school science and home activities which form one important reason, out of many, why students’ performance in science is getting poorer by the day. There is a disconnection between schools and students' home communities. Schools are in communities but often not of communities. That is, teaching and learning are often disconnected from the day-to-day life of the community, and students do not see how the skills they acquire in school have currency in business, at home, and in other communities beyond school (Bouillion and Gomez, 2001). This is largely because science as

presented in school bears no relevance with daily activities carried out at home by the children. As important as these science subjects are, students' performance has not been encouraging.

According to Jatto (2004), formal education in Nigeria has not provided school learners with the functional education, rather, it has continued to turnout half-baked graduates with more certificates that are almost useless in most labour markets and industries.

Kola (2013) avers that over the years there has been low enrolment in the sciences in our institutions and, according to him, the causes of this low enrolment include society disdain, mockery of the teacher and low prestige of the teacher. This paper however feels that the main cause of low enrollment and low performance is rather disconnect between classroom science and the students' environments (the home, the market place, the farm, the church etc.). To confirm this, Mberekpe (2013) identified the use of abstract standardized materials as one of the most important. Imagine a biology teacher wishing to give examples of mammals and he goes to mention elephant or whale which he himself or the students have never seen, whereas there are abundance of common examples the students are familiar with such as dog, goat, rat etc. Presentation of science in this way creates a conception of science as abstract, and the students tend to learn by memorizing for the purpose of examinations without really acquiring the required skills.

Emphasizing the importance of science skills development, Benchmarks for Science Literacy avers that it prepares students to "make their way in the real world, a world in which problems abound-in the home, in the workplace, in the community and on the planet." In this technological age, knowing how to acquire and evaluate information and how to use it to understand and solve problems is a prerequisite for most jobs our students will have as adults (Valentino, 2000).

Usually when students or children ask questions on scientific phenomena in the environment, the tendency is for the teacher or parent to quickly provide the answer. This in turn results in stunted learning experience, whereby the child has to learn by memorizing the facts and which does not make for good science learning. Rather, the child's curiosity can be answered by in turn asking him questions to help him see what he already knows, what he thinks, what he needs to learn, or what he needs to do to answer his own question (Home Science Tools, 2017).

Scientific phenomena in the environments

The general objective of basic science education is to enable pupils observe and explore the environment using their senses and their hands. The recipients are able to meaningfully interact with the environment (Agogo, 2017). This will build a strong base for them to study science at whatever level, thus equipping them for meaningful contributions to national development. There are a lot of phenomena in the child's environment that have scientific connotations and can be used to teach science with hands-on experiences. This can make learning experience more meaningful and lasting as averred by Coolidge-Stoltz et al. (1993) that "science is everywhere. All around the child's environment, there are events, materials, and phenomena that the child interacts with, or observes on daily basis that have scientific connotations. Yet the child is not aware that these same things are connected to what the teacher is trying to impact to him in the class. Inyang-Abia (2001) affirms that "every community is filled with natural and man-made resources that provide worthwhile learning opportunities for all categories of students when relevant objectives are clearly stated". There are diverse phenomena that may be natural, activities of man on things and things on man that may be used in learning/teaching of science. Such resources include the people; places; culture; services/activities etc.

Eshiet (2004) lists some of such phenomena to include: Administration of coconut milk from the young fruit to revive somebody who is feeling weak; and the use of blow-pipe and charcoal by a blacksmith to smelt the iron then beat it up to the desired shape. Other common phenomena in the environment that can be used to enhance meaningful science teaching/learning include: Burning processes in the kitchen that can be used to teach energy conversion; pollution; chemical change; etc; boiling of foods (or water) that can be used to teach vaporization, condensation and states of matter; bush burning by hunters and farmers for teaching of desertification, climate change etc; refuse generation at home for teaching pollution and waste management (incineration, re-cycling etc.); electrification in the house for teaching circuits, conductors and insulators; fermentation of cassava (*akpo*) for teaching microorganisms, anaerobic respiration etc; a look at the various domestic animals for adaptive features; slaughtering of animals at home or a visit to the slaughter house for the learning of internal organs; food spoilage for teaching of microbes; smoking or drying of meat (or application of salt) as a means of preservation; observation of cockroaches in the house for the teaching of arthopods, insects, their habitats, characteristics etc; bicycles to teach levers, centripetal forces etc.; petrol in cars to teach energy types and energy conversion. The list can go on without end. All it requires is for the teacher to identify the everyday life event(s) that can be linked to the concept he wants to teach.

Connecting classroom science with everyday life

For meaningful learning to take place, the student must be interested, and Staver (2007) avers that the relevance

of the concept (to be learnt) to the student motivates interest. Relevance refers to how much satisfaction the student has, how much it connects with the students' interest and how much it connects with social issues, cultural back grounds. More so, cognitive theories of learning maintain that meaningful learning of a new thing depends largely on relating it to what is already meaningful and familiar. Therefore science teaching must be brought down to earth with things that are already familiar and important to the student (Staver, 2007).

In order for science learning to be effective and produce the desired effect on the individual and the nation, How Kids Learn (2017) informs that,

Kids learn science in a superior way when we direct their natural curiosity and build upon their developing science skills to actually do real science hands-on. Simply stated, the best way for kids to learn science is by doing real science. A child can get scientific facts or even knowledge from a book. However, they are fully immersed in the learning process when they do science.

Emphasizing this, Tamirat (2015) gives the following analysis: You remember 20% of what you hear, 50% of what you hear and see, 90% of what you hear, see and do, and with repetition close to 100% is remembered. With the abundance of community resources/events in the environment available for learning science, there is a lot to be done on the part of the pupils/students, teachers and the curriculum to achieve the desired meaningful and effective leaning that can bring about development of the individual and the nation at large. In agreement with this, Muoneke and Asagha (2015) stress that science teaching at all levels should be practical and society-oriented. Inyang-Abia (2001) also avers that the community is a significant catchment area for all forms of educational processes and materials. It is therefore the responsibility of the individuals (teachers and students) to use such resources, people and activities for teaching/learning. For meaningful learning of science, there must be an effective and deliberate integration of classroom science with the wider culture (or environment).

Inyang-Abia (2001) avers that children have the potentials of finding out and learning on their own, and that things found out in this way last longer in the memory, are easily recalled and are usually more meaningful to the person. According to him, the teacher should specify the objectives for the lesson and then allow students to observe the phenomena, ask questions, organize their findings and make decisions on their own (or with the guidance of the teacher). Phenomena based learning, according to Silander (2015), begins with observation of the real phenomena (which are abundant in the environment), asking questions and attempting to answer them. For instance, the child observes vapour from boiling water in the kitchen and will ask: where is the vapour coming from? As it is going into the atmosphere, where does it eventually settle? How is the vapour generated? Can it be made to return to the water?

As the children (students) ponder on these questions and attempt to provide answers, the teacher can lead them into scientific concepts such as kinetic energy, states of matter, laws of thermodynamics etc. This kind of learning follows the constructivism theory whereby learners build up complex knowledge from little pieces of information they would have observed in the environment (Silander, 2015).

Staver (2007) stresses that, as one of the techniques of an effective science teacher, science concepts and instructions should be connected to the learners' personal experiences.

For meaningful science learning to take place, which will then lead to development of the individual and the nation as a whole, the teacher should realize that real science is not just for the classroom but is part of everyday life. He should therefore move away from the usual "chalk and talk" method and begin to direct learners' attention towards the phenomena in the community that have scientific connotations. The teacher should encourage learners to ask questions on their observations in the environment. The teacher should guide learners to find out answers to their own questions by trying out things (How Kids Learn, 2017). Curriculum planners should incorporate specific activities in the curriculum that will assist teachers in directing students' attention to everyday life events to make science learning more meaningful.

CONCLUSION

The teaching/learning of science is very significant to the individuals, which in turn contributes to the overall development of any nation. "Science" in the 21st century is synonymous with "solution" to problems faced by mankind in everyday life (Oduor, 2013). Usually, science teaching in the classroom is not linked to the learners' everyday life, making the concepts appear abstract to the learner. This leads to disinterest and poor performance, as is evidenced in enrollment and performance in the sciences.

This paper suggests a bridging of the disconnect (gap) between classroom science and everyday life to improve enrollment and performance in science in Nigeria. There exists various phenomena in the environment of the learner that can be used to steer up the learners' interest and performance. The teacher should identify these phenomena and link them appropriately to the correct concepts. The curriculum planners should also produce materials that will guide the teacher on the appropriate association of the phenomena in the environment with science concepts in the classroom.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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