THE USE OF INSTRUCTIONAL RESOURCES IN SCIENCE EDUCATION: ISSUES AND CHALLENGES

Abstract

This paper discusses the issues and challenges of instructional resources for teaching and learning science in Nigeria secondary schools. The concept of instructional resources was treated as well as the relevance of availability and proper usage of instructional resources. The instructional resources discussed in this study were basically material and human resources. The human resources are laboratory staff. The material resources treated among others include: the classroom, the laboratory, library, equipment, models and charts, curriculum and science textbook. The issue of inadequacy and lack of these resources in most secondary schools were discussed. The work also examined the instructional resources and the science teacher. The study concluded that science should be learnt in a way that will equip our students with such attributes as creativity, resourcefulness and manipulative skills in this way it could be meaningful to the learner and also help in the development of entrepreneurial skills for self-reliance. It was therefore, recommended that stakeholders in science education should provider enough funds to build more classrooms, laboratories and provide the equipment and resources for the teaching and learning of science, libraries should be provided with modern quality science textbooks for teachers and students and government should make available adequate fund for provision of instructional resources for teaching science.

Keywords: *Science learning and teaching, Instructional Resources*

Introduction

In any academic environment there are facilities that can contribute in no small measure to teaching and learning process. Science is a body of knowledge comprising of ideas, Skills, and information about the world, nature and man. According to Mbah and Leghara (2008), Science is a two-activity that involves product (the knowledge and other outcomes of science) and process (the skills and scientific procedures of investigation). It is an embodiment of attitude of inquiry, observation and reasoning with respect to the world. It is usually developed through practice, observation and reasoning. For learning to take place learners must have access to necessary information, materials and resources. Due to the nature of science, teaching and learning of science subjects cannot be facilitated without availability and usage of some resources.

ucation in general and science education in particular. Resources in education encompasses all persons and things capable of conveying information, values, processes, experiences and techniques that can be used to actively engage learners in the learning process. The teaching and learning of the science (physics, chemistry and biology) including basic science and technology at the secondary school level require diverse human and material resources.

Lack of ideal resources for science teaching and learning in Nigerian secondary schools in particular has been a major issue of concern. It is a well-known fact that the quality of education a student receives largely depends on the quality of teaching/learning resources provided. Teaching learning resources are all the things used by the teacher during teaching to aid understanding and make teaching successful and effective. These resources are broadly grouped into two namely, material and human resources according to Adeyemo (2010). The material resources include: the classroom, the laboratory, library, equipment, models and charts, curriculum and science textbooks. The human resources include qualified science teacher and laboratory personnel (laboratory staff).

Concept of Science Learning and Teaching

Science teaching is concerned with sharing science content and process with individuals who are not traditionally considered to be member of the scientific community, the individuals could be students, farmers or a whole community (Abdullahi, 2013). Science teaching includes work in science content, science process, some social science and some teaching pedagogy. The standards for science education provide expectations for the development of understanding for students through the entire course of study and beyond.

Concept Scientific Development

According to Abdullahi (2013), Science is a process as well as knowledge. Children learn science by being involved not only with its contents, but also with its methodology. The effective science facility accommodates both. Science study requires a variety of unique instructional

ommon to education. A science facility must have space to
ıation with hands-on instructional strategies. Science instructional areas have spatial and material needs that are different from those considered in designing a general classroom. As early as possible, students need to become acquainted with the nature of science and the processes of science. It is imperative that all students have a full science education experience starting in kindergarten, and that an increasing number of students pursue science education throughout their high school years and beyond .

Science education deals with sharing of science content and process with individuals who are not considered traditionally to be member of the scientific community; the individuals could be students, farmers, market women or a whole community (Wudil, 2017). Science education in Nigeria concentrates on the teaching of science concepts, methods of teaching and addressing misconceptions held by learner regarding science concepts. Science education is very important to the development of any nation and that is why every nation must take it very serious in all institutions of learning. Many of the developed nations were able to achieve so much in science and technology because of science education.

Despite all the great things science education can accomplished in the national development of a nation there are many problems militating against it especially in Nigeria. Science education is very important to the development of any nation in many areas. A graduate of physics education can be self-employed as opined by who of the physics graduates have some knowledge of electronics that is enough for them to be able to have a little period of training as apprentices and then stand alone as electronic technician. For instance, semiconductor physics is very important in the modern technology that if properly learnt it is enough for one to stand upon for a living, semiconductor physics is part of what any graduate in physics will learn and should learn. In semiconductor, is very important in a growing economy like ours in Nigeria; it is useful in ceramic industry and a well-trained physics education graduate can be well established in ceramic industry. Without science education Information and Communication Technology would be impossible.

Science and technology will be impossible without science education; for instance engineering, medicine, architecture etc will not be possible if there is no one to teach the students the core subjects needed for these course. Biology education is very important to any growing economy like Nigeria. Many graduates of biology education are self-employed and employers of labour, many owned schools for themselves where people work and earn their living while some are in to fish business. There are colleges of education where students of chemistry department are taught how to

departments can establish their own chalk business as soon many schools do not need to buy chalk outside anymore and they can equally produce for other schools.

One specific focus of science education may be one of simply learning facts by note, science education in recent history also generally concentrates on the teaching of science concepts and addressing misconceptions that learners may hold regarding science concepts or other contents. Science education has been strongly influenced by constructivist thinking (Eriba, 2012).

Constructivism in science teaching has been informed by an extensive research programme into students thinking and learning in science, and in particular exploring how teachers can facilitate conceptual change towards canonical scientific thinking (Ada, 2016). Constructivism emphasizes the active role of the learner, and the significance of current knowledge and understanding in mediating learning, and the importance of teaching that provides an optimal level of guidance to learners (Pierre, 2014).

In an attempt to make science teaching effective and relevant for a large and necessarily more diverse of the population, there is need to transform how learners think so that they can understand and use science like scientists do.

Meaning of Instructional Resources

Instructional resources according to Jatau and Jatau (2008) are different kinds of materials the teacher and the entire class use in teaching and learning process so as to make it more effective and productive. Makoti and Onderi (2014) considered it as things which are to help teachers to teach more effectively. In this context, resources were conceptualized as devices that contribute to effective science delivery and learning by the teacher and the learners respectively to achieve specific goal and general goal of science education.

Availability and Suitability of Instructional Resources in Teaching and Learning process

ources in teaching and learning process as identified by Taylor and Rasheed (2017), include:

i. It helps to increase teacher's competence.
ii. It enhances the learning and retention of knowledge and skills.
iii. It helps to arrest and sustains learner's attention.
iv. It encourages development of scientific terms and communication skills
v. It helps to motivate learners.
vi. It helps to make learning more concrete and real.
vii. It stimulates problem solving and finally makes it easy to relate different pedagogical strategies.
viii. It encourages participatory learning.
ix. It reduces teachers stress by making teaching and learning easy and more interesting.

Types of Instructional Resources

According to Kibirige and Hodi (2015) some of the instructional resources use for science teaching includes:

Laboratories

Science is experimental and so is learnt by doing. Experimentation in science is sorely dependent on the availability of science equipment/materials for proper understanding, development and application. Ugwu (2008) maintains that lack of adequate laboratory facilities is a common feature in most of our secondary schools. Students rarely have hands-on, minds-on activities science practical is better done in the laboratory but most schools lack there important resources for teachers demonstration to students.

Library

The benefits of a functional and/or good library system are enormous and include the provision of access to books and other reading materials or resources. The immediate benefit of access to reading resources is the promotion of reading culture which in turn underpins the

cy skills. The ability of the academic library to provide the available learning resources is being continually undermined and called into question. In spite of the fact that library is the supportive input for an academic institutions for teaching, learning and research. It is observed that various institutions managements are not providing adequate library resources for their institutions, and also in some places where these resources are available: they are not put into maximum use (Iortim & Atagher, 2013). Majority of students do not have textbooks and most of the schools do not have libraries and where they have one, the textbooks in the libraries are outdated.

Physical Environment (Classroom)

Quality physical environment is very important because it can significantly affect student achievement. Lack essential infrastructure makes learning environment must be adequate and conducive.

Science Textbooks

The importance of relevant science textbooks in the teaching and learning process of science has been widely recognized in the literature. The textbooks provide structure and order in the teaching and learning process and in the classroom, they are considered as useful and effective tools or instruments whose purpose is to facilitate the work of the teacher on a daily basis. Textbooks give students stability and confidence. Science textbooks also provide security and confidence to inexperienced teachers. Unfortunately, secondary schools in Nigeria are associated with lack or shortage of relevant science textbook for science curriculum implementation especially when new curriculum is introduced in schools.

Other Teaching Resources (Materials)

Other instructional resources include:

- Visuals-charts, photograph, slides, posters, models, real objects, etc.

strip, television, video, etc

- Static display-chalk board, flannel graph, etc
- Electronic-radio, email, computer, etc.

Human Resources Available for Science Teaching

Human resources in this context are the laboratory staff. In a standard laboratory, provision should be made for laboratory staff such as laboratory technicians/laboratory technologist. They constitute a vital component of the teaching force. But the most unfortunate thing with our education system is that, school administrators are yet to see the need for these all-important support staff for effective teaching of not only integrated science alone but all the sciences. This lukewarm attitude of school administrators towards their employment has often put a lot of burden on the teacher: this category of support staff usually renders useful assistance for the science teachers in effective handling of his or her lesson. The absence of qualified/laboratory technicians in most of our schools can make the job of the teacher of science very difficult, but as the situations are now, the science teacher has to cope with the problem.

Most school systems do employ laboratory assistants or attendants to help the science teachers. The problem with such assistants or attendants is that most of them are not specially trained to work in a laboratory. It is then expected that the teacher should take up the responsibility of training such support staff anytime they are employed to assist him or her.

The science teacher should also make laboratory 'assistant' or attendant to be interested in science. It is also the responsibility of the science teacher to recommend his untrained laboratory assistants for the many in-service courses.

Instructional Resources and Science Teacher

Resources for teaching science are irrelevant and valueless except are properly utilized by science teacher. In other words, the usefulness of instructional resources depends on what the teacher makes out of them. It is necessary therefore, that the science teacher should skillfully and intelligently handle and use these resources for them to serve the desired purpose. If not, it can hinder meaningful learning consequently; the science teacher should have a basic knowledge and skill on how to make use of the necessary instructional resources. One of the reasons why some science teachers avoid the use of some available instructional resources for teaching is because many of them lack the basic knowledge and skills to operate them (Eriba, 2012; Wudil, 2017 Ankeli, 2018).

Conclusion

Effective teaching and learning of science requires adequate resources such as classrooms, laboratories, textbooks, charts, models and consumables like chemicals and reagents for the teachers to engage students in practical and activity work. Unfortunately, most of these resources are either lacking or inadequately provided for secondary schools. Urgent step is therefore needed to provide sufficient material resources for teaching the science subjects in order to realize the goals of science education in Nigeria secondary schools.

For science education to be important in the development of our nation, it should equip our students with such attributes as scientific enquiry, power of observation, and mastery of manipulative skills, creativity resourcefulness, and mechanical comprehension. It should translate from why of science to know-how, be activity oriented and relate to the environment. Science taught and learnt in this way could be meaningful to the leaner and also help in the development of entrepreneurial skills for self reliance. The teaching of science mainly for the acquisition of knowledge has lead to the development of passivity, docile

learning and dependency on teachers and text books, instead of active learning in which teachers and text book are challenged. As bedrock of economic growth, one can say without fear of contradiction that the only way out of our problem of underdevelopment is through the provision and use of science equipment by students and also allocation of adequate time for science practical. It is one of the effective routes out of stagnation through the development of capabilities in science education.

Recommendations

In view of the relevance of instructional resources in science teaching and learning process and the problem of lack/inadequate provision of these resources, it is therefore recommended that;

1. The stakeholders in science education should provide enough funds to build more classrooms, laboratories and provide the equipment and resources for the teaching and learning of science.
2. Government should provide adequate funds to schools for procurement of material resources.
3. Libraries should be provided with modern relevant quality science textbooks for teachers and students.
4. all tertiary teachers training institutions and the department of education of the universities should have resource centers for training and retraining of teachers to enable them acquire knowledge and develop basic skills necessary to use the instructional resources.

Ethical: NA
COnsent: NA

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