



THE AVAILABILITY, UTILIZATION AND EFFECTIVENESS OF LOCAL RESOURCES AS INSTRUCTIONAL MATERIALS IN THE TEACHING OF CHEMISTRY IN SECONDARY SCHOOLS IN EKITI STATE, NIGERIA

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ABSTRACT

The study examined the Availability, Utilization and Effectiveness of Local Resources as Instructional Materials in the Teaching of Chemistry in Secondary Schools in Ekiti State, Nigeria. A descriptive survey research was used to elicit appreciable responses from the chemistry students and teachers. The population consist of all the senior secondary schools chemistry students and teachers in Ikole Local Government Area of Ekiti state. The population is made up of two thousand (2000) students and two hundred and fifty (250) teachers. The sample consist of fourteen [14] chemistry teachers and one hundred and eighty [180] chemistry students selected using the random sampling technique. There were male and female students and teachers who were leaning and teaching chemistry in their respective schools. The schools were also randomly selected based on their locations. The only instrument used to collect data for this study is a questionnaire titled "The use of local resources in the teaching of chemistry". Another questionnaire is used to gather final senior secondary school certificate examination (S.S.C.E) results in chemistry for the period of three years. The reliability of the instrument was ascertained by the use of test retest method on sixty students from the remaining ten schools which were not included in the sample. The retest was done after two weeks; the two sets of scores obtained from the test were correlated to obtain reliability co-efficient of 0.69 using Pearson product movement correlation co-efficient. This value was considered high for this type of study. The questionnaires were personally administered to the students and the chemistry teachers. This was done by paying visits to each of the selected schools, full guidance and instructions were given to the teachers and the students during the visits to each school. The questionnaires were distributed by the researcher and sufficient time was allowed to enable



the students and the teachers complete the questionnaire. The questionnaires were collected for collation. Frequency counts, percentages and bar charts would be used to present the result. Based on the results obtained from the study, appropriate conclusion and recommendations were made.

Keywords: availability, utilization, effectiveness, local resources, instructional materials.

INTRODUCTION

Chemistry is the study of matter, its properties, how and why substances combine or separate to form other substances and how substances interact with energy.

Many science students think of chemistry as being white coated scientist, mixing strange liquid in a laboratory but the truth is that, we are all chemist. Doctors, Nurses and veterinarian must study chemistry, but understanding basic chemistry concept is important for almost every profession.

Chemistry is part of everything in our life. Every materials in existence is made up of matter even our own bodies (m.livescience.com/45986-what-is-chemistry.html)

Chemistry is involved in everything we do, from growing and cooking food to cleaning our homes and bodies to launching a space shuttle, chemistry is one of the physical science that helps us to describe and explain our world.

Atoms, Molecules and compound are the involved ones in the study of chemistry in other words, it's how atom interacts to form molecule and how molecule interact with each other.

It also looks into composition of substance and their properties. There are five main branches of chemistry, each of which has many areas of study.

Analytical chemistry uses qualitative and quantitative observation to identify and measure the physical and chemical properties of substances in a sense, all chemistry is analytical.

Physical chemistry combines chemistry with physics physical chemist study how matter and energy interacts thermodynamics and quantum mechanics are two of the important branches of physical chemistry.

Organic chemistry specifically studies compounds that contain the elements carbon other than trioxocarbonate, carbon dioxide, carbon monoxide and carbide. Organic



chemistry is also known as the 'chemistry of life' because the entire molecule that makes up living tissue has carbon as part of their makeup.

Inorganic chemistry studies materials such as metals and gases that do not have carbon as part of their makeup.

Biochemistry is the study of chemical process that occurs within living organism.

The outer electron orbits or shell primarily determine the chemical characteristic of materials and whether materials will chemically combine. Thus, Chemistry is the study of the composition of matter and the changes that take place in that composition Badruddoh khan (2008).

The earliest practical knowledge of chemistry was concerned with pottery and dyes, these craft were concerned with considerable skill but with no understanding of the principle involved, as early as 3500 B.C in Egypt and Mesopotamia. The basic idea of element and compound were first formulated by the great philosophers and during this period from 500 to 300 B.C, opinion varied but it was generally believed that four elements (fire, air, water and earth) combined to form all things.

In the hand of the Oxford chemist's (Robert Boyle, Robert Hook and John Mayow), chemistry began to emerge as distinct from the pseudoscience of alchemy.

Other scientist who contributed greatly to the discovery of chemistry education and practices include Hook, who in 1800s gave the rational explanation of combustion with air, Mayow, who also studied animal respiration, German's J.J Bercher and G.E Stahi in 1800s introduced the false phlogiston theory of combustion which held that the substance phlogiston is contained in all combustible bodies and escaped when the bodies burn.

Since chemistry is one of the subjects offered by science students, the meaning of the word "SCIENCE" needs to be looked into. This word suggests different meaning to various sets of people and its definition also varies from one scientist to another. However, when defined in terms of product, science is an organised body of knowledge in form of law, theories, facts and concepts while in terms of process, it involves processed skills such as observing, classifying, and communicating what scientists do.

Anglo (2000) describes science as the process or groups of interrelated processes through which we have acquired our modern and ever changing knowledge of the natural world, which encompasses inanimate natural life, human nature and the human society



Duyilemi (2004) defined science as an attempt by human beings to organise their experiences about nature into meaningful system of explanations. Emoven (2000) defines sciences as a body of knowledge acquired through observation and systematic experiment.

Children science news (2002) defines science as a process of rational inquiry which is stimulated by a desire to explain phenomenon of human experience. In the same way, Okoli (2004) define science as a way of viewing the world, likewise Opang (2007) defines science as the knowledge obtained by observation and testing of facts.

Based on the definitions above, science can then be said to be an all-embracing subject which touches every aspect of human life.

It is quite gratifying to note that chemistry as one of the science subjects is a core subject according to the national policy on education (2014) among other science subjects. Chemistry is studied by senior secondary school students who are in science department and tertiary institutions' students who engaged in science courses.

Chemistry is an accumulated and accepted knowledge that has been systematized and formulated with reference to the discovery of general truths or the operation of general laws.

Today, chemistry is taught both in senior secondary schools and tertiary institutions, it is limited to the first three years of senior secondary schools and it is at this level, this research is based on.

A good knowledge of chemistry will help students in senior secondary schools to choose a career before proceeding to higher institution or vocational schools.

It is known and accepted that and its study is a necessary aid to good living because of its' relevant in careers such as Medicine and Engineering hence chemistry must have a reasonable place in our school curriculum as it help to develop curiosity, self-reliance and objectivity. The study of chemistry will help the students to remove superstitions belief and fear of the unknown in their daily lives. It will sharpen their natural power of careful observation and will help them to report accurately, what they have observed.

It is sure that a well granted chemistry education among the citizen of the society guarantee a higher standard of living since its knowledge would enable us to develop our mineral resources, improve our health programme, refined our petroleum and solve other problems that called for scientific solutions.



In this view, it is expected to be taught very well and effectively, but even if we have brilliant teachers in the class-rooms and he refuses to use the element of instructional materials, his work may not be satisfactory enough. This is to say that the importance of instructional materials to chemistry like any other subjects could not be over-estimated or over-emphasized, but as an effective teacher who knows the genesis of his job would use instructional materials especially local resources to aid teaching which eventually help the students to understand whatever the teacher is teaching.

However, experience and findings over the years have shown that the study of chemistry by senior secondary school students have been given a care free attitude. The teachers need to provide and use substitute experience through appropriate resources which will best provide learners meaningful teaching and enhance their level of creativeness.

According to Raji (2009) and Schellar (2001), the innovative teachers uses a wide variety of inter-related materials to assure quality instruction, he uses films, film-stripes, pictures, museum materials, television set and audio recording to improve learning opportunities. Some of the problems facing our educational system in Nigeria include shortage of resources as instructional material, population explosion in our school, high rate of drop out and high rate of failure, all of which lead to a general cry of falling standard of education. Some of these problems can be reduced to a minimum by adequate provision and judicious use of instructional materials especially local materials which promote students active participation in teaching and learning process.

Due to high cost of sophisticated instructional materials, teachers need to improvise the suitable resources available for teaching.

National Teacher Institute (2002) defines improvisation as the construction of alternative material in place of an original, such equipment is not generally or mass produced, specifically, the improvisation of local resources bring pupils and students to the level of insight and understanding of relationship and process. The use of improvised materials in chemistry makes learning easier more than mere or just verbal explanations. The use of conventional laboratory equipment and local materials for practical work in the process of teaching chemistry will help to develop their ability to survive in the present scientific age and enhance the adaptability to future changes.



All the foregoing point to the fact that teaching of chemistry will become meaningful and retention feasible if appropriate instructional materials are used while teaching.

In Nigeria today, the issue of high rate of dropout and failure in chemistry is increasing, this is leading to a general cry of falling standard of science courses even in the tertiary institution.

In this view, this study investigate the essence of the use of local resource as instructional materials in place of the sophisticated materials in teaching chemistry and the problem facing it effective teaching in Nigeria using Ikole Local Government Area of Ekiti State as a study sample.

The major problem facing chemistry subject in Nigeria is lack of competent teachers who possess the skill to handle the subject very well. All lack of fund to procure equipment for effective teaching which can make it easier is another major problem.

Many teachers depend on sophisticated equipment to be imported before they could teach or do practical work and when there are no enough funds to buy imported equipment, they arrive in teaching only the theoretical aspect of chemistry and the practical is done in abstract, whereas chemistry cannot be taught without the practical aspect of it. These result to poor performance of the students because they see this with a sense of imagination. Whereas, what is better of that sophisticated materials that can even last longer are lying useless all over our environment. If only the teachers are resourceful and knows how to improvise, most of these materials will be useful enough for chemistry teaching and learning.

Competent teachers who are more resourceful should be employed and be encouraged to use local learning resources; this will improve the academic performance of students.

Some methods are by their very nature accompanied by certain materials or resources which aid learning. Teachers are not adequately equipped with relevant instructional materials and a teacher cannot teach well if he or she is not equipped with adequate apparatus. In the senior secondary school syllabus, (unified chemistry teaching syllabus for secondary schools in Ekiti State, 2016), it is stated that students must be able to do some practical's on their own. This aspect of chemistry cannot be effectively taught unless, the teachers invite or employ the use of apparatus and where they are not available, the teachers should improvise using locally available materials



RESEARCH QUESTIONS

The following research questions are raised for the study:

1. What is the source of local resources used by teachers as instructional materials?
2. Does the use of local resources as instructional materials pose any problem during teaching?
3. What are the problems confronting the learning of chemistry?
4. What general attitudes do chemistry teachers exhibit toward the use of local resources?

LITERATURE REVIEW

What are instructional materials?

Schran (2007) defines instructional materials as information carrying technologies that are used for instructional purposes with the hope of delivering educational information very quickly and vary widely. Kolawole (2002) in Tropical issues in research and education defined instructional materials as anything other than the teacher himself used during the teaching process for effective teaching and learning. Adeosun (2000) defines instructional materials as the instruments and devices through which information is conveyed so that it could have an effect on the receiver. Likewise Allen (2006) defines instructional materials as devices which present a complete body of information and largely self-supporting, rather than supplementary in teaching and learning processes.

Therefore, instructional materials are devices, methods or experiences used for teaching purpose, they are a broad and all inclusive term that is serviceable when referring to all kinds of materials for instructional process.

Instructional materials in teaching Chemistry

Since the recognition of the importance of Chemistry in the private and public lives, efforts have been made by educationist to look into how Chemistry could be taught in our school.

Chemistry could be taught to the students without emphasis laid on the practical aspect of it, if the knowledge imparted to the students are to be useful.



In order to calculate the process of chemistry in the students, it is necessary to provide them with necessary equipment and materials on that they can develop the proper scientific skill and attitudes.

The report of Stone (2003) dealt with the quality of teaching and also with facilities necessary for successful teaching. Stone's survey on the other hand was largely concerned with facilities available for science teaching. Kemp (2000) and Wales (2004) have pointed out that resources utilization increase rate of learning and at the same time frees the teachers to use more on gainful activities.

Resources utilization makes learning to be real and immediate by bridging the two world inside and outside the classroom. According to UNESCO (2008), real materials, written and printed, and other physical facilities help in making a scientific principle, graphic and increase the tendency of students to inquire about their environment.

Classification of instructional materials

Only a few years back, instructional materials in Nigeria education comprised a little more than the blackboard and notice board. Later on the realization of the value of instructional materials in improving instructional leads to their attained in the socio-economic level concurrently with her education has encouraged a sudden use of instructional materials. Also, the new policy by the Federal Government that makes educational technology a vital discipline in all facets of teacher education has further reinforced the need for instructional materials in few institutions. Instructional materials are in variety of forms and are used in all content areas. They can be classified as follows:

- (a) Reading materials: These can also be called " Print media", they include Books, Reference books, work book, magazine, bulletins, supplementary readers, Newsletters, Curriculum guides, encyclopaedic, pamphlets, journeys etc. Heinch R. et al (2007)
- (b) Audio materials: Audio materials are these materials that rely solely on the sense of hearing for teaching and learning. By audio media it meant the various means of recording and transmitting the human voice and other sounds for instructional purposes. The audio materials and equipment commonly used for classroom instruction are: the phonograph or record player, the open real tape recorder, the cassette tape recorder, and radio.



According to Adjai (2007), Audio aids are those materials that help learning through sense of hearing and they possess the following characteristics:

1. They are relatively inexpensive in terms of costs of production, distribution and use.
2. They speak directly to their audience in a personal, powerful and persuasive way.
3. They are appropriate for a wide range of teaching and learning purposes.
4. They are widely available and accessible to both teachers and students.
5. They are very effective for teaching and learning especially when combined and integrated with print and other learning activities.

(c) Visual materials: Farrant (2009) defined visual aids as those materials that help learning through "sight". Visual aids are materials or teaching and learning device that could be seen. Examples are graphics, charts, opaque projector, motion pictures, video tape recorder etc. Gorgre (2012) stated that visual aids are the means by which learners can acquire the visual images that are very important, these objects and pictures are frequently used to perform the function of providing encoding schemes.

(d) Audio-visual materials: These are instructional materials that are capable of being seen and heard, examples are overhead projectors, motion picture, video tape, recorder etc. According to Robinson (2012), Audio visual materials embrace objects or materials that appeal to all the sense. Kolawole (2002) states that Audio- visual aids are those materials that engage both sense of hearing (audio) and sense of seeing (visual) together.

The environment and the community based resources

It is almost impossible for a single school to have all the necessary facilities for Science teaching, and then it will be important for the Science teacher to look into the environment for community based resources.

But some teachers hardly get out of their classrooms and the need for getting out into the immediate environment where the students can explore nature and their surroundings must continually be emphasized.



The contact with the environment or community resources could be through an excursion or visit to the National Life Park, museum, ponds etc. Whatever is learnt in the environment could also help buttress what is learnt in classroom.

Ikerji et al (2002) summarizes the following as ways to make more effective use of community based resources.

- a) Motivate of teachers resourcefulness. The teacher should be motivated to look inwards to see alternative uses of community resources in the day to day instruction.
- b) An initiative for cordial-social-community relationship. The community hosting every school should be made to accept their roles in conducive environment where the learning can take place.
- c) Retraining and workshop for Science teachers. There is need for Science teachers to be retrained for effectiveness.

Classification of Low-cost materials in teaching Chemistry

There are different ways of classifying and categorizing low-cost materials. For instance, UNESCO (2014) identified the following ways:

- i. The available materials in the Natural environment as well as scraps/ discards from commercial and domestic use. They may be freely and easily available. Typical examples are seeds, shells, bottle caps, packing materials, fused bulbs etc.
- ii. The available materials which are easily accessible in the environment but the purchase of which could be within the reach of the schools. Examples in this category could be battery, bulb, wire etc.
- iii. The available example of prototype materials prepared by teachers and specialist for possible wider dissemination. Examples are charts, periodic tables, simple models or kits which are either distributed by government agencies or sold commercially.
- iv. Educational materials which need the use of machines. Films, slides and film –stripes require projectors. Audio tape requires a tape recorder.
- v. Materials such as radio programs, television programs, video tapes and film which most often are made for wider utilization to justify the high cost. The use of those materials in the classroom depends largely on the teacher's skill and competence.



In the 21st century, modern information and communication technologies (ICT) also provide an opportunity for low-cost based teaching and learning. The use of open-source and free software that are made for educational purposes is now becoming common in most institutions and secondary school, provided that the needed infrastructure is in place.

There are different approaches to the study of locally provided equipment in different countries. Possible types of production are given below according to Muscar (2008):

- a. Production by teachers and students.
- b. Establishment of control production units in the country.
- c. Central development and assembly of equipment and kits.
- d. Decentralized development and production.
- e. A combined approach (probably the most frequent)

In general, in developing and using low-cost materials, it is necessary to consider the level at which the materials are used such as elementary schools, secondary schools and colleges. The materials should also be judged from the point of view of certain criteria such as the amounts of money needed, the involvement or participation of various groups (such as teachers, students, community, specialists etc.), the environment from which the materials are obtained and the extent of utilization.

Many types of equipment can be developed at a low cost and still retain the precision needed for school Chemistry curriculum (Musar, 2008). It is however important to determine what precision is actually needed for teaching Chemistry at each level. The development of low cost educational materials should also take into account the psychological, instructional and production aspects (UNESCO, 2004).

The psychological aspect refers to a consideration of

- i. The target group
- ii. The types of experience that would best stimulate the group in terms of age, intellectual level, socio-cultural background and interest.
- iii. A clear identification of the actual needs for low-cost materials.



The instructional aspect refers to a consideration of the educational objectives that the educational materials may help to achieve. The objective may involve different types of knowledge, skills and attitudes.

The production aspect refers to the development of the actual materials, being guided by the psychological and instructional aspect. This aspect needs to take into account, the availability, cost and flexibility of use of the materials, the persons to be involved and type of skills expected of them in the production and finally quality factors that play important role in the performance and durability of the product.

An example of the production of low-cost materials for Chemistry teaching is the production of the Ethiopian Chemistry teacher's source book: Vol-1, model and materials MOE and CSE (2002). This source was developed through a hands-on workshop held in Addis Ababa from 22 January to 2nd February, 1990. The source book describes the procedures for developing low-cost Chemistry models and laboratory materials for use in the Ethiopian schools.

The descriptions are presented into languages, namely Amharic (the official language in Ethiopia) and English.

I therefore conclude this short history by presenting a selected copy of the described materials in the Appendix and by citing the message in the preface of the source book that states as follows; MOT and CSE (2002).

“Chemistry should be fun”. It must not be taught only by lecturing or chalk and talk.

Local resource usually stimulates the creativity of teachers and learners to use their practical skills for the improvement of Chemistry lessons.

It will help students to be acquainted with subject-oriented language through activities which induce free speaking situations. It will help to train students in basic lab skills which lead to latter use of sophisticated equipment.

Importance of Local Resources as instructional materials:

The teaching of Chemistry involves a lot of well-coordinated activities as well as the use of students' experience. A look at the syllabus and textbook available on Chemistry readily pointed to one basic fact that instructional materials and other tools such as local resources have an important role to play in proper understanding of the subject. Local



resources are generally used in Science to demonstrate the mechanising involved in most scientific process.

They also serve as useful supplement to direct verbal communication. On the importance of materials for teaching, Wales (2004) states that “teaching aids when selectively chosen and appropriately used enables a good teacher to teach more in time. It can increase the impact and his range, it can enable him to convey to a class a degree and depth of comprehension which would have been impossible to achieve through the spoken or written word alone”.

In order to motivate the learner, instructional material should be introduced at the right time to serve specific purpose which can vary from arousing interest to illustrate, to engage the students in self-instruction. The general objective for the use of local materials according to Remizourki (2000) must be to make the learning more meaningful. The teacher has to realize when and how to use a medium.

The teacher should bear in mind a few facts that determine effective use of resources, these are: awareness of resources, types of learner and what they are expected to do.

Local resources can be used to assist the learners in being more thorough and systematic in gaining knowledge about basic law such as Osmosis. Therefore these tools could be used at three stages of a course i.e. at the beginning when it serves as medium of motivation, during developmental stages when it becomes instructional means and at the end of the lesson when it serves to consolidate what has been learnt.

Local resources materials according to Hell (2001) in his hand-book on the activities of teachers on young children stated that it is among one the most important teaching aids. He said, through local resources, children would have plenty of opportunities to explore and experiment on their own. Also to develop skills, to investigate and understand simple basic ideas on which chemistry is based.

Oladimeji (2006) states further on the importance of local resources that “there is abundant evidence that teaching within suitable local materials improve learning. Adjai still on the importance of local resources was of the opinion that local resources foster creativity both among teachers and pupils.



Osuagun & Oladimeji (2007) emphasises that improved local resources helps to meet various conditions such as emergency, problems of availability, costs, technology transfers and educational needs.

Advantage of Using Local Resources

The use of local resources helps the learners to gain concept about their physical world. The use of local resources increase the rate of learning and at the same time, it allows the teachers to use extra time gained for the other activities. According to Adeosun (2000), the use of local materials attract and sustain attentions, it stimulates the thinking and easily interest students.

Romizourki (2005) states that the use of local materials encourage involvement of teachers in curriculum design and develops effective lesson planning for objectives determination and evaluation. Learning becomes real and permanent while immediate utilization discourages rote learning. Local resources utilization makes access to education equal for all learners. It also helps the child to discover himself and makes learning profitable and permanent.

Availability of Instructional Materials

Varieties of studies related to resources in Chemistry teaching suggest that inadequate facilities in schools and the presence of very many unqualified teachers gives rise to poor performance of students academically because of poor teaching methods.

In the work of Wood (2003) bases on the teaching of Science in the first two years of secondary school on Nigeria, the concern was with teacher's qualification and experience, time spent on Science teaching, laboratory facilities, syllabus and textbook. He concluded that these were inadequate.

Adeniyi (2011) emphasises that standard equipment begets standard result. He said that for the use of materials for teaching to be effective there must be a resource to aid communication which he said is the environment resources.

Needs for Improvisation

The teaching of Chemistry in Nigeria has always been cultivated with series of problems. These include non-availability of funds to buy equipment themselves because they are made outside the country, most schools have very little to purchase Science equipment needed for instructional purpose of these equipment, it then becomes necessary



for the teachers handling Chemistry in secondary schools to find ways of providing substitutes to forestall rote learning.

Balogun (2010) was of the opinion that no effective Science education programme can exist without Science equipment. The spirit of Science in which Chemistry has a great impact can only be communicated to students by improving science teaching equipment. Students who want to become professional scientists need the equipment to begin to develop the necessary science skills: process skills, attitudinal and practical skills. He further said that the basic source of human science experience is of course direct contact with objects and events in Nature (in and outside of laboratory) in observation and experimentation. He concluded that Science equipment helps to achieve some specific educational goals namely:

It enables learner to develop functional knowledge and manipulative skills.

It enables learners to develop attitude to acquire scientific appreciation skills.

Ughamadu (2009) affirms that improvisation helps to stimulate interest in every instructional engagement, there is need to generate, arouse and maintain learners' interest. Once interest is sustained, effective learning is likely to take place.

Erickson & Curl (1972) says that instructional materials provide meaningful sources of information to learners. The use of local resources enhances and promotes clarity of communication. Through the use of local resources, teachers can bring a particular experience that is as good as real to the class.

It provides first-hand experience which is not available within the environment of the students.

It helps to get rid of any type of communication problems which may face the teacher in actual learning and teaching situations.

Teachers demonstrations may not be clear enough to the learners but effective utilization of local resources can help the teachers out of those physical limitations.

The application and use of local instructional materials can make learning become more real, concrete, immediate and permanent, it creates impressions that are vivid and powerful that learners hardly forget experiences they are exposed to.

Local resources can be used to bridge the gap between the world outside and inside the classroom.



Imogie (2000) says that the instructional media reinforce verbal message, allows all members of a group or a class the opportunity to share a joint experience provide for a direct interaction of student with their social and physical environment, illustrate and clarify non-verbal symbols and images, quantitative relationships and special detail and show inaccessible processes materials, events, things and changes through speed and space.

Oladimeji (2006) in his opinion makes it clear that without Science apparatus, no meaningful teaching and learning of Science can take place. Therefore, we should do all that is humanly possible and reasonable to procure at least some of the apparatus we need. He further explained that lack of standard equipment is no excuse for not providing a suitable learning environment, we have to explore what raw materials are available in the locality and make essential modifications, adaptations and trials with them.

Local resources and Chemistry

The use of local resources as instructional materials can be very important in developing the child's capabilities or abstract thinking and natural aptitude and also to encourage learners' skills of creativity.

Employment of local resources can be used to teach topics like purification of water, production of soap, physical changes, gas law, separating techniques, etc. Effective learning takes place at its best when students participates in a variety of learning experiences and activities in which the students are challenged to think creatively about what is to be learned. It is therefore important that the environment in which students learn be enriched with many and varied experiences. The key to motivating, stimulating and finding relevance is providing s experience.

METHODOLOGY

Research design

A descriptive survey research was used in this study so as to elicit appreciable and responses from the chemistry students and teachers



Population

The population consist of all the senior secondary schools chemistry students and teachers in Ikole Local Government Area of Ekiti state. The population is made up of about two thousand (2000) students and two hundred and fifty (250) teachers.

Sample and sampling method

The sample for this study was seven [7] senior secondary schools out of the seventeen [17] senior secondary schools in Ikole Local Government Area of Ekiti State. The sample consist of fourteen [14] chemistry teachers and one hundred and eighty [180] chemistry students selected using the random sampling technique.

There were male and female students and teachers who were leaning and teaching chemistry in their respective schools. The schools were also randomly selected based on their locations.

Research instrument

The only instrument used to collect data for this study is a questionnaire titled “The use of local resources in the teaching of chemistry”.

The questionnaire is made up three sections A, B, and C.

Section A is designed to gather information on personal data of the respondents such as Name, Location of the school, Age of the school in years, types of the school, Qualification, Class, Sex and Years of experience. Section B demand “Yes “or “No” from the respondents. It is designed to ask questions which were in relation to local resources. It is capable of indicating the teacher’s level of resourcefulness and improvisation, the type of problem pose during the teaching and learning of chemistry using local resources as instructional materials, the teachers’ attitude toward the use of local resources in the teaching of chemistry and the problem facing chemistry teachers generally.

Section C consist of list of items used for school science equipment survey (S.S.E.S), it was used to estimate the availability, the standard and quality of the equipment for teaching chemistry in various selected schools.

Another questionnaire is used to gather final senior secondary school certificate examination (S.S.C.E) results in chemistry for the period of three years.



Validity of the research instrument

Questionnaire was designed to elicit information from the respondents and copies of the constructed questionnaire were given to professionals to ensure face validity. This was done in order to inspect the items on the questionnaire and if the instrument has the expected standard.

Reliability of the research instrument

The reliability of the instrument was ascertained by the use of test retest method on sixty students from the remaining ten schools which were not included in the sample. The retest was done after two weeks; the two sets of scores obtained from the test were correlated to obtain reliability co-efficient of 0.69 using Pearson product movement correlation co-efficient. This value was considered high for this type of study.

Procedure for data collection

The questionnaires was personally administered to the students and the chemistry teachers.

This was done by paying visits to each of the selected schools, full guidance and instructions were given to the teachers and the students during the visits to each school.

The questionnaires were distributed by the researcher and sufficient time was allowed to enable the students and the teachers complete the questionnaire

Data analysis techniques

The questionnaires were collected for collation. Frequency counts, percentages and bar charts would be used to present the result.

RESULTS AND DISCUSSION

Research Question 1: What is the source of local resources used by the teachers as instructional materials?

To answer this question, teachers' responses to item in the table below.

Table 1: The level of resourcefulness of teachers in relation to instructional material.



S/N	ITEM	Y ES	% YES	N O	% NO
1	Do government support your school financially in the provision of locally made resources for the teaching and learning of chemistry?	4	29	10	71
2	Are the locally made resources used for the teaching and learning of chemistry provided by any educational authorities?	5	36	9	64
3	Do the teacher supply the local materials needed for teaching and learning of chemistry?	13	93	1	7

Table 1 above revealed that the level of resourcefulness of the teachers in relation to instructional materials were very low.

They show that the schools were not well funded by the government for the procurement of local resources. The table also shows that little support were also received from the educational authorities in the procurement of locally made resources and that most of the local resources that were available were provided by the teachers alone.

Since the teachers were not receiving any support from any place and they only depends on the little ones within their range, they were not exposed to any other type of local materials apart from the one found in their immediate environment, this seriously contributed to the fall in the level of their resourcefulness.

Research Question 2: Does the use of Local instructional materials pose any problem during teaching?

To answer this question, responses to items in the below table were considered.



Table 2: Analysis of the problem facing the use of locally made instructional materials during teaching.

/N	ITEM	%	
		YES	NO
1	Do the teachers need to know certain skills before using local resources?	1	2
2	Are local resources liable to damage during lesson?	1	7
3	Does local resources measures accurately during experimental period?	4	7

The table above shows that the use of local resources as instructional materials posed three major problems during the teaching period. The table revealed that before a teacher can use any local resources as instructional materials, he must know some certain skills, he must be a person who can think very fast and deeply, he must be a good improviser, a person who know how to find solutions problems, he must be very good in creativity, sometime local resources does function accurately like the imported ones and the differences may be very minimal to the extent that if the teacher cannot watch very keenly, he may not be able to notice the difference.

The teacher must be a person who is patient enough to take not of all these things. A times, the atmospheric condition have effect on the use of local resources, for example, during the raining season, the humidity of the air do have effect on the equipment, so, the teacher must be very careful in the movement of the equipment in and out of the rain. Also the dry season have its own side effect, for instance, it causes expansion and contraction of some materials, e.g. metals

This table also showed that local resources are liable to damage at any time even during the lesson, since they are locally made, they cannot have the same quality as those manufactured in the factory.

Research Question 3: What are the problems confronting the leaning of chemistry?

To answer this question, responses to items in the below table were considered.



Table 3: Analysis of the problem confronting the leaning of chemistry

S /N	ITEM	%	
		YES	NO
1	Do you have a separate laboratory for the teaching of chemistry?	0	100
2	Is the available laboratory well equipped to facilitate leaning?	20	80
3	Are there enough instructional materials for teaching and learning of chemistry in your school?	18	82
4	Have you attended any exhibition on the importance of locally made resources for the leaning of chemistry?	60	40

The above table clearly shows that there is no separate laboratory specifically made for the teaching of chemistry and the available ones used for all the science practical were not well equipped and not up-to-standard because of lack of fund. The table also shows that majority of the students have not been out for any exhibition on the importance of locally made resources for the teaching of chemistry or partake in any activity which involves the sharing of knowledge or bring about interaction with colleagues from other schools on the use of local resources in order to gain knowledge.

This table also revealed that most of the schools do not have enough instructional materials for the teaching of chemistry and no educational authority help to supply them. All these are problems confronting the learning of chemistry in the schools under study.

Research Question 4: What general attitude do chemistry teachers exhibit toward the use of local resources?

To answer this question, responses to items in the below table were considered.



Table 4: General attitude of chemistry teachers towards the use of local resource

/N	ITEM	%	
		YES	NO
1	Are you a member of any association that appreciate the use of locally made resources in teaching chemistry?	5	9
2	Are the materials used for teaching chemistry locally made?	7	7
3	Does the use of local resources motivate and create interest in students?	13	1

The table shows that higher percentage of the teachers teaching chemistry in senior secondary schools do not belong to any association that appreciate the use of locally made resources in teaching chemistry which can enhance interaction between them and their colleagues from other schools for them to gain more knowledge.

The table also shows that some of the materials used in teaching chemistry are locally made; nevertheless, some of them are also imported ones from factories. The table also shows that the use of local resources motivates and create interest in the students but its effectiveness in learning greatly depends on the ability of the teachers to make them available and use them accordingly.

DISCUSSION

From the result of this research work, it was clearly established that local resources are very useful in the teaching and learning of chemistry, Kemp (2000) and Wales (2004). However, the research work shows that higher percentage of the senior secondary schools are well located in respect to the availability of local resources that can be used for effective teaching and learning of chemistry.

This research work shows that most teachers do not totally depend on sophisticated materials for the teaching of chemistry though their level of resourcefulness is low.

The research shows that most senior secondary schools were not well funded by the government and educational authorities for the procurement of local resources. This



research work also shows clearly that local resources really have a positive effect on the performance of the students if they are duly available and utilized.

Also from the results of this finding, it was established that teachers need to know certain skills such as creativity, patient, fast thinking, problem solving, diligence and stead fasting in order to utilized the available local resources effectively.

This research also shows that there are other problems such as lack of adequate equipment needed to facilitate learning of chemistry, lack of exposure to science (chemistry) activities and exhibitions which greatly have negative effect on the performance of both teachers and students of chemistry

Finally, this research stated clearly that higher percentage of the teacher teaching chemistry in senior secondary schools do not belong to any association that recognised the importance of locally made resources in teaching of chemistry which can enhance interaction between them and their colleagues from other schools for them to gain knowledge.

The purpose of this study was to investigate the use of local resources as instructional materials in teaching chemistry in Ikole L.G.A of Ekiti state.

The sample consisted of one hundred and eight chemistry students [180] and fourteen [14] chemistry teachers randomly selected from seven of the nineteen senior secondary schools in the local government under study. Two sets of questionnaires [one for teachers and one for students] were used to generate data for the study. The S.S.C.E results in chemistry of each selected school for three years were also used. Frequently count, simple percentages and bar charts were used to analyse the data generated and presents the result.

The analysis of the subjects responses revealed that most of the instructional materials used in the teaching and learning of chemistry are imported and could be made locally but the problem faced in the production of these instructional materials have a positive relationship with students' academic performance. The result also showed that majority of the teachers and students do not attend symposia, seminars exhibition or excursions on chemistry and have not been to any resource centre where they can gain more knowledge or share experience with their colleagues to improve their competence for effective teaching and learning of the subject.



CONCLUSIONS

From the analysis of the data and subsequent interpretations of the result, it was concluded that the use of local resources as instructional materials have great value on the academic performance of the students when used effectively and efficiently. The study also proved that instructional materials can be produced locally.

Also, teachers can make teaching and learning effective by making use of local resources that is related to every topic and concept he may want to teach.

RECOMMENDATIONS

Based on the finding of this study, the following recommendations are made.

1. Teachers should endeavour to expose their students to the use of local materials.
2. Teachers should learn to improvise whenever sophisticated instructional materials are not available in order to adequately achieve his aims and objective in every topic taught.
3. Government and educational authorities should give incentives to teachers who teach chemistry in secondary school in order to increase their efficiency.
4. In-service training which will help to renew and acquaint chemistry teachers with updated concept and methodologies of the educational system should be organized nationwide. This is recommended to make old teachers be in line with the current changes in educational system and appropriate authorities must aid the comprehensive plan for such in-service training and re-training programs.
5. Teachers and students should endeavour to maintain positive attitude towards the use of local instructional materials.

REFERENCES

- Adeniyi, A. B. (2011). Improvisation in the Laboratory. *Journal of the Science Teachers Association of Nigeria*. 19(3), 57-62.
- Adeosun, O. V. (2000). *Technology of Education*. Bamgboye and co press Limited, Ado Ekiti.
42-45.



- Adjai, O. S. (2007). *Tools for Science Teaching in Nigeria*, Atoto Press and Publishing Company, Ilorin. 41-45.
- Bajah, S. T. (2005). Teaching Science Creatively. *University of Ibadan press*. 14-15.
- Bajah, S. T. (2006). Correlates of Science Extrinsic School Environment factors with level of Attainment in Standardized Test. *University of Ibadan press*. 1-5
- Balogun, T. A. (2010). A System Approaches to Education in Nigeria. *West African Journal of Education*. 16(2), 205-219.
- Balogun, T. A (2011). Improvisation and Local Production of Apparatus for Science Teaching. (Unpublished Thesis); Department of Teachers Education, University of Ibadan, Ibadan
- Duyilemi, B. O. (2004). Laboratory Management; A Way to Improve Science Based in Nigeria Secondary School. A Lecture Delivered at the Faculty of Science, Ekiti State University, Ekiti State.
- Duyilemi, B. O. (2001). Educational Technology, Curriculum and Society. Dubeno Nigeria Publishers, Ondo, Nigeria. 61-78.
- Ekiti State Syllabus (2016). Unified Chemistry Teaching Syllabus for Secondary Schools in Ekiti State.
- Emoven, P. K. (2000). Science and its Importance (unpublished M.Phil Thesis). Moi University, Eldoret.
- Erickson, A. O. & Curl, B. T. (2000). Importance of Instructional Material in Teaching Students Effectively. Nicloks Publishing, Kogan, New York. 75-90.
- Gagne, R. M. (2012). The Condition of Learning (2nd Edition), New York, Holt Rinchart and Winston. 51-55.
- Gagne, R. M. (2012). Principle of Instruction Design (2nd Edition), New York. Holt Rinchart and



Winston. 32-39

Heinion, R., Molenda M. & Russel, J. D. (2007). *Instructional and New Technology*. Owerri: onii Publishing

Imogie, A. I. (2002). *Improving teaching and learning: An introduction to instructional technology*. Benin: Joe Seg Assoc.

Kolawole, O. B. (2002). *Tropical issues in Research and Education*. An unpublished M.Ed Thesis, University of Ibadan. Ibadan

Otiende, E., Wamahium, S. P. & Karagan, A. M. (2005). *What is Chemistry?*. Retrieved on January 4, 2016 from <http://m.livescience.com>

MOE & CSE, (2002). *Ethiopian Chemistry Teacher's Sourcebook: (1) Model and Materials*. EMPDA: Addis Ababa

Musar, A. (2008). *Equipment for Science Education: Constraints and Opportunities*. The World Bank.

National Policy on Education (2014). *National Curriculum for Senior Secondary Schools*. Federal Ministry of Education Science and Technology. Abuja

Okoli, S. I. (2004). *Teaching Science Creatively*. *Journal of STAN*, 16(3), 3-5.

Oladimeji, G. A. O. (2006). *Improvisation in Integrated Science*, *Journal of Science Teachers Association of Nigeria*. 16(2), 100-107.

Oladimeji, M. O. (2005). *Important Aspect of Modern Science Curriculum*. *Journal of the Science Teachers Association of Nigeria*. 12(4), 14-17.

Osuagwu, C. G. & Oladimeji, M. O. (2007). *The Development of Materials For Effective Science Teachers Education*. Proceedings of STAN National Workshop on the Nigeria Basic Science Project and 3-3 Secondary School System.

Raji, I. F. (2009). *An Investigation into the Problems of Resources and Utilization in the Teaching of Biology in Irewolede L.G. A*. An unpublished M.Ed Thesis, University of Ibadan. Ibadan.

Romiszowski, A. J. (2000). *Designing Instructional System and Designing Making in Course of Planning and Curriculum Design*. Nicloks publishing, Kogan, New York. 25-90

Schramn, J. J. (2001). *The Teaching of Science as Inquiry*. In Schramn and Brandwein (eds); the



Teaching of Science. Cambridge Harvard University press.

Shuaibu, M. J. & Otuka, J. O. E. (2002). The Design of Creative Laboratory Activities in the Sciences. *Journal of the Science Teachers Association of Nigeria*, 19(2), 19-35.

Ughamadu, K. A. (2009). Educational technology and micro teaching for teacher effectiveness.

Onisha: Emba Printing and Publication

UNESCO Report (2008). Teaching Aid News. *The Magazine of Experience in Training Programme*. 4(24), 13-24.

UNESCO (2008). Design, Development and Evaluation of Low Cost Educational Materials: Report of a Regional Workshop. UNESCO Regional office for Education in Asia and Oceania: Bangkok.

Wales, J. M. (2004). The Place of Teaching Aids in Nigeria Education, *West African Journal of Education*, 2(1), 24-28.

Wittich, I. & Schallar, O. E. (2001). Instructional Technology, its nature and uses. (5th Edition),

New York. Harper and Row. 5-20