EFFECT OF IMPROVISED INSTRUCTIONAL MATERIALS IN TEACHING AND LEARNING CHEMISTRY IN SECONDARY SCHOOL OF TSAFE LOCAL GOVERNMENT ZAMFARA STATE

BY

AHMAD SANI 16!0111025
HADI ADAMU 1610111074
NURA LAWALI 1510111006

FEDERAL UNIVERSITY GUSAU

OCTOBER, 2021

EFFECT OF IMPROVISED INSTRUCTIONAL MATERIALS IN TEACHING AND LEARNING CHEMISTRY IN SECONDARY SCHOOLS OF TSAFE LOCAL GOVERNMENT, ZAMFARA STATE

BY

AHMAD SANI 1610111025

HADI ADAMU 1610111074

NURA LAWALI 1510111006

A RESEARCH SUBMITTED TO THE DEPARTMENT OF SCIENCE EDUCATION, FACULTY OF EDUCATION, FEDERAL UNIVERSITY GUSAU. IN PERTIAL FULFILMENT OF THE AWARD OF BACHELOR OF SCIENCE EDUCATION

(B. SC.ED.CHEMISTRY)

OCTOBER 2021

APPROVAL PAGE

This research has been approved in meeting the requirement of the department of science education, faculty of education, Federal University Gusau.

Dr.Bashir suleiman
Project Supervisor

11/10/2021
Date/Signature

Mal. Abdullahi Bello
Project Coordinator

13/10/2021
Date/Signature

Dr.Umar Sodangi
Head of Department

13/10/2021
Date/Signature

External Supervisor

Date/Signature

DECLARATION

We declared that the work in this project tittle as ; Effect of improvised instructional materials i teaching and learning of chemistry at secondary schools of Tsafe local government. Has been carrie out by us in the department of science education. The information derived from the literature has bee duly acknowledged in the text and the list of references provided. No part of this project report wa previously presented for another degree at any other institution

Names	Signatures	Date
1. Ahmad Sani		7/10/2021
2. Hadi Adamu		7/10/2021
3. Nura lawal		7/10/2021

DEDICATION

This project Dedicated to our parents: Malam Adamu Sabo(Damfa), Malama Aishatu Muhammad Tsafe,Malam Muhammad sani mada, malam Lawali Gusau and the entire Muslim ummah.

ACKNOWLEDGEMENTS

Our profound Praise, Glorification, and Gratitude goes to Allah (S.W.T) for His numerous blessings in my academic pursuits. May His Peace and Blessings be upon His messenger, Muhammad (S.A.W), his Family, Companions, and whose follows his teachings till the Day of Judgment.

Thanks to all academic and non-academic staff of the Department of Science education in particular and that of Faculty of Education at large and also Chemistry Department.

A special thanks to my respected tutor, guider, adviser, as well as project supervisor, Dr.BASHIR SULEIMAN who took his time counseling and advising me through the period of this research.

My unabated thanks to Ustaz Musa S Lawal Tsafe the leader of mu'assasatu Sheikh Ja'afar Tsafe and Masjid Abiy Hurairah yaryara Tsafe especially Education Committee for both financial and academic assistance with advises.

A special thanks to our respective Aunties Shafi'ah, Kabeerah, Saleemah, Sadeeyah for their concern upon me. And a special appreciation to a special person, Hibbatullahi Ahmad Labbo.

My appreciation with thanks to all members of Shababu Ahlis-Sunnah Wal-Jama'ah Tsafe, for their prayers to me; Hassan, Hashim, Adul-Rahaman, Rabi'u, Mustapha Ibrahim, Usman, Saifullahi, Yusuf, Aliyu, Adul-Karim, Salihu, Habibu Yusuf, Habibu Bala and others. And also

members of our class. I wish to thanks the founder of Garewa Foundation Tsafe, Alh. Abubaka Yahaya (Uban Marayu).

Finally, much thanks to all our well wishers, known and unknown, for their prayers, advise and support all round. May Allaah (S.W.T) bless all.

ABSTRACT

This research was on: Effect of improvised instructional materials in teaching and learning chemistry Secondary Schools of Tsafe Local Government, Zamfara State. It was guided by two (2) research questions and two (2) objectives. The population of the study consists of all fifteen (15) secondary schools in Tsafe Local Government .The sample schools selected are two (2). Instrument tagged in the study was pre test and post test . The project supervisor validate the post test question used in the study. The use of different tools to the respondents helped in triangulates the truthiness of data. The finding revealed that there are effect and influence in teaching chemistry Using improvised instructional materials Senior secondary schools but there is lack of improvised instructional materials from the teachers. And thus, the study recommended that different ways of providing improvised instructional materials should improve by school management, education board, teachers, and other non-governmental organizations.

LIST OF TABLES

TABLE OF CONTENTS

HAPTER FIVE : SUMMARY, CONCLUSION AND RECOMMENDATION

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the study

Chemistry is an exact and a core science subject in Nigerian secondary schools. Its teaching often requires creativity and improvisation. To make chemistry concepts comprehensible to students, chemistry teachers must employ creative teaching methods and be prepared torespond to queries and explain concepts in an atypical manner (Nbina, 2012). The author further pointed out that the widespread poor performance and the negative attitude towards chemistry from secondary school students have largely been ascribed to lack of proper teaching methods. Teachers who adapt appropriate improvisation materials in teaching chemistry will likely be more successful in imparting chemistry knowledge to the novice chemists in their classes. Samba and Eriba (2011) see improvisation as the act of using alternative materials and resources to facilitate instructions whenever there is lack or shortage of specific first hand teaching aids. The authors see improvisation as the choice of the best instructional material which enables the teacher to achieve some carefully specified educational objectives. Stiggins (2008) added that there are various methods used to increase class participation and performance among students. The researchers hope that improvisation of instructional teaching materials could be one of them. Recent models of teaching and learning view learning as a social activity in which children construct knowledge

with the teacher and other children (Kerry, 2002). Chemistry is a branch of physical science, and it is the study of the composition, properties and behaviour of matter. Since it's a physical science, its teaching has to be physical and real

(Baja, 1988). The teaching of chemistry is made interesting with the use of teaching aids which include flash cards, pointer, computers, improvised materials and overhead projectors among others. The knowledge of this subject is control to vocations in health services, pharmaceuticals, petroleum and petrochemical industries, food processing, teaching services and extractive industries, which is relevant for economic development. The teaching of this subject should aim at developing in the students those manipulative and experimental skills necessary to make them competent and confident in the investigations of the material resources around them. However, as important as this subject is to all science related vocations, the performance of students in it at the senior secondary school certificate levels has not met the desired needs of the nation hence the need for this investigation. The present digital age of human existence had brought about changes in every aspect of human life such as the way we work, the way we live, the way we eat, the way we communicate, the way we transfer or carry money and the way we teach and learn. In the education sector, many new teaching materials are being provided in addition to the old ones. In many schools these teaching materials are not always available in the right quantity, but teaching and learning must go on in the school. Thus, there is need to look at the classroom practices of the chemistry or science teachers which would help them to perform their duties effectively in a

situation where the teaching materials are in short supply or not available. Effective teaching and learning is done with instructional materials; Nachias (2000), Owo (2009) and Nwagbo and Ugwuanyi (2015) observed that innovative pedagogical practices using technology and improvisation enhance teachers effectiveness chemistry concepts cannot be fully achieved without the use of instructional materials. The teaching of chemistry without instructional materials will certainly result to poor performance in the course. Franzer et al. (1992) stressed that;a professionally qualified science teacher no matter how well trained would be unable to put his ideas into practice if the school setting lacks the equipments and materials necessary for him or her to translate his competence into reality. Basssey (2002) described instructional materials media as system component that may be used as part of instructional process which are used to disseminate informative message and ideas or which make possible communication in the teaching-learning process. Experience over the years has shown that teachers have been depending on excessive use of words to express, convey ideas or facts in the teaching-learning process. This process is termed the 'chalk-talk' method. Today advances in technology have made it possible to produce materials and devices that could be used to minimize the teachers' talking and at the same time, make the message clearer, more interesting and easier for the learner to assimilate (Onasanya, et al. (2008).According to Soetan et al. (2010), graphics including charts, posters, sketches, cartoons, graphs and drawings. Graphics communicate facts and ideas clearly through combination of drawings, words and pictures. The use of graphics in teaching creates definitiveness to the materials being studied. They help to visualize the whole

concepts learned and their relationships with one another. Hands-on instructional materials show, rather than tell, which increase information retention. A truism often heard in teaching is that if you have not learnt, I have not taught. A reasonable conclusion then is that the importance of instructional materials in teaching and learning science is most efficient illustrated through student achievement result. The Biological Science Curriculum Study (BSCS) (2011) asserts that students come to the science classroom with many misconceptions to correct for proper scientific learning to progress. Schools should base instructional material on fundamental scientific concepts and principles, which help to align students understanding with current knowledge and teach them to monitor and control their own thoughts process to facilitate learning. When science is integrated with other inter-disciplinary courses, the teacher should give careful attention to designing "a logical and coherent structure" for ensuring that they clearly communicate and ensure contextual understanding of embedded scientific concepts, as recommended by the Long Beach Unified School District (LBUSD) (2010).The LBUSD recommends the use hand-on science activities. The BSCS advocates group work and inquiry based activities. Such explorations encourage students to engage in science, which promote problem-solving thought patterns and correct students' mistaken notion of science and the world. Teachers who take time to provide instructional materials and option that take into consideration or account the different ways students receive and express knowledge are more likely to see their students' success. Science classroom should provide a variety of audio, visual and print input methods depending on students need, allow students the flexibility to communicate their true learning. According to

BSCS, students or teachers who must closely follow their 5Es instructional model engage, explore, explain, elaborate and evaluate...achieve a high rate of success. Taylor, Scotter and Coulson (2007) conclude, "that there is a statistical link between superior student achievements and basic or extensive of strategies and learning sequences consistent with the 5Es".Research study has shown that where instructional materials are used the learning environments are highly stimulating and the students appear to take greater interest in learning.

1.2 Statement of the Problem

The transmission of facts, ideas and information from the teacher to the students in a systematic order or procedure is refereed to as teaching. During this process instructional material other wise known as teaching aids meant to make instruction more meaningful, clear and much more interesting to students are brought in display. There is a general impression that science education is not achieving the desired objectives especially with high incidence of students' poor performance in chemistry and other science subjects at senior secondary certificate examination. This situation has assumed a precarious dimension in all secondary schools in Cross River State and particularly in Yakurr Local Government Area. The failure of educational system to provide adequate and appropriate teaching-learning aids in order to improve academic performance of students is of a great concern to government, educational institutions and other concern citizens. It is believed that if adequate instructional materials are made available to school and are used appropriately in teaching-learning process, a better performance could be achieved. Hence, the

motivation of this study which seeks to find out the influence of instructional materials on academic performance of senior secondary schools students in chemistry.

1.3 Objective of the Study

The purpose of this study is to:

Find out the influence of instructional materials on academic performance of senior secondary school students in chemistry.

To examine the relationship between instructional materials and student academic performance in chemistry

To examine the impact of instructional materials in teaching and learning of chemistry in secondary school

Determine the effect of teaching experience on the chemistry teachers' effort at improvisation of instructional materials

1.4 Research Questions

Is there any differences in chemistry performance of student taught chemistry using improvised instructional material and those taught with lecture method.

1.5 Research Hypotheses

The following research hypotheses were formulated by the researcher:

There is no statistical significant difference in performance of chemistry students taught using improvised instructional materials and those taught using lecture method.

There is statistical significant difference between the academic performance of chemistry students and the use of improvised instructional materials in teaching and learning.

1.6 Significance of the Study

This study will help to:

Steer Government and Proprietors of schools to recognize the need to adequately equip their schools with current and appropriate instructional materials.

Prove the worth of instruction materials in teaching learning processes.

Inculcate in teachers the habits of using instructional materials appropriately in teaching learning process to arouse interest and determination among students.

1.7 Scope/ Delimitation of the Study

The scope of the study covers the impact of instructional material and resources in the teaching of chemistry in secondary schools; but in the cause of the study, there are some factors that limited the scope of the study;

(a)Availability of research material: The research material available to the researcher is insufficient, thereby limiting the study.

(b)Time: The time frame allocated to the study does not enhance wider coverage as the researcher has to combine other academic activities and examinations with the study.

(c)Finance: The finance available for the research work does not allow for wider coverage as resources are very limited as the researcher has other academic bills to cover

1.8 Definition of Terms

Instructional materials:

Instructional Materials instructional materials are the tools used in educational lessons, which includes active learning and assessment. Basically, any resource a teacher uses to help him teach his students is an instructional material

Chemistry:

Chemistry is the scientific discipline involved with elements and compounds composed of atoms, molecules and ions: their composition, structure, properties, behavior and the changes they undergo during a reaction with other substances.

Secondary school

A secondary school is both an organization that provides secondary education and the building where this takes place. Some secondary schools can provide both lower secondary education and upper secondary education, but these can also be provided in separate schools, as in the American middle school- high school system.

CHAPTER TWO

REVIEW OF REALTED LITERATURE

2.1 Introduction

The history of chemistry spans a period from very old times to the present. Since several millennia BC, civilizations were using technologies that would eventually form the basis of the various branches of chemistry. Examples include extracting metals from ores, making pottery and glazes, fermenting beer and wine, extracting chemicals from plants for medicine and perfume, rendering fat into soap, making glass, and making alloys like bronze. Chemistry was preceded by its protoscience, alchemy, which is an intuitive but non-scientific approach to understanding the constituents of matter and their interactions. It was unsuccessful in explaining the nature of matter and its transformations, but, by performing experiments and recording the results, alchemists set the stage for modern chemistry. Chemistry as a body of knowledge distinct from alchemy began to emerge when a clear differentiation was made between them by Robert Boyle in his work The Sceptical Chymist (1661). While both alchemy and chemistry are concerned with matter and its transformations, the crucial difference was given by the scientific method that chemists employed in their work. Chemistry is considered to have become an established science with the work of Antoine Lavoisier, who developed a law of conservation of mass that demanded careful measurement and quantitative observations of chemical phenomena. The history of

chemistry is intertwined with the history of thermodynamics, especially through the work of Willard Gibbs.

2.2 Conceptual frame work

Instructional materials

Instructional Materials, also known as Teaching/Learning Materials (TLM), are any collection of materials including animate and inanimate objects and human and non-human resources that a teacher may use in teaching and learning situations to help achieve desired learning objectives.

Instructional materials may aid a student in concretizing a learning experience so as to make learning more exciting, interesting and interactive.

They are tools used in instructional activities, which include active learning and assessment. The term encompasses all the materials and physical means an instructor might use to implement instruction and facilitate students achievement of instructional objectives.

2.2.1 Types of instructional materials

1	Prints	Textbooks, pamphlets, handouts, study guides, manuals
2	Audio	Cassettes, microphone, podcast
3	Visual	Charts, real objects, photographs, transparences
4	Audio visual	Slides, tapes, films, filmstrips, television, video, multimedia
5	Electronic interactive	Computers, graphing calculators, tablets

2.2.2 The need for instructional materials

1. Conceptual knowledge requires examples, familiarity with the concept's features, contexts, and engagement/experience. These tools directly help.

2. Some academic subjects like chemistry or electronics can benefit students in more useful ways if they know what the real-world counterparts to a theory are – circuits, tissue under a microscope, plants, etc. Such information sticks longer because the memory encoding for these concepts involves strong sensory and experiential components. The brain acquires the concept with multiple representations in a network- right from what the concept looks on paper to how it feels to the senses

3. Using youtube videos and discussing Ted talks puts dense information in a familiar context. Youtube is a part of human culture, so are memes, putting information in the context of the internet culture can motivate or change the perception of the so-called 'boring' topics.

IMs and TAs also motivate students at the level of the classroom. This goes hand in hand with confidence (security that one can learn) as having materials is proof of accessing information. Having access can, at the very least, prime students to learn.

4. Relying on general information on the internet can overwhelm students due to an inherent lack of direction and potential misinformation. This problem can be solved by designing IMs to accommodate snowballing around a topic, using authority references, summarizing content or priming content like video overviews and info-graphics.

5. The cost of implementing TAs and IMs is not trivial. However, improved teaching efficacy and learning efficacy can significantly lower the burden of learning course content. Teachers may save time, students may require lesser effort to achieve learning goals, and primary organizational resources would be better managed (man-hours to pay for, classroom upkeep, scheduling). And even if it does cost the organization a little more, better learning would probably always be worth it.

6. Testing and assessment not only helps to confirm the learning of content but also helps improve the learning. Research has shown that being tested (the testing effect) can promote memory and conceptual understanding. Attempting worksheet exercises, quizzes, essays, etc.

reinforce learning as well as create a hub for further self-motivated learning. Check out the 1st link in the articles listed below for referenced research insights.

7. At the superficial level and the definition level, who wouldn't want a lively class and learning experience?

8. and IMs would work even better if they are aligned with brain-based learning concepts. These concepts are a framework to design a way the brain processes information. If TAs and IMs hijack these processes or even reinforce them, the growth in learning would be dramatic.

2.3.Theoretical frame work

The concept of teaching

Concept of teaching:- Teaching is a process in which individual teach or instruct another individual. Teaching is considered as the act of imparting instructions to the learner in the classroom situation.

Teaching definitions

Let us discuss the concept of teaching as state by some prominent philosophers and educationist.

(1) H C Morrison :- teaching is an intimate contact between the more personality and a less mature one.

(2) jackson:- Teaching is a face to face encounter between two or more persons, one of whom (teacher) intend to effect certain changes in the other participants (student).

(3) N.L.Gage (Democratic point of view):- Teaching is interpersonal influence aimed at changing the behavior potential of another person.

(4) Clerk:- Teaching refers to activities that are designed and performed to produce in students behavior.

We can define teaching according to the following three viewpoints.

(a) Authoritarian

(b) Democratic

(c) Liassez faire.

(a) Authoritarian:-

According to this viewpoint-

Teaching is an activity of memory level only

This teaching does not develop thoughts and attitude in the students.

Is known as thoughtless teaching

This teaching is teachers centric criticism of the teachers.

(b) Democratic teaching:-

According to this-

Teaching is done at understanding level.

Memory level teaching is the prerequisite (concept) is first memorized and then understand

Such teaching is known as thoughtful teaching.

According to this point of view, teaching is an interactive process, primarily involving classroom talks which takes place between teachers and student.

Here students can ask questions and criticize the teachers.

Here students can ask the questions and self-disciplined is insisted.

(c) Laissez Faire Attitude:-

It is known as reflective level teaching.

It is more difficult then memory level and understanding level of teaching.

Memory level and understanding level teaching are must for the reflective level of teaching.

It is highly thoughtful activity.

In this level both students and teachers are participants.

This level produces insights.

Nature and characteristic of teaching:-

Teaching is a social and cultural process, which is planned in order to enable an individual to learn something in his life. We can describe the nature and characteristics of teaching in following way:-

(1) Teaching is a complete social process

Teaching is undertaken for the society and by the society. With everchanging social ideas, it is not possible to describe exact and permanent nature of teaching.

(2) Teaching is giving information

Teaching tells students about the things they have to know and students cannot find out themselves. Communication of knowledge is an essential part of teaching.

(3) teaching is an interactive process

Teaching is an interactive process between the student and the teaching sources, which is essential for the guidance, progress, and development of students.

(4) Teaching is a process of development and learning.

(5) Teaching causes a change in behavior.

(6) Teaching is art as well as science.

(7) Teaching is face to facencounteer

(8) Teaching is observable, measurable and modifiable.

(9) Teaching is skilled occupation:- Every successful teacher is expected to know the general methods of teaching-learning situations.

(10) Teaching facilitates learning

(11) Teaching is both conscious and an unconscious process.

(12) Teaching is from memory level to reflective level.

(13) Teaching is a continuum of training, conditioning, instruction, and indoctrination.

The concept of learning

Learning:- is the process of acquiring new understanding, knowledge, behaviors, skills, values, attitudes, and preferences. The ability to learn is possessed by humans, animals, and some machines; there is also evidence for some kind of learning in certain plants. Some learning is immediate, induced by a single event (e.g. being burned by a hot stove), but much skill and knowledge accumulate from repeated experiences. The changes induced by learning often last a lifetime, and it is hard to distinguish learned material that seems to be "lost" from that which cannot be retrieved.

Human learning starts at birth (it might even start before and continues until death as a consequence of ongoing interactions between people and their environment. The nature and

processes involved in learning are studied in many fields, including educational psychology, neuropsychology, experimental psychology, and pedagogy. Research in such fields has led to the identification of various sorts of learning. For example, learning may occur as a result of habituation, or classical conditioning, operant conditioning or as a result of more complex activities such as play, seen only in relatively intelligent animals. Learning may occur consciously or without conscious awareness. Learning that an aversive event can't be avoided nor escaped may result in a condition called learned helplessness.[There is evidence for human behavioral learning prenatally, in which habituation has been observed as early as 32 weeks into gestation, indicating that the central nervous system is sufficiently developed and primed for learning and memory to occur very early on in development.

Types of learning

Non-Associative learning

Active learning

Associated learning

Play

Enculturation

Episodic learning

Multimedia learning

Rote learning

Meaningful learning

Formal learning

Non formal learning

Informal

E-learning and augmented learning

Evidence-based learning

Tangential learning

1- Non-associative learning

Non-associative learning refers to "a relatively permanent change in the strength of response to a single stimulus due to repeated exposure to that stimulus.This definition exempt the changes caused by sensory adaptation, fatigue, or injury.

Non-associative learning can be divided into habituation and sensitization.

Habituation

Habituation is an example of non-associative learning in which one or more components of an innate response (e.g., response probability, response duration) to a stimulus diminishes when the stimulus is repeated. Thus, habituation must be distinguished from extinction, which is an associative process. In operant extinction, for example, a response declines because it is no longer followed by a reward. An example of habituation can be seen in small song birds—if a stuffed owl (or similar predator) is put into the cage, the birds initially react to it as though it were a real predator. Soon the birds react less, showing habituation. If another stuffed owl is introduced (or the same one removed and re-introduced), the birds react to it again as though it were a predator, demonstrating that it is only a very specific stimulus that is habituated to (namely, one particular unmoving owl in one place). The habituation process is faster for stimuli that occur at a high rather than for stimuli that occur at a low rate as well as for the weak and strong stimuli, respectively. Habituation has been shown in essentially every species of animal, as well as the sensitive plant Mimosa pudica and the large protozoan Stentor coeruleus.This concept acts in direct opposition to sensitization.

Sensitization

Sensitization is an example of non-associative learning in which the progressive amplification of a response follows repeated administrations of a stimulus (Bell et al., 1995).[citation needed] This is based on the notion that a defensive reflex to a stimulus such as withdrawal or escape

becomes stronger after the exposure to a different harmful or threatening stimulus. An everyday example of this mechanism is the repeated tonic stimulation of peripheral nerves that occurs if a person rubs their arm continuously. After a while, this stimulation creates a warm sensation that eventually turns painful. The pain results from the progressively amplified synaptic response of the peripheral nerves warning that the stimulation is harmful.[clarification needed] Sensitization is thought to underlie both adaptive as well as maladaptive learning processes in the organism.

2-Active learning

Active learning occurs when a person takes control of his/her learning experience. Since understanding information is the key aspect of learning, it is important for learners to recognize what they understand and what they do not. By doing so, they can monitor their own mastery of subjects. Active learning encourages learners to have an internal dialogue in which they verbalize understandings. This and other meta-cognitive strategies can be taught to a child over time. Studies within metacognition have proven the value in active learning, claiming that the learning is usually at a stronger level as a result.In addition, learners have more incentive to learn when they have control over not only how they learn but also what they learn.Active learning is a key characteristic of student-centered learning. Conversely, passive learning and direct instruction are characteristics of teacher-centered learning (or traditional education).

3-Associative learning

Associative learning is the process by which a person or animal learns an association between two stimuli or events. In classical conditioning a previously neutral stimulus is repeatedly paired with a reflex eliciting stimulus until eventually the neutral stimulus elicits a response on its own. In operant conditioning, a behavior that is reinforced or punished in the presence of a stimulus becomes more or less likely to occur in the presence of that stimulus.

4-Play

Play generally describes behavior with no particular end in itself, but that improves performance in similar future situations. This is seen in a wide variety of vertebrates besides humans, but is mostly limited to mammals and birds. Cats are known to play with a ball of string when young, which gives them experience with catching prey. Besides inanimate objects, animals may play with other members of their own species or other animals, such as orcas playing with seals they have caught. Play involves a significant cost to animals, such as increased vulnerability to predators and the risk of injury and possibly infection. It also consumes energy, so there must be significant benefits associated with play for it to have evolved. Play is generally seen in younger animals, suggesting a link with learning. However, it may also have other benefits not associated directly with learning, for example improving physical fitness.

Play, as it pertains to humans as a form of learning is central to a child's learning and development. Through play, children learn social skills such as sharing and collaboration.

Children develop emotional skills such as learning to deal with the emotion of anger, through play activities. As a form of learning, play also facilitates the development of thinking and language skills in children.

There are five types of play:

1-Sensorimotor play aka functional play, characterized by the repetition of an activity

2-Roleplay occurs starting at the age of 3

3-Rule-based play where authoritative prescribed codes of conduct are primary.

4-Construction play involves experimentation and building.

5-Movement play aka physical play.

These five types of play are often intersecting. All types of play generate thinking and problem-solving skills in children. Children learn to think creatively when they learn through play. Specific activities involved in each type of play change over time as humans progress through the lifespan. Play as a form of learning, can occur solitarily, or involve interacting with others.

5-Enculturation

Enculturation is the process by which people learn values and behaviors that are appropriate or necessary in their surrounding culture.Parents, other adults, and peers shape the individual's understanding of these values.If successful, enculturation results in competence in the language,

values, and rituals of the culture.This is different from acculturation, where a person adopts the values and societal rules of a culture different from their native one.

Multiple examples of enculturation can be found cross-culturally. Collaborative practices in the Mazahua people have shown that participation in everyday interaction and later learning activities contributed to enculturation rooted in nonverbal social experience. As the children participated in everyday activities, they learned the cultural significance of these interactions. The collaborative and helpful behaviors exhibited by Mexican and Mexican-heritage children is a cultural practice known as being "acomedido". Chillihuani girls in Peru described themselves as weaving constantly, following behavior shown by the other adults.

6-Episodic learning

Episodic learning is a change in behavior that occurs as a result of an event. For example, a fear of dogs that follows being bitten by a dog is episodic learning. Episodic learning is so named because events are recorded into episodic memory, which is one of the three forms of explicit learning and retrieval, along with perceptual memory and semantic memory.Episodic memory remembers events and history that are embedded in experience and this is distinguished from semantic memory, which attempts to extract facts out of their experiential contextor – as some describe – a timeless organization of knowledge.For instance, if a person remembers the Grand Canyon from a recent visit, it is an episodic memory. He would use semantic memory to answer someone who would ask him information such as where the Grand Canyon is. A study revealed

that humans are very accurate in the recognition of episodic memory even without deliberate intention to memorize it. This is said to indicate a very large storage capacity of the brain for things that people pay attention to.

7-Multimedia learning

Multimedia learning is where a person uses both auditory and visual stimuli to learn information (Mayer 2001). This type of learning relies on dual-coding theory (Paivio 1971).

8-Rote learning

Rote learning is memorizing information so that it can be recalled by the learner exactly the way it was read or heard. The major technique used for rote learning is learning by repetition, based on the idea that a learner can recall the material exactly (but not its meaning) if the information is repeatedly processed. Rote learning is used in diverse areas, from mathematics to music to religion. Although it has been criticized by some educators, rote learning is a necessary precursor to meaningful learning.

9-Meaningful learning

Meaningful learning is the concept that learned knowledge (e.g., a fact) is fully understood to the extent that it relates to other knowledge. To this end, meaningful learning contrasts with rote learning in which information is acquired without regard to understanding. Meaningful learning, on the other hand, implies there is a comprehensive knowledge of the context of the facts learned.

10-Formal learning

A depiction of the world's oldest continually operating university, the University of Bologna Italy

Formal learning is learning that takes place within a teacher-student relationship, such as in a school system. The term formal learning has nothing to do with the formality of the learning, but rather the way it is directed and organized. In formal learning, the learning or training departments set out the goals and objectives of the learning.

11-Nonformal learning

Nonformal learning is organized learning outside the formal learning system. For example, learning by coming together with people with similar interests and exchanging viewpoints, in clubs or in (international) youth organizations, workshops.

12-Informal learning

Informal learning is less structured than "nonformal" one. It may occur through the experience of day-to-day situations (for example, one would learn to look ahead while walking because of the danger inherent in not paying attention to where one is going). It is learning from life, during a meal at the table with parents, play, exploring, etc.

13-E-learning and augmented learning

Electronic learning or e-learning is computer-enhanced learning. A specific and always more diffused e-learning is mobile learning (m-learning), which uses different mobile telecommunication equipment, such as cellular phones.

When a learner interacts with the e-learning environment, it's called augmented learning. By adapting to the needs of individuals, the context-driven instruction can be dynamically tailored to the learner's natural environment. Augmented digital content may include text, images, video, audio (music and voice). By personalizing instruction, augmented learning has been shown to improve learning performance for a lifetime. See also minimally invasive education.

Moore (1989) purported that three core types of interaction are necessary for quality, effective online learning:

Learner–learner (i.e. communication between and among peers with or without the teacher present),

Learner–instructor (i.e. student-teacher communication), and Learner–content (i.e. intellectually interacting with content that results in changes in learners' understanding, perceptions, and cognitive structures).

In his theory of transactional distance, Moore (1993) contented that structure and interaction or dialogue bridge the gap in understanding and communication that is created by geographical distances (known as transactional distance).

14-Evidence-based learning

Evidence-based learning is the use of evidence from well designed scientific studies to accelerate learning. Evidence-based learning methods such as spaced repetition can increase the rate at which a student learns.

15-Tangential learning

Tangential learning is the process by which people self-educate if a topic is exposed to them in a context that they already enjoy. For example, after playing a music-based video game, some people may be motivated to learn how to play a real instrument, or after watching a TV show that references Faust and Love craft, some people may be inspired to read the original work. Self-education can be improved with systematization. According to experts in natural learning, self-oriented learning training has proven an effective tool for assisting independent learners with the natural phases of learning.

Extra Credits writer and game designer James Portnow was the first to suggest games as a potential venue for "tangential learning". Mozelius et al.points out that intrinsic integration of learning content seems to be a crucial design factor, and that games that include modules for further self-studies tend to present good results. The built-in encyclopedias in the Civilization games are presented as an example – by using these modules gamers can dig deeper for knowledge about historical events in the gameplay. The importance of rules that regulate learning modules and game experience is discussed by Moreno, C.,in a case study about the mobile game

Kiwaka. In this game, developed by Landka in collaboration with ESA and ESO, progress is rewarded with educational content, as opposed to traditional education games where learning activities are rewarded with gameplay.

2.4 Review of empirical studies

How to Enhance Teaching and Learning

Teaching is a profession in which one has to make decisions on a continual basis, both while planning units and lessons and within a lesson as it is transpiring. Even when it seems all is working well, alert practitioners know that at any moment they might have to change course and take a different approach. Good decision-making has been called an art because it involves an open mind, the ability to listen to others, the skill to be able to change course "in the moment" and the knack for asking important questions.

I pose below a series of questions we might ask ourselves in order to determine the next steps we could take to make learning experiences even better.

The concept of chemistry

The history of chemistry spans a period from very old times to the present. Since several millennia BC, civilizations were using technologies that would eventually form the basis of the various branches of chemistry. Examples include extracting metals from ores, making pottery and glazes, fermenting beer and wine, extracting chemicals from plants for medicine and perfume,

rendering fat into soap, making glass, and making alloys like bronze. Chemistry was preceded by its protoscience, alchemy, which is an intuitive but non-scientific approach to understanding the constituents of matter and their interactions. It was unsuccessful in explaining the nature of matter and its transformations, but, by performing experiments and recording the results, alchemists set the stage for modern chemistry. Chemistry as a body of knowledge distinct from alchemy began to emerge when a clear differentiation was made between them by Robert Boyle in his work The Sceptical Chymist (1661). While both alchemy and chemistry are concerned with matter and its transformations, the crucial difference was given by the scientific method that chemists employed in their work. Chemistry is considered to have become an established science with the work of Antoine Lavoisier, who developed a law of conservation of mass that demanded careful measurement and quantitative observations of chemical phenomena. The history of chemistry is intertwined with the history of thermodynamics, especially through the work of Willard Gibbs.

Definitions of Chemistry:

1. Chemistry is the scientific discipline involved with elements and compounds composed of atoms, molecules and ions: their composition, structure, properties, behavior and the changes they undergo during a reaction with other substances.

2. the branch of science concerned with the substances of which matter is composed, the investigation of their properties and reactions, and the use of such reactions to form new substances.

Branches of chemistry

Traditionally, chemistry has been broken into five main subdisciplines:

1 Organic,

2. Inorganic

3. Analytical

4.Physical,

5. Biochemistry.

The concept Improvisation

Improvisation:- is the activity of making or doing something not planned beforehand, using whatever can be found.

Improvisation in the performing arts is a very spontaneous performance without specific or scripted preparation. The skills of improvisation can apply to many different faculties, across all artistic, scientific, physical, cognitive, academic, and non-academic disciplines.

Improvisation also exists outside the arts. Improvisation in engineering is to solve a problem with the tools and materials immediately at hand.

Types of improvisation

Long form improvisation

Short form improvisation

Narrative theatre rehearsal.

five distinct approach to improvisation

Basic performance

Devised theatre

Applied theatre

Creative drama

Scripted theatre rehearsal.

parts of improvisation

Beginning

Middle

End.

Improvisation of teaching and learning

The ability to take existing pieces and put them together in a new combination for a purpose. The pieces could be bits of information about a problem they could be part of a Melody teachears or students apply tolls or method to these pieces in a flexible manner.

Important of improvisatin in teaching and learning processes

1. When we put in to groups for the purpose of Making calculations, we want their discussion to be calculated as well as varbal. Improvisation can provide them with great opportunity to communicate respond to each other through calculation in a way that has a more immediacy than performing the calculation of others or comprising.

2. Teachers can benefit greatly by using improvisation in the classroom. Improvement in students behaviour and focus are common outcomes, as well as lower stress level and better rapport between students and their teachers.

Advantages of improvisation

1. Allows students and teachers to be positive peoples

2. Make teachers to be more creative

3. Help them be become team players

4. Make students better listeners

5. Helps them to make big choices

6. Brings out their playful side

7. Help them to enjoy the moment

Challenges of improvisation

Financial constraints

Lack of skills and strategies

Large classroom size

Time constraints

School location

Unavailability of tools

Lack of exposure

2.5 Uniqueness of the studies

Contents of senior secondary school level

Chemistry – SS1, SS2 & SS3 ; content; curriculum

ASSURE Educational Services has put-together the scheme of work on Chemistry – SS1, SS2 and SS3 based on the National Curriculum and the syllabus of WAEC and NECO. All the topics highlighted in the National Curriculum and the syllabus of WAEC and NECO have been accommodated in our Scheme of Work.

SS1 Chemistry – 1st Term Scheme of Work and contents

Class	Term	Topics.	Contents
SS1	1st Term	Introduction to chemistry	Chemistry, an experimental subject Importance of chemistry in everyday life Adverse effects of chemical processes Career opportunities in chemistry Nature of matter and separating techniques What is matter? States of matter Properties of matter Physical and chemical changes Element, compound and mixture Separating techniques

Particulate nature of matter,

Valency and formulae.

Matter consists of small indivisible, particles, Atomic structure

Elements and symbols, Valency and radicals

Formulae of compound, Relative atomic mass

lsotopy and relative atomic mass

Relative molecular mass, Empirical formula

and molecular formular Chemical equations

SS1 2nd Term

Law of conservation of mass

Law of definite proportion or

constant corn position

Law of multiple proportions

Experimental discoveries of atomic particles Particles of the atom

Discovery of the particles.

The periodic table

Chemical combination

Electrovalent (ionic bond)

Covalent bond

Co-ordinate covalency (co-ionic)

Metallic bond

Hydrogen bond

Vander waal's force.

SS1 3rd term

Acids, bases and salts

Acid Bases and alkalis

Theories of acids and bases.

Hydrogen ion concentration and pH scale salt

Efflorescent, deliquescent and Hygroscopic substance

Carbon and its compounds occurrence

General properties of carbon

Destructive distillation (carbonisation) of coal fuel gas Carbon (IV) oxide

Carbon (II) oxide Trioxocarbonate (IV)

Hydrocarbons and industrial Chemistry Hydrocarbons petroleum

Cracking and reforming Synthetic petrol

Important raw materials In industries

Classes of the chemical industries

Types of industry

SS2 Chemistry – Scheme of Work and contents

Class	Term	Topics.	Contents
SS2.	1st term		

Atomic emission spectra and the atomic structure

Periodic table

Atomic properties of elements

Families of element

Effects of electricity on chemical substances

ElectrolysisWater

Water cycle,Types of natural water

Purification of water

Physical properties of pure water

Chemical properties of pure water

Hardness of water, Types of hardness

Advantages of hard water

Disadvantages of hard water

Preparation of a soap solution

Water pollution

Control of water pollution

Solution, Types of solution

Determination of solubility

Solubility graphs or curves

Applications of solubility curves

Faraday's laws of electrolysis

Uses of electrolysis, electrode potential

Electrochemical cells

SS2. **2nd term.**

Rates of reaction

Chemical reaction

Reaction rates during a reaction

Collision theory

Chemical equilibrium

Reversible reaction

Open and closed system

Chemical equilibrium Reversible reaction

Open and closed system

Concept of equilibrium and equilibrium constant

Le Chatelier's principle

Application of Le Chatelier's principle in industrial processes

Air and pollution Air

Composition of air

Effects of air on some compounds

Air pollution

Control of air pollution

Water and solutions

Water, Water cycle, types of natural

Types of natural water

Purification of water

Physical properties of pure water

Chemical properties of pure water

Hardness of water, types hadnes

Advantages of hard water

Disadvantages of hard water

Preparation of a soap solution

Water pollution, control of pollution

Types of solution

Determination of solubility

Solubility graphs or curves

Applications of solubility curves

SS2 3rd term

Hydrogen

Facts about hydrogen occurrence

Preparation of hydrogen

Physical properties of hydrogen

Chemical properties of hydrogen

Uses of hydrogen

Oxygen and its Compounds

Occurrence

Laboratory preparation of oxygen

Industrial preparation of oxygen

Physical properties of oxygen

Chemical properties of oxygen

Test for oxygen, uses of oxygen

Binary compounds of oxygen (oxides)

Hydrogen peroxide

Chemical properties of hydrogen peroxide

Uses of hydrogen peroxide

Occurrence Preparation of ozone

Physical properties of ozone

Chemical properties of ozone

Uses of ozone

Halogens and their compounds

Halogens, fluorine, uses of fluorine, chlorine

Physical properties of chlorine

Chemical propertiess of chlorine

Tests for chlorine, uses of chlorine

Hydrogen chloride

Physical properties of hydrogen chloride gas

Chemical properties of hydrogen chloride gas

Tests for hydrogen chloride gas

Uses of hydrochloric acid chloride

Properties of chlorides

SS2 Chemistry – Scheme of Work and contents

Class	Term	Topics.	Contents
SS3.	1st term.	**Nitrogen and its compounds**	
			Nitrogen, preparation of hydrogen
			Physical properties of nitrogen
			Chemical properties of nitrogen
			Uses of nitrogen

Compounds of nitrogen Ammonia

Laboratory preparation of ammonia

Industrial preparation of ammonia

Physical properties of ammonia

Chemical properties of ammonia

Tests for ammonia uses of Ammonia

Ammonium salts, properties of ammonium salts

Oxides of nitrogen

Trioxonitrate (V) acid.

Trioxonitrate (V) salts

Test for trioxonitrate (V) sal

Some important trioxonitrate(V) salts

Nitrogen cycle

Introduction to organic chemistry

What is organic chemistry?

Characteristics of organic compounds

Basic organic reactions

Hydrocarbons ,Alkanes

Homologous series

Preparation of alkanes

Physical properties of alkanes

Chemical properties of alkanes

Isomerism

Preparation of methane

Physical properties of methane

Chemical properties of methane

Nomenclature

Unsaturated hydrocarbon.Alkenes

Laboratory preparation of ethene

Industrial preparation of ethene

Physical properties of ethene

Chemical properties of ethene

Polymerization

Uses of ethene, Alkynes

Laboratory preparation of ethyne

Physical properties of ethyne

Chemical properties of ethyne

Uses of ethyne, Benzene

Structure of benzene

Physical properties of benzene

Chemical properties of benzene

Uses of benzene

Carbohydrates and giant molecules

Carbohydrates

Laboratory preparation of glucose

Industrial preparation of glucose

Properties of glucose, Uses of glucose

Disaccharides, Polysaccharides.

Amides,Amines,Amino acids

Proteins, Polymers, Plastics

SS3 2nd term

Metals and their compounds

Metals,Principles of metal extraction

Chemical and thermal reduction

Electrolytic method

Group I elements (metals)

Sodium, Compounds of sodium

Group II elements,

Calcium. Compounds of calcium,

Magnesium, Compounds of magnesium

Group III element

Aluminium,Compounds of aluminium

Group IV elements,Tin, Lead

Extraction and properties of transition metals

First transition series

Physical properties of transition elements

Chemical properties of transition elements

Extraction of metals of the first transition series

Types of iron and their uses

Steel and its uses, Steel-making processes

Chemical properties of iron, Tests for iron (ll) ions

Compounds of iron, Copper

Compounds of copper, Zin, Alloys

Compounds of zinc, Alloys

Radioactivity

What is radioactivity?

Properties of radiations emitted

Detection of radiation, Radioactive decay

Rate of radioactive decay,Nuclear reactions

Atomic energy by fission and fusion

Uses of radioactive isotopes

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The aims of this research is to look in to the "Effect of improvised Instructional materials in teaching and learning of chemistry at secondary schools of tsafe local government". The method be which information or data regarding The s study was collected. These include: research design population of the study, sample and sampling techniques, instrument of Data collection, validity, realiability and data collection.

3.2 Research design

According to (Nwana, 1981) Research design is a term to describe s number of decisions which need to be taken regarding the collection of Data before ever the data are collected. Carrying out research of this nature is not possible without making a survey of the sample selected. First and foremost , we made a survey of the sample selected.

Survey research is adopted for the purpose of this study, as it aimed at collecting data on particular problem from a sample on order gain estimable dimensions of the problem in large society.

3.3 Population of the study

The population of this study consisted of public secondary schools chemistry students of secondary schools in tsafe local Government.

3.4 Sample and sampling techniques

Systematic sampling techniques was used to select government day secondary school Tsafe out of the secondary schools in Tsafe . The schools consist of only boys respectively.

Government Day secondary school (Janbulo)

Government Day secondary school (SDP)

3.5 Instrument for data collection

The research instrument that will be used are students.

Data of project develop test items for pre test.

Past WAEC and Neco questions papers should be adopted for the post test.

Two lesson plan should be used as for two group developed by the project writers.

3.6 Reliability of Instrument

The researchers collected data through pre test method by selecting two schools among (15) fifteen secondary schools in Tsafe local government and we calculated the coefficient

correlation using karl person product moment correlation method, we got 0.879. There fore the Reliability of the instrument is 0.88.

3.7 Validity of Instrument

To Validate the instrument pre test schedule to collect the data for this study by researchers after designing the instrument ; The researchers gave it to the project supervisor, He read the instrument, make comments and corrections which were then affected by the researchers before we came up with the final draft of the instrument within this, the content of validity of instrument was ensured.

3.8 Procedure of data collection

Chemistry students of two public secondary schools were involved for data collection.

First school was taught using improvised instructional materials and second Without improvised instructional materials.

Pre test was carried out, while Post test was conducted after the treatments.

3.9 Procedure of data analysis

Data collected was used to calculate the mean and standard deviation of the groups to answer the research questions and T- test was used to test the hypotheses.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 Introduction

In this chapter, The purpose of this study is to determine the effect of improvised instructional materials in teaching and learning chemistry in secondary schools of Tsafe local government. The chapter presents the analysis data, discussion of the findings and summary of the findings.

4.2 Analysis of Data

The data obtained from the performance scores of students in post test present in table 1, followed by the analysis of the data.

Table 1 : Post test treatment mean performance scores of students taught using improvised instructional materials and those with lecture methods.

Groups	N	Total scores	Mean	SD
Experimental	20	270	12.79	3.56
Control	20	295	10.93	4.23

The analysis was to determine the differences between post test mean performance scores of students taught using improvised instructional materials and those taught without using improvised instructional materials.

Based on the analysis carried out from table 1, The students taught chemistry using improvised instructional materials has the mean of 12.79 while students taught chemistry with out using improvised instructional materials has the mean of 10.93.This implies that students taught with improvised instructional materials has the highest academic performance than those taught without it.

Table 2 : Summary test of significant differences between post test of experimental and control class.

Groups	N	Mean	SD	DF	t-cal.	P-value
Experimental	20	12.79	3.56	67.	4.875.	0.000
Control	20	10.93	4.23			

T(67)=4.875,p>0.05

The analysis was to test if there is a significant differences between post test scores of experimental group and that of post test scores of control group using t- test statistics.

Based on the analysis carried out from table 2, the calculated value of t=4.875 with P- value

P=0.000 is less than the level of significance =0.05, There fore we rejected the hypotheses saying that there is no statistical significant differences in performance of chemistry students taught using improvised instructional materials and those taught using lecture method and concluded that there is significant differences between the academic performance of chemistry students and the use of improvised instructional materials in teaching and learning.

4.3 Discussion of findings.

The table 1and 2 described that the post test was conducted after teaching the students of sampled Government Day secondary school Tsafe (Jambulo) using improvised instructional materials and Government Day Secondary Tsafe (SDP) without using improvised instructional materials .

The Government Day Secondary school Tsafe (Jambulo) taught using improvised instructional material has the highest academic performance. Because of using improvised instructional material while the Government Day secondary school (SDP) has low academic performance, because we taught them without using improvised instructional material

From here we understood that the use of improvised instructional material it help in raising capability of students in teaching and learning of chemistry in senior secondary schools.

4.4 Summary of findings

The major findings of this study are summarized as follows :

1. There is difference in the mean performance scores of students taught chemistry using improvised instructional materials and those taught using lecture method. I. e those exposed chemistry students performed better.

2. Most of the students of chemistry from the sampled schools are in need of available materials for Improvisation.

3. There is over crowded in the class room which make students to see and understand what teacher is teaching.

4.5 Suggestion for further studies

The data obtained in this study are from a limited sampled, It is found that improvisation is an important method raising academic performance in chemistry, Its hoped that more comprehensive research study will be carried out to cover a large population.

It will maximally help to generalized the findings.

It's not only of interest that there is significant differences in the mean scores of the students taught chemistry using improvised instructional materials and those with out it. Its important that

studies regarding the variables that may be accountable for this difference can be conducted to find out more behind this differences.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

In chapter four, the data collected were analyzed accordingly. In this chapter, efforts were made to summarize the findings obtained from test Conclusion was drawn while recommendations was latter made based on the results of the findings of the study.

5.2 Summary

The chapter one discussed the objectives to be achieved in this very research i.e the effect of improvised instructional materials in teaching and learning chemistry in secondary schools of Tsafe Local Government.

Chapter two deal with the conceptual framework i.e concept, types, the need for instructional materials, and concept of Improvisation, teaching and learning. The chapter also reviewed others' works that are relevant to this study, and find that there is an area left without putting much emphasis on it which is effect of improvised instructional materials in teaching and learning in secondary schools especially on arts and other non sciences subjects.

The methodology in chapter three explained the design adopted for this study, the population, as well as the sample and sampling techniques. The chapter also mentioned the

instrumentation of this (test). After validating it, the test was conducted to the respondents and they were given enough time to answer the questions.

The chapter four deals with the presentation and analysis of data collected. Tough, there is an effect and influence to the students whose majority of them have understood the lesson using Improvisation, but those taught without using improvised instructional materials have less academic performance ; this is because its hardly for students to understand the topic without effectively use instructional materials.

Chapter five summarized, concluded, and recommended to the research. The references were also cited in this chapter.

5.3 Conclusion

Base on the result of the findings, the researchers concluded that there are different ways of Improvisation of instructional materials. There is need of qualified teachers that are able in an improvising different instructional facilities are among the necessary things to put into consideration for effective teaching and learning chemistry for senior secondary schools .

Furthermore, it is pertinent to note that lack of adequate supervision of teachers, lack of training and re-training of teachers, on how they improvised e.t.c, contributed to lack of the effective understanding of chemistry topics.

5.4 Recommendations

In order to make teaching and learning chemistry effective in senior secondary schools, the following recommendations are to put forward:

1. Different ways of providing instructional materials should be improve by school management, other non-governmental organization, teachers, and education board.

2.There should be comprehensive training and re-training package for teachers inform of refresher courses, workshops, and seminars to improve the efficiency of the teachers.

3. There should be emphasize s in providing improvised instructional materials, especially in teaching and learning chemistry in senior secondary schools.

4. To avoid being bored, abstract, and difficulty of understanding the lesson by the students, the teacher should be ready of using teaching aids throughout his/her lessons; otherwise, his objectives may likely not to be achieved.

REFERENCES

Akkinson, N. J. (1999): *Modern Teaching Aids: A Practical Guide to Instructional Techniques i Education.* John Wiley and Sons, London.

Bongton, A. J. & Onyenwe, P. (2004): *Educational Administration.* Stanly Thomas, London.

Browns, J. W. (1994): *A-V Instruction: materials and Methods 2nd(Ed.).* McGraw Hill Boo Company Inc., New York.

Chonjo, M. (1994): *Importance of Physical Facilities and Teaching-Learning Materials* Tanzaniya. (Unpublished)

Farrat, J. S. (1977): *Principles and Practice of Teaching.* Evans Publishers, London.

Kenobi, K. (2015): *Effects of Instrumental materials on Students' Academic Performance i Selected Secondary Schools in Nigeria.* University of Calarba, (Unpublished)

Maundu, A. (1987): *Principles and Practice of Educational Technology.* International Publisher Limited, Ibadan.

Megbo, A. and Saka, J. (2005): *Instructional in Classroom: Problems and Prospects o. Educational Technology in Nigeria.* Ife Oluwa Ent. (Nig) Ltd., Ondo.

Mwiria, G. (1995): *Teaching Today.* Stanley Thomas Ltd., London.

Ma'u, L. (2017): *Assessment of [illegible] Materials for Proper Utilization in the Process of Effective Teaching [illegible] Wamakko LGEA, Sokoto State.* Shehu Shagari College of Education [illegible]

NERDC, (2013): *National [illegible] for ECE.* NERDC Press, Yaba, Lagos.

NTI, (2007): *Manual for the [illegible] Primary and Junior Secondary School Teachers: Improvization of [illegible]*

Takai, A. K. (2012): *[illegible] Improvization and Utilization of Instructional Materials [illegible]* Zaria, Kaduna state, Nigeria.

APPENDIX I

LISTS OF SECONDARY SCHOOLS IN TSAFE LOCAL GOVERNMENT

Government Day Secondary School Tsafe (Jan Bulo).

Government Day Secondary School Tsafe (SDP).

Government Secondary School Tsafe (Raka)

Government Girls Day Secondary School Tsafe (FOCAL).

Government Day Secondary School 'Yankuzo.

Government Day Secondary School Tsafe 'Yanwarin Daji.

Government Day Secondary School Chediya.

Government Day Secondary School Kwaren ganuwa.

Government Day Secondary School Danjibga.

Government Day Secondary School Keta.

Government Day Secondary School Kunchin Kalgo.

Government Day Secondary School Bilbis.

Government Day Secondary School Kucheri.

Government Day Secondary School Magazu.

Government Day Secondary School 'yandoton Daji.

APPENDIX II

S/N	X (SDP)	Y (JANBULO)	X^2	Y^2	XY
1.	42	50	174	2500	2100
2.	50	28	2500	782	1400
3.	50	43	2500	1849	2150
4.	50	38	2500	1444	1900
5.	50	25	1225	1625	1250
6.	35	42	2500	1764	1470
7.	50	32	1225	1024	1600
8.	35	32	2500	1024	1120
9.	50	33	2500	1089	1650
10.	40	42	1600	1764	1680
11.	38	20	1444	400	760
12.	28	43	784	1849	1204
13.	50	45	2500	2025	2250
14.	48	50	2304	2500	2400
15.	50	10	2500	100	500
16.	50	20	2500	400	1000
17.	46	50	2116	2500	2300

18.	40	50	1600	2500	2005
19.	40	46	1600	2116	1840
20.	38	35	1444	1156	1292
Total	**880**	**734**	**39606**	**29211**	**31866**

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{\left(\sum X^2 - \frac{(\sum X)^2}{N}\right)\left(\sum Y^2 - \frac{(\sum Y)^2}{N}\right)}}$$

$$r = \frac{31866 - \frac{(880)(734)}{40}}{\sqrt{\left[39606 - \frac{(880)2}{40}\right]\left[29211 - \frac{(734)2}{40}\right]}}$$

$$r = \frac{31866 \quad 645920}{40}$$

$$\sqrt{[39606 - 774400][29211 - 538756]}$$

$$40 \qquad 40$$

$$r = \frac{31866\text{-}16148}{\sqrt{(39606 - 19360)(29211 - 13468.9)}}$$

$$r = \frac{15718}{\sqrt{20306(15742.1)}}$$

$$r = \frac{15718}{319659082.6}$$

$$r = \frac{15718}{17879.0123496797}$$

$r = 0.879$

APPENDIX III

Lesson plan 1

School: Government Day Secondary School Tsafe (janbulo)

Subject: Chemistry

Class: SS 1

Lesson Topic: Acid

Duration: 40 minutes

Gender: Males

Number of students: 40

Average age: 16-17 years

Improvised instructional materials: water, vineger, grapes and amarantus leaf.

Method of instruction: Demonstration and Discussion methods

Behavioural objectives: At the End of the Lesson students should be able to define (1) Define Acid (2) List the classification of Acid (3) Differentiate between weak Acid and strong Acid (4) Give the examples of Strong and Weak acid

Entry behaviour: The students have been taught Chemical reaction

Introduction: The Teacher introduced the lesson by going over the previous lessons.

Instructional strategy (presentation): The teacher introduce the lesson to the students by the following steps

Step (1) Definition of Acid: Is a substance which when dissolve in water produce Hydrogen ion

Step (2) Classification of Acid i. Organic Acid ii. Inorganic Acid.

(i) organic Acid: is natural products in plants and Animals. Examples are: ethanoic acid from vineger, tartaric Acid from grapes, Amino from protein.

(ii) inorganic Acid: prepared from inorganic matter e.g hydrocloric Acid.

Step (3) Differentiation between weak Acid and strong Acid.

(i) weak Acid : partially ionize in water with low concentration of Hydrogen.

(ii) strong Acid; ionize completely in water to give hydrogen ion and anions.

Step (4) Examples of Strong and Weak Acid:

Strong Acid	Weak Acid
Hydrochloric Acid Hcl	1.Ntrous acid HNO2
Nitric Acid HNO3	2.Formic acid HCOOH
Sulfuric Acid H2SO4	3.Acetic acid CH3COOH
Hydrobromic Acid HBr	4. sulfurous acid H2SO3

Evaluation of the lesson: The Teacher evaluate the lesson by asking students the following questions :

1. What is Acid

2. Mention two types of Acid

3. Differenciate between Strong and Weak Acid

4. Give two examples of Weak and Strong Acid

Summary and conclusion: The teacher concluded the lesson by going over the lesson briefly.

APPENDIX IV

Lesson plan 2

School: Government Day Secondary School Tsafe (SDP)

Subject: Chemistry

Class: SS 1

Lesson Topic: Acid

Duration: 40 minutes

Gender: Males

Number of students: 40

Average age: 16-17 years

Instructional materials: water, vineger, grapes and amarantus leaf.

Method of instruction: Demonstration and Discussion methods

Behavioural objectives: At the End of the Lesson students should be able to define (1) Define Acid (2) List the classification of Acid (3) Differentiate between weak Acid and strong Acid (4) Give the examples of Strong and Weak acid

Entry behaviour: The students have been taught Chemical reaction

Introduction: The Teacher introduced the lesson by going over the previous lessons.

Instructional strategy (presentation): The teacher introduce the lesson to the students by the following steps

Step (1) Definition of Acid: Is a substance which when dissolve in water produce Hydrogen ion

Step (2) Classification of Acid i. Organic Acid ii. Inorganic Acid.

(i) organic Acid: is natural products in plants and Animals. Examples are: ethanoic acid from vineger, tartaric Acid from grapes, Amino from protein.

(ii) inorganic Acid: prepared from inorganic matter e.g hydrocloric Acid.

Step (3) Differentiation between weak Acid and strong Acid.

(i) weak Acid : partially ionize in water with low concentration of Hydrogen.

(ii) strong Acid; ionize completely in water to give hydrogen ion and anions.

Step (4) Examples of Strong and Weak Acid:

Strong Acid	Weak Acid
Hydrochloric Acid Hcl	1.Ntrous acid HNO2
Nitric Acid HNO3	2.Formic acid HCOOH
Sulfuric Acid H2SO4	3.Acetic acid CH3COOH
Hydrobromic Acid HBr	4. sulfurous acid H2SO3

Evaluation of the lesson: The Teacher evaluate the lesson by asking students the following questions :

1. What is Acid
2. Mention two types of Acid
3. Differenciate between Strong and Weak Acid
4. Give two examples of Weak and Strong Acid

Summary and conclusion: The teacher concluded the lesson by going over the lesson briefly.

APPENDIX V

Post test Questions

Q1. Soluble salt can be prepared using the following method except by ?

A. Action of dilute acid on metals

B. Action of dilute acid on an insoluble base

C. Direct combination of constituent elements

D. Neutralization reaction

E. Precipitation from solutions

Q2. Which of the following oxides does not undergo neutralization with acids?

A. Al2O3

B. PbO

C. PbO2

D. SnO2

E. ZnO

Q3. Sodium hydroxide solution was added to a solution of unknown salt X in a test tube, a blue precipitate was observed. The cation in the unknown salt X is ?

A. Na^{+}

B. Fe^{3+}

C. Fe^{2+}

D. Cu^{2+}

E. Ca^{2+}

Q4. The product of the electrolysis of dilute sodium chloride solution with platinium electrodes are ?

A. Chlorine and water

B. Hydrogen and chlorine gas

C. Hydrogen and oxygen gas

D. Sodium amalgam and chlorine

E. Sodium hydroxide and water

Q5. Which of the following is a basic salt?

A. $Mg(NO_3)_2$

B. $Mg(OH)NO_3$

C. NaCl

D. Na_2CO_3

E. Na_2SO_4

Q6. When Sodium dissolves in water the resulting solution is?

A. Acidic

B. Aerosol

C. Alkaline

D. Emulsion

E. Neutral

Q7. The oxidation state of Chlorine in $KClO_3$ is?

A. +1

B. +2

C. +3

D. +5

E. +7

Q8. Water from a river contaminated by alkali waste will have PH of about

A. 1

B. 3

C. 5

D. 7

E. 9

Q9. One of the following is an example of strong acid

A. NaCl

B. NaOH

C. COOH

D. CH3OHCH3

E. HCl

Q10. One of these are types of acid

A. Big and Small

B. Strong and Weak

C. Hard and soft

D. Hot and Cold

E. Saturated and Unsaturated