# ASSESSMENT OF RESOURCES AVAILABILITY IN TEACHING AND LEARNING OF INTEGRATED SCIENCE IN SECONDARY SCHOOLS

Ogologo, Gift Allen and Gideon Wokocha
Department of Integrated Science
Ignatius Ajuru University of Education
E-mail: gift.alleno@gmail.com

## Introduction

Science can be defined as the activities of culminating falsifiable and verifiable body of knowledge about living and non living component of the environment obtained by careful observation, and testing of facts (Abdulahi, 1982). In Mohammed and Bello (2010), Science can also be defined as the axle on which development and progress of both the individual and the nation depends. It is like the legs by means of which we get about the materials environment of life (Emovon 1983) in Mohammed and Bello (2010). Evidences abound that science is not only a tool but also a vehicle for all round development of any nation. Therefore, to a very great extent, the level of scientific development of any nation determines the standard of living of the citizen of that nation. For this, any nation that wished to be recognized globally must ensure she is sound fated in science. However, any nation that does not develop scientifically will continue to dwarf among the development and developed nations. The importance of science to any nation is not a matter of measuring up to the present scientific level but also include improving on the attained level. If not, such as country will not be able to compete favorable with other countries with advent of time, due to the fact that, science is dynamic but not static. It is however, an open secret that the Nigeria educational system has undergone various types of hauling in the past years. It will therefore be ridiculous that any nation should rest her hope off meaningful development on the foreign aids she will enjoy from other countries. Such a nation will not only remain a beggar but will equally be a perpetual slave to her givers (masters). Without doubt, Nigeria has had enough experience in the search for education that is functional which will yield economic and political self-sufficiency. A good example of such move was the introduction of 6-3-3-4 system of education and later 9-3-4 system which are not only welcome but are good innovations.

Science education is type of education required by all citizens and government is laying much emphasis on this education. However, despite the fact that many emphasis have been laid on science and technology education in Nigeria, it is very painful to note that little or nothing has been done or achieved in terms of nation's development Ahmed *et al* (2012). Instructional resources which are educational inputs are of vital importance to the teaching of any subject in the school curriculum. In each society there are facilities other than classroom that can contribute in no small measure to teaching and learning process. For learning to take place learners must have access to necessary information materials

and resources. They have to interact with tangible and intangible resources for an instruction to ensure some level of performance. Maduabum (1998) as cited by Miebaike, (2008), in his investigation on how to teach integrated science effectively suggested that whatever a teacher seeks to achieve with students or, his aspiration will be influenced or limited in some instance by the teaching and learning resources available to him. Savoury, (1958) as in Jekayinfa (1995) asserted that it is very vital to have sufficient and adequate human resources in terms of teacher quality for teaching of all subjects in the school curriculum. Without the teachers as implementing factors, the goal of education can never be achieve. According to Jegede (1998), in Victoria (2009), the science teacher is known as very important human resources for effective science teaching and communication. He further advanced that the teachers are critical human resources upon which science depends. The importance of the teacher's knowledge is based on effective science teaching, and for science teacher to be effective, they must be educated and well trained.

However, human and material resources according to Bajah, (1986) have great effect on students' academic performance and also contributed poor performance because of lack of facilities and other resources. In order to ensure sustainable teaching- learning process in integrated sciences, it is important that human and non-human (material, physical and financial) resources must be adequately provided. Ivowi (1999), observed that lack of science equipment and laboratories are some of the constraint facing science teaching in Nigeria. Teachers represent a large proportion of the input of an educational system. Combs (1970) in Jekeyinka (1995), observed that the problem of teacher supply is not one of simple numbers. It is first and foremost a problem of quantity and of getting the right quality. Fayemi (1999) also observed that it is truism that teachers are the hubs of any educational system that upon their number, their quality and devotion depend on the success of any educational system. Fafunwa (1976) in his paper "the purpose of teacher education" commented on the importance of teachers when he said: "the demand for more and better schools, the need to relate curriculum to the needs of the child and the environment. The crying needs of the child and his other instructional materials, the desirability of training in vocational and technical skills, and indeed the overall problem of preparing the future citizens of Africa who will be fully oriented to their environment cannot be fully accomplished without the aid of competent teachers.

## Statement of the Problem

In spite of the desire for technological development, couple with the fact that integrated science is a very vital subject for technological development and as such, its teaching and learning and learning as well as student's poor academic performance have become a source of concern to all stakeholders. The problem of the present study is to assess available resources in the teaching of integrated science in Ahoada West Local Government Area Rivers State

## Research Questions

1. What is the quantity of laboratory equipment/apparatus in the teaching/learning of integrated science?
2. What is the quantity of laboratory reagents/chemicals in the teaching/learning of integrated science?

    This study adopted a descriptive survey design.

3. What is the number of qualified basic science teachers to teach integrated science in junior secondary schools?

## Methodology

The population of the study consists of all secondary schools within Ahoada West Local Government Area. This is estimated as 16. To ensure equal selection of the sample to be used, a random sampling technique was adopted to select four (4) schools to be used for the study. The instrument utilized for the study were checklist on basic science laboratory apparatus and reagents (C-BSLAAR) and basic science teaching resources assessment questionnaire (B-SSTRAQ) was designed to assess the quantity of available basic science laboratory equipment, apparatus, chemical and reagents. To assess the extent of availability of laboratory equipment/apparatus and chemical/reagents section c of B-STRAQ assess the quantity, qualification and years of experience of basic science teachers. To ensure that the instrument measure correctly what is meant to measure. A checklist was presented to my project supervisor for retting and expertise advice before administration.

**Research Question 1:** What is the quantity of equipment/apparatus in each of the selected schools?

Table 4.1: Quantity of laboratory equipment/apparatus in the selected schools

| S/N | Equipment /apparatus | Sch.1 | Sch.2 | Sch.3 | Sch.4 |
|-----|---------------------|-------|-------|-------|-------|
| 1 | Microscope | _ | _ | _ | _ |
| 2 | Chemical Balance | 5 | _ | 2 | 3 |
| 3 | Burette | 18 | _ | 10 | 20 |
| 4 | Pipette | 16 | 20 | 10 | 20 |
| 5 | Beakers | 24 | 18 | 9 | 25 |
| 6 | Conical flasks | 20 | _ | 9 | 20 |
| 7 | Bunsen burner | 6 | _ | 5 | 5 |
| 8 | Retort stand | 12 | 6 | 5 | 10 |
| 9 | Tripod stand | 8 | _ | 3 | 5 |
| 10 | Specimen bottle | 2 | _ | 8 | _ |
| 11 | Test tubes | 14 | 10 | 7 | 10 |
| 12 | Thermometer | 1 | 12 | 10 | _ |
| 13 | Beam balance | 5 | _ | 3 | _ |
| 14 | Slides | _ | _ | 5 | 5 |
| 15 | Hand lens | 3 | 2 | 4 | _ |
| 16 | Stop watch | 10 | 4 | 4 | 3 |
| 17 | Glass and block prism | 12 | 12 | 1 | 10 |
| 18 | Weight balance | 6 | _ | 2 | 10 |
| 19 | Wash bottle | 10 | _ | 3 | 5 |
| 20 | Gas cylinder | 2 | 2 | 1 | 10 |
| 21 | Models | _ | _ | _ | 1 |
| 22 | Filter funnels | 22 | _ | 2 | _ |
| 23 | Anemometer | _ | _ | _ | 20 |
| 24 | Hydrometer | _ | _ | 1 | _ |
| 25 | Barometer | _ | _ | 1 | _ |
| 26 | Rain gauge | _ | _ | _ | _ |
| 27 | Petri dishes | _ | 4 | 2 | _ |
| 28 | Wind vane | _ | _ | _ | _ |
| 29 | Preserved specimens | _ | _ | 9 | _ |
| 30 | Cover slip | _ | _ | 3 | _ |
| 31 | Measuring tap | 6 | 6 | 1 | 5 |
| 32 | Glass tube | 5 | 8 | 3 | 5 |
| 33 | Tester | _ | 4 | 11 | _ |
| 34 | First aid box | 2 | _ | 1 | _ |
| 35 | Sterilizer | 5 | _ | 1 | 5 |
| 36 | pH meter | 2 | _ | _ | 1 |
| | Total items available | 24 | 13 | 30 | 21 |

A look at table 4.1 reveals that items 4, 5, 8, 11, 16, 17, 20, 31 and 32 are available in all the selected schools, item 1, 26, 28, are not available in any of the school while the rest item are either available in three, two or one of the selected schools. The table also shows that of the 36 laboratory equipment/listed 24, 13, 30 and 21 are respectively available in school 1, 2, 3 and 4. This indicate that majority of the laboratory equipment are not available in these schools, with school 2 mostly affected.

**Research Question 2:** What is the quantity of laboratory reagents/chemical in each of the selected basic secondary schools?

**Table 4.2:** Quantity of laboratory reagents/chemical in each of the selected basic secondary schools

| S/N | Chemical/Reagent | Sch. 1 | Sch. 2 | Sch. 3 | Sch. 4 |
|-----|------------------|--------|--------|--------|--------|
| 1 | Iodine | 2 | 3 | 3 | 1 |
| 2 | Ammonia | 3 | 4 | 2 | 3 |
| 3 | Silica gel | 1 | _ | 2 | _ |
| 4 | Hydrochloric acid | 5 | _ | 1 | 4 |
| 5 | Sulphuric acid | 4 | 2 | 5 | 4 |
| 6 | Nitric acid | 4 | 5 | 4 | 4 |
| 7 | Glycerin | _ | _ | _ | _ |
| 8 | Iron fillings | 3 | _ | 3 | 1 |
| 9 | Millions reagent | 1 | _ | 3 | 1 |
| 10 | Stench solution | _ | _ | _ | _ |
| 11 | Sudan III | _ | _ | 4 | _ |
| 12 | Glucose | _ | _ | _ | _ |
| 13 | Calcium chloride | 3 | _ | 3 | 2 |
| 14 | Calcium carbonate | 2 | _ | 2 | 2 |
| 15 | Potassium Phosphate | 1 | _ | 1 | 1 |
| 16 | Potassium permanganate | 2 | _ | 4 | _ |
| 17 | Sodium chloride | 5 | _ | 3 | 5 |
| 18 | Tin foil | _ | _ | _ | _ |
| 19 | Sodium hydroxide | 4 | _ | 6 | 4 |
| 20 | Potassium hydroxide | 3 | _ | 3 | 2 |
|  |  | 15 | 4 | 16 | 13 |

Table 4.2 indicated that item 1, 2, 5, 6, are available in all the 4 selected schools while items 7, 10, 12, and 18 are not available in any of the schools. The other items are available either in three, two or one of the selected schools more so, table also indicated that schools 1, 2, 3 and 4 has 15, 5, 16 and 13 items out of the 20 listed items shows that school do not have most of the items (laboratory reagents/chemicals).

Research Question 3: What is the Number of Qualified Basic Science Teachers in Basic Secondary Schools?

Table 4.3: Number of Qualified Basic Science Teachers in Awelga.

| School S/N | No of Teachers | Academic Qualification | Subject Specialization | Years of Experience |
|---|---|---|---|---|
| 1 | 4 | i) B.Ed | i) Biology | 6 – 10 |
| | | ii) B.Ed | ii) ITS | 11 – 15 |
| | | iii) B.Ed | iii) ITS | 6 – 10 |
| | | iv) B.Ed | iv) ITS | 11 – 15 |
| 2 | 3 | i) NCE | i) ITS | 6 – 10 |
| | | ii) B.Ed | ii) ITS | 6 – 10 |
| | | iii) B.Ed | iii) ITS | 6 – 10 |
| 3 | 3 | i) B.Ed | i) ITS | 6 – 10 |
| | | ii) B.Ed | ii) Agric.sci. | 1 – 5 |
| | | iii) B.Ed | iii) ITS | 6 – 10 |
| 4 | 3 | i) B.Ed | i) ITS | 11 – 15 |
| | | ii) B.Ed | ii) Agric. Sci. | 11 – 15 |
| | | iii) B.Ed | iii) Biology | 6 - 10 |

Table 4.3 shows that 4 out of the 13 basic science teachers, are not qualified to teach basic science because of their area (subject) of specialization.

## Discussion of Findings

Finding on the extent of availability of laboratory equipment/facilities revealed that most of the basic secondary schools lack the required laboratory equipment/facilities for the teaching and learning of basic science. And where there equipment are available they are very much inadequate (i.e. very low extent of availability. In addition, the finding on the extent of availability of laboratory reagents/chemicals showed that the required laboratory reagents/chemicals are available (though to a low extent) in most of the basic secondary schools. These findings are in agreement with earlier findings of Nnorom (2013), Eya and Elechi (2011) who reported lack of (or inadequate) simply of laboratory materials. However this finding is contrary to the finding of Ahrned, Abimbola, Omosewo and Akanbi (2013) that documented the availability of all basic science and technology resources (non-human) in all the schools sampled. The relevance of laboratory materials (equipment and reagents) in the teaching – learning of science cannot be underrated. Laboratory materials in educational setting enrich teaching and enhance the learning and understanding of science concept, theories and science process skills as well as the application of the skills. The more laboratory materials a teacher used to enrich his teachings, the better and effective the teaching will be, and the better the output (learning) will be seen in the learner. Surprisingly, non of these schools had adequate laboratory equipments and reagents for the teaching and learning of basic

science. According to Jegere (1982) the poor availability of basic science equipments and reagents had been the reason given by many integrated (basic) science teachers for not teaching the practical aspect of the subjects. This group of teachers usually employ lecture (chalk and talk) method in the teaching of basic science, instead of methods that promote students' active involvement in the learning. This inadequate laboratory materials could be attributed to government failure in providing these laboratory materials for schools, and to the science teachers inability to improvise, as there are many of these equipment/apparatus that can be improvised by the teachers or by the students. Probably these teachers are either not competent, or skillful in improvisation or they are not creative and resourceful.

Findings on the number and availability of qualified and experienced basic science teachers (see table 4.5) indicated that eight (8) of the thirteen (13) available basic science teachers have the required teaching qualification with a minimum of five years teaching experience. However, it was also discovered that the number of basic science teachers in school 1, 3 and 4 was not adequate. Probably, became of the inadequate number of basic science teacher in these schools of made Biology and Agricultural Science teachers to be assigned to teach basic science. These teachers are not trained basic science teachers hence they are likely to lack the subject content knowledge even though they may posses the pedagogical content knowledge. According to Gbamanja (1997), a trained teacher is an educationist, who underwent pedagogical training including a good knowledge of the principles and practice of education, in addition to his teaching subject or discipline. A qualified and effective teacher requires a conglomeration of the teacher's academic (subject matter) knowledge and his pedagogical knowledge (Manoucheri 1997, Brown and Borko, 1992). In the same view a basic science teacher should be knowledgeable in basic science as well as how to tech it for meaningful and effective learning to occur. However, it is disheartening that some of the basic science teachers in these schools are not knowledgeable in the content of basic science and how it should be taught.

## Conclusion

The laboratory and science classrooms are expected to be conducive for effective and meaningful learning of science to take place. To this end, the success or failure of an effective and meaningful learning of basic science to a large extent depends on the quality and quantity of human resources (basic science teachers) and non-human resources (laboratory equipment and reagents). The poor state of resources for the teaching and learning of basic science in basic schools is discouraging. Basic science and the beginning science subjects need to be given adequate attention in terms of supply of the adequate caliber of basic science teachers, as well as enough quantity of laboratory materials to enable the children to engage in active learning of science, which in turns will make them to be scientifically literate, in addition to improving their academic achievement in science.

## Recommendations

On the basis of these findings, the following recommendations are put forward;

a. To ensure meaningful learning of science government should make conscious efforts to provide adequate funding for the procurement of the adequate learning materials in the school in collaboration with the state ministry of education, this will not only make the learning materials available but adequate in the schools.

b. The government and non-governmental organization should renovate the existence laboratory, build laboratory and should ensure adequate provision of adequate resources (materials, physical and human resource)

c. More qualify teachers/lab attendance should be recruited into secondary schools.

d. Teachers should be trained in the skills of improvising some of the equipment/facilities for science teaching.

e. Workshop and seminar should be organized for serving integrated science teachers on improvisation and utilization of essential integrated science materials resources

f. Qualify basic science teachers should be assign to teach basic science.

g. Parents, teachers, association should have a role to play in assisting schools in some equipments.

## Reference

Abdulahi, A. (1982). Science Teaching in Nigeria. Iiorin atoto press ltd. *Nigeria journal Professional Teachers* vol. 1 no. 6 (2010).

Bajah S.T. (1986) Teaching integrated science creatively. Ibadan University press.

Fayemi, T.A. (1991). "The effects of instructional resource on the learning of history in selected secondary schools in Ogbomoso Local Government". An unpublished M.ed Thesis.

Irowi U.M.O. (1997). Improving Teacher Education Programme in Nigeria. *Nigerian Journal of Curriculum Studies*. 3 (1), 1-7.

Jegede, O.J. (1982). Evaluation of the present Nigerian integrated science project. The new Nigerian project and the 3-3 secondary schools system. Workshop proceeding of STAN.

Jekayinfa A.A.(1995) effects of instructional resources on the academic performance of students in history in Nigeria.

Miebaike, T.B. (2008). The role of teaching aids in stimulating interest in teaching and learning of integrated science in secondary schools in Ekremor L.G.A. of Bayelsa State.

Miebaike, T.B. (2008). The role of teaching aids in stimulating interest in teaching and learning of integrated science in secondary schools in Ekremor L.G.A. of Bayelsa State.

Mohammed K. O, & Bello O.S. (2010). The effects of Science on the Nation. *Nigeria Journal of Professional Teachers* Vol. 1 No 6 (2010).

Victoria, N (2009). An assessment of availability and utilization of resources in teaching integrated science in secondary schools in Ogba/Egbema/Ndoni Local Government Area of Rivers State.