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The attitude of biology teachers towards improvisation and utilization of instructional materials in teaching and learning biology in private secondary schools in Potiskum local government area

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Abstract

This study was carried out on the Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area. Four research questions in line with the purpose of the study were formulated to guide the study. Descriptive survey research design was adopted for the study. The target group of the study was the entire 38 Biology teachers from 22 Private schools in Potiskum Local Government Area. Due to manageable size of the group, there is no sample and sampling technique used for the study as such the entire group was used for the study. Data were collected for the study through the administration of structured questionnaire. The data obtained were analysed using mean. The findings of the study revealed that, Biology teachers give students group projects to produce instructional materials and Biology teachers request that students bring materials in the environment to be used as improvised material during lessons. The findings of the study also revealed that, Biology teacher utilized improvised Visual aids like diagram, charts, posters, pictures and photographs for effective teaching of Biology, and Biology teachers utilized available resource person in the community to improvised instructional materials for teaching Biology. The findings of the study further revealed that, the use of Improvised Biology Materials helps the biology teachers to capture and sustain the curiosity and interest of the learners towards the lesson in schools and that the use of Improvised Biology Materials helps the biology teachers to motivate students in the subject being taught. The findings of the study also revealed that, lack of awareness on where to obtain facilities for improvising instructional materials and lack of motivation on part of government for Biology teachers in their efforts towards improvisation of instructional materials for teaching Biology are some of the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area. It was recommended that, Policy-makers in the secondary schools should raise fund so as to procure materials necessary for improvisation and purchase of textbooks that will facilitate the effective teaching of the course.

Keywords: Biology, Teachers, Improvisation, Instructional Materials, learning, Private Schools

1. Background of the Study

Science is the bedrock on which modern day technological breakthrough is hinged. Different authors have defined Science in different ways. (1) defined science as a systematic study of the nature of the behavior of the material and physical universe through observation, experimentation and measurement. According to (2) also defined science as a systematic, precise, objective way to study the natural world. Science is often an exciting and satisfying enterprise that

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requires creativity, skill and insight based on this (3) defined science as rationally structured knowledge about nature, which embraces systematic methods of positive attitudes for its acquisition, teaching, learning and application.

The major goal of science education is to develop scientifically literate individuals that are concerned with high competence for rational thoughts and actions. The objectives of science education in this country according to (4) include the need to prepare students to observe and explore the environment, explain simple natural phenomena, develop scientific attitudes including curiosity, critical reflection and objectivity, apply the skills and knowledge gained through science to solve everyday problems in the environment, develop self-confidence and self-reliance through problem solving activities in science.

In recent times, countries all over the world, especially the developing ones like Nigeria, are striving hard to develop technologically and scientifically, since the world is turning Scientific and all proper functioning of lives depend greatly on Science. According to (5), Science is a dynamic human activity concerned with understanding the workings of our world. This understanding helps man to know more about the universe. Without the application of science, it would have been difficult for man to explore the other planets of the universe. Science comprises the basic disciplines such as Mathematics, Physics, and Biology.

Biology remains a central subject that is invaluable in academic and vocational training. Thus, there is no gainsaying that no meaningful industrial and national developments could be achieved without a thorough understanding of the subject as it aids in the synthesis of new substances, and in refining and upgrading of the raw materials the nature has endowed us with (6). It has also been established that Biology is a prerequisite to pursuing courses such as Medicine, Pharmacy, Nursing Science, Engineering courses, geosciences (Geology and Geophysics) and other science-related courses which are important ingredients to national development and wealth creation (7). It is therefore imperative that secondary school students are well-grounded in Biology for Nigeria to attain the state of national development it desires and to rank favorably among the committee of nations.

Studies have shown that secondary school students are exhibiting low interest in Biology (8). This low interest of students in Biology has led to poor achievement in examinations. In our march towards scientific and technological advancement, we need nothing short of good achievement in Biology at all levels of schooling. Unfortunately, achievement of students in Biology at the end of the secondary school has not improved in the last decade (9). (10) Has linked poor achievement trend in Biology particularly to the lack of instructional resources in schools due to poor funding of schools. The poor funding of schools has hindered the principals from providing the teachers with adequate instructional resources.

The Federal Ministry of Education (11) emphasizes the need for teaching and learning of science processes and principles. The policy recommends practical, exploratory and experimental methods of teaching. In this regards, (12) stated that the basic tools that science uses in the learning of science processes are the instructional materials. Studies have shown that the use of instructional materials have improved achievement (13) and (14). Instructional materials are wide varieties of equipment and materials use for teaching and learning by teachers to stimulate self-activity on the part of the students. The teaching of Biology without instructional materials may certainly result in poor academic achievement. Poor academic achievement in Biology could also be attributed to many factors such as, low interest of students in Biology, inadequate motivation from teacher, lack of adequate supply of instructional material, lack of qualified teachers, use of teacher centered instructional strategies, inadequate use of instructional materials and use of abstract standardized materials.

This implies that the mastery of Biology concepts might not be fully achieved without the use of instructional resources that the students are abreast with. The teaching of Biology without instructional materials may certainly result in poor academic achievement. (10) Observed that there is lack of adequate and appropriate instructional resources for effective teaching of Biology in schools. For (16), the poor achievement in Biology was traced to poor usage of instructional resources for Biology teaching and learning, poor state of infrastructure facilities, large class size, poor teaching, use of faulty assessment practice, and inadequacy of quality teachers. According to (17), the poor state of laboratory facilities and inadequate use of instructional materials has constituted a cog in the wheel of students' achievement in Biology in the Senior School Examination. The verbal exposition does not promote skill acquisition, objectivity, and critical thinking abilities that will enable the child to function effectively in the society. This according to him leads to poor achievement of students in the subject. (17) stressed that a professionally qualified Biology teacher no matter how well trained, would be unable to put his ideas into practice if the school setting lacks the equipment and material resources necessary for him or her to translate his competence into reality.

(16) Described a teacher as person who attempts to help someone acquire or change some knowledge, skills, attitude, idea or appreciation. According to (14) a teacher is a person who imparts knowledge, skills and attitude to someone in a school. A Biology teacher according to Miller, (2) is an individual who is trained in pedagogy area Biology to impart knowledge, skill and attitudes to students in an institution. Teachers of Biology in this study are individuals who have been trained professionally in the art of teaching Biology curriculum to students in senior secondary schools.

Attitude is defined as an accumulation of information about an object, person, situation or experience. It is a predisposition to act in a positive or negative way toward some subject (13). Attitude is an essentially information obtained about someone or something that form an opinion or predisposition about. (12) Asserted attitude to be a positive or negative view of a person, place, thing, or event and that people can also be conflicted or ambivalent towards an object, meaning that they simultaneously possess both positive and negative attitude towards the item in question.

Instructional materials are also described as concrete or physical objects, which provide sound, visual, or both to the sense organs during teaching (17). The teaching of Biology cannot be done effectively without interaction between the teacher, students and the environmental resources. The Chemistry curriculum is planned to enable the teacher use activity oriented, child-centred approach (guided inquiry) to teach (18). However, evidence from research has shown that instructional materials, resources and equipment for science, especially Biology are either in short supply or are completely lacking in schools to the extent that most teachers end up with verbal exposition of scientific principles, facts and concepts. Studies have also revealed that the achievement of Nigerian students in Ordinary Level Biology was generally and consistently poor over the years (19). This has been a major source of concern to the school administrators, parents and the government at large.

(20) opined that Biology resource are intensive, and in an era of poor funding or scarcity of resources, it may be very difficult to find some of the original materials and equipment for the teaching of Biology in schools adequately. A situation that is further compounded by the galloping inflation in the country, some of the imported sophisticated materials and equipment are found to be expensive and irrelevant; hence the need to produce materials locally. Researchers such as (5) reported that there were inadequate resources for teaching Biology in secondary schools in Nigeria. The authors further stated that the available ones are not usually in good conditions in most cases. According to (10), some of the factory produced/imported instructional materials have also been discovered to be based on foreign ideas and culture. It is against this background that the need to fashion out ways by which local resources can be used for developing instructional materials becomes necessary. There is the need therefore, for improvisation.

According to (21), improvisation is the provision of alternatives to real things. Improvisation is the making of substitutes when the real equipment or material is not adequate or available. It is the art of providing and using alternative materials or resources in the absence of the real or factory made one. (22) Also defines improvisation as the art of using materials or equipment obtained from local environment or produced by the teacher, and with the assistance of the local personnel to enhance instruction. In other to teach by inquiry method or use activity based instructions, improvisation is required since instructional materials seem not to be adequate (23).

(23) Further stated that the provision and use of available instructional materials for teaching will lay a sound bases for scientific and reflective thinking among students. The real materials that are the conventional instructional materials are imported or factory made laboratory equipment for science teaching. Examples of conventional instructional materials are: microscope, laboratory reagents, laboratory glassware, Bunsen burner, tripod stand. However, if these conventional Instructional Materials are not available or inadequate, they can be locally made by using resources in the environment as alternative. These will include used electrical bulb for round bottom flask; beverage tins for convex and concave mirror; juices of unripe orange as acid, solution of ash from wood as base, candle or stove as burner, teaspoon for spatula. Improvised instructional materials may not be identical with the conventional one; therefore teachers should be skillful in their handling and using them (21). Improvisation requires a considerable development through imaginative planning and good knowledge.

Improvisation is a teacher-oriented activity used to effectively carry out the teaching/learning process successfully. (23) Identified two main constraints militating against the successful improvisation of Science equipment. These are the technical and the human factors respectively. The technical factors relate to the question of degree of accuracy and precision that is possible with the improvised equipment, the human factor relates to the teachers' skill in developing the resources while providing the appropriate learning experience to the learners. In addition, (22) reported lack of adequate professional training as a major problem militating against the effective use of local resources for Science teaching.

Improvisation serves the following purposes in the education system: It reduces the money spent on the purchase of equipment in educational institutions; ensures the realization of lesson objectives; helps in solving the problem of lack of equipment in educational institutions; gives room for a teacher to demonstrate his creative skills and gives room for the use of cheap local materials as alternatives to the expensive foreign ones. The researcher stated that improvisation encourages students towards the development of creative abilities; strengthen enquiry, discovery and investigative method in sciences; it provides a frame of reference on which students can key their attention during classroom activities; enables teacher to think of cheaper, better and faster methods of making teaching learning process easier for students; affords students the opportunity of becoming familiar with resources in their environment.

Against this background, the present study intends to investigate the Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area.

2. Statement of the Problem

It is being observed that memorization of facts have replaced experimentation in chemistry among students in secondary schools. This is sad because this subject is expected to be life science. But the researcher observed that most chemistry teachers do not expose their students to practical work, instead they prefer to teach only theory aspects of Biology concepts and neglect the practical/Laboratory activities that are expected to accompany the theory lessons. According to (20) the failure to organize practical work for student by their Biology teachers can be attributed to unavailability of chemistry laboratory equipment, absence of Biology laboratory, poor motivation on the part of chemistry teachers and Biology teachers deficiency in practical skills required to put the available chemistry laboratory equipment into productive use as well as lack of improvised instructional materials. Due to this attitude of Biology students towards the learning of this subject, its advancement and breakthrough remains a hope of many decades to come.

Against this foreseen, this study aims to assess the Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area.

2.1. Purpose of the Study

The main purpose of this study was to investigate the Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area. Specifically, the study sought to:-

- Determine the Attitude of Biology Teachers towards Improvisation of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area.
- Determine the extents of utilization of Improvised Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area.
- Determine the benefits of using Improvised Instructional Materials in Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area.
- Find out the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area.

2.2. Research Questions

The following research questions were formulated to guide the study;

- What are the Attitude of Biology teachers towards production and Improvisation of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area?
- To what extents Biology Teachers utilized Improvised Instructional Materials for Teaching of Biology in Private Secondary Schools in Potiskum Local Government Area?
- What are the benefits of using Improvised Instructional Materials in Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area?
- What are the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area?

3. Significance of the Study

This research aims at producing results and adding values to teachers, students and the society at large.

On the part of the students, they will be in a better position to access the usefulness or otherwise of their involvement in the improvisation of teaching materials for Biology lessons. This will go a long way to make them become more interested in the activities of improvisation and also be able to handle and preserve improvised materials better. In addition these findings will enable teachers and students' appreciate the usefulness or otherwise of their environment as it concerns their performance in Biology examination and total living.

On the part of the teachers, they will be in a better position to justify or otherwise, the time, effort and even money they invest in improvising Biology teaching materials. The finding well also guide their subsequent steps or strategies towards enhancing better Biology teaching with regards to improvisation of teaching materials.

On the society at large, the findings of this study will enlighten the society on the value of the environment. This will enhance better preservation and protection of the environment. The findings of this study will review the usefulness and value things in the environment from what science teaching materials are improvised.

Generally therefore, the finding of this study will guide policy makers, educations, curriculum planners and all concerned with Biology education review, to re-affirm on withdraw their individual views or collective views about improvisation of Biology teaching and learning of materials.

Scope and Delimitation of the Study

The study is carried out to determine the Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area. The study will be carried out on only Chemistry Teachers in Private Senior Secondary Schools in Potiskum Local Government Area.

4. Material and methods

4.1. Research Design

This study was adopted the descriptive survey research design. According to Ali (2006) descriptive survey research design is a descriptive study which uses sample of an investigation to document, describe and explain what is in existence or non-existence on the present status of phenomena being investigated. A survey research design is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. The design is therefore suitable for this study since it involves the Attitude of Biology. Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area.

4.2. Area of the Study

Potiskum is a local government area in Yobe state of Nigeria. It's headquarter is in the town of Potiskum on the A3 highway at attitude of 11° 42' 33" N 11° 04' 10" and latitude E/11.70917°N 11.06944°E. It has an area of 559Km² and population of 205, 876 at the 2006 census with postal code of the area is 631. Potiskum is the headquarter of both the old Fika Emirate and the Potiskum Emirate reinstated in 1999. It is bounded by Bauchi state in the South side and by Nangere in the north and by Fune in East and Fika LGA in the South.

4.3. Population of the Study

The population of this study was comprising of entire 38 Biology teachers from all Private secondary schools in Potiskum Local Government Area of Yobe State.

4.4. Sample and Sampling Techniques

Due to manageable size of the population, there is no sample and sampling techniques to be used for the study, as such the entire population was used for the study.

4.5. Research Instrument

The structured questionnaire was the major instrument to collect data for this study. The researcher design the questionnaire title “Attitude of Biology Teachers towards Improvisation and Utilization of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area”. The questionnaire items was designed based on each stated research question for the respondents to response to using likert’s scale type with four responses as Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD).

4.6. Validation of Research Instrument

To validate the instrument, copies of the research topic, purpose of the study and research questions together with the draft instrument were given to three experts, one from School of Education and other two from School of Science Education, Department of Biology Education Federal College of Education (Technical) Potiskum, Yobe State. The experts were requested to examine and scrutinize the items in terms of content relevance, suitability, item clarity and coverage of the dimensions of the study. After the experts was examined the items and the suggestions and comments made were guided the construction of the final draft that was approved by the project supervisor.

4.7. Method of Data Collection

The researcher employed both self-delivery techniques in data collection. Thus, the copies of the questionnaires were distributed by the researcher to the Biology teachers at their respective schools. After responding to the questionnaires the researcher was collected back the filled questionnaire on-the-spot.

4.8. Method of Data Analysis

The data collected for this study was analyzed using mean scores and standard deviation. A four point likert scale was used to rate responses of 4, 3, 2 and 1 respectively for:

Strongly Agreed	4 points
Agreed	3 points
Disagreed	2 points
Strongly Disagreed	1 point

The mean is determined with the following formula:

$$\bar{X} = \frac{\sum FX}{N}$$

Where,

\bar{X} = mean

F= frequency

X= nominal value of option

\sum = summation sign

N= number of the respondent

$$\frac{4 + 3 + 2 + 1}{4} = 10 = \frac{2.50}{4}$$

The decision rule is 2.50. This means that any mean score equal to or greater than (\geq) 2.50 was considered as agreed response and any mean score less than ($<$) 2.50 was considered as disagreed responses.

While the Standard Deviation was determine using the following formula:

$$S. D. = \sqrt{\frac{\sum f(x - \bar{x})^2}{fx}}$$

Research Question: 1

What are the Attitude of Biology Teachers towards production and Improvisation of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area?

Table 1 Mean on the attitude of biology teachers towards production and improvisation of instructional materials in private secondary schools in Potiskum local government area

S/N	Items	SA	A	D	SD	X	Remark
1	Biology teachers give students group projects to produce instructional material.	15	14	9	-	3.15	Agreed
2	Biology teachers request that students bring materials in the environment to be used as improvised material during lessons.	9	13	13	3	2.88	Agreed
3	Biology teachers cut calendars and magazines to serve as instructional materials for teaching Biology.	7	16	9	6	2.93	Agreed
4	Biology teachers used improvise Biology materials downloaded from the Internet.	14	13	10	1	3.10	Agreed
5	Biology teachers think to used orange juice instance of real acid	9	15	10	4	2.97	Agreed
6	Biology teachers use ash solution as a substitute to base.	14	12	10	2	3.11	Agreed
7	Biology teachers believe that tomatoes juice can be used as an improvised acid	6	17	11	4	3.03	Agreed
8	Biology teachers take coloured flowers as a substitute for acid-base indicators.	6	13	12	7	2.80	Agreed

From table 1 above, the findings of the study revealed that, Biology teachers give students group projects to produce instructional materials, Biology teachers request that students bring materials in the environment to be used as improvised material during lessons, Biology teachers cut calendars and magazines to serve as instructional materials for teaching Biology, Biology teachers used improvise Biology materials downloaded from the Internet, Biology teachers think to used orange juice instance of real acid, Biology teachers use ash solution as a substitute to base, Biology teachers believe that tomatoes juice can be used as an improvised acid and Biology teachers take coloured flowers as a substitute for acid-base indicators are some of the Attitude of Biology Teachers towards production and Improvisation of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area.

Research Question: 2

To what extents Biology Teachers utilized Improvised Instructional Materials for Teaching of Biology in Private Secondary Schools in Potiskum Local Government Area?

From table 2 below, the findings of the study also revealed that, Biology teacher utilized improvised Visual aids like diagram, charts, posters, pictures and photographs for effective teaching of Biology, Biology teachers utilized available resource person in the community to improvised instructional materials, Biology teachers utilized available resources in their community such as plastic, tin, glass and leather materials to improvised instructional materials for teaching Biology, Biology teachers make use of alternative improvised Laboratory equipment like conical flasks, Bunsen burner, reagents for effective teaching of Biology, Biology teachers utilized lime juice instead of real acid, Biology teachers utilized ash solution as a substitute to base, Biology teacher utilized locally improvised Hot plate/Bunsen burner for effective teaching of Biology and Biology teachers utilized colored flowers to produce improvised acid-base indicators are some of the extents Biology Teachers utilized Improvised Instructional Materials for Teaching of Biology in Private Secondary Schools in Potiskum Local Government Area.

Table 2 Mean on the extent's biology teachers utilized improvised instructional materials for teaching of biology in private secondary schools in Potiskum local government area

S/N	Items	SA	A	D	SD	X	Remarks
1	Biology teacher utilized improvised Visual aids like diagram, charts, posters, pictures and photographs for effective teaching of Biology.	21	12	5	-	3.42	Agreed
2	Biology teachers utilized available resource person in the community to improvised instructional materials.	10	22	5	1	3.13	Agreed
3	Biology teachers utilized available resources in their community such as plastic, tin, glass and leather materials to improvised instructional materials for teaching Biology.	18	12	7	1	3.29	Agreed
4	Biology teachers make use of alternative improvised Laboratory equipment like conical flasks, Bunsen burner, reagents for effective teaching of Biology	9	20	7	2	3.05	Agreed
5	Biology teachers utilized lime juice instead of real acid	10	15	10	3	3.00	Agreed
6.	Biology teachers utilized ash solution as a substitute to base.	13	18	7	-	3.15	Agreed
7	Biology teacher utilized locally improvised Hot plate/Bunsen burner for effective teaching of Biology	9	19	8	2	3.02	Agreed
8	Biology teachers utilized coloured flowers to produce improvised acid-base indicators.	10	12	11	5	2.96	Agreed

Research Question: 3

What are the benefits of using Improvised Instructional Materials in Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area?

Table 3 Mean on the benefits of using improvised instructional materials in teaching and learning of biology in private secondary schools in Potiskum local government area

S/N	Items	SA	A	D	SD	X	Remarks
1.	The use of Improvised Biology Materials helps the Biology teachers to capture and sustain the curiosity and interest of the learners towards the lesson in schools.	19	17	1	1	3.48	Agreed
2.	The use of Improvised Biology Materials helps the Biology teachers to motivate students in the subject being taught.	18	13	6	1	3.32	Agreed
3.	The use of Improvised Biology Materials in teaching and learning help to improve the overall performance of students in Biology.	17	12	8	1	3.24	Agreed
4.	The use of Improvised Biology Materials is not time consuming in the course of lesson presentation in Biology.	13	15	6	4	3.20	Agreed
5.	There is much retention of memory of what is taught whenever Improvised or local Biology Materials are used in the teaching in Biology	16	15	2	5	3.42	Agreed

From table 3 above, the findings of the study further revealed that, the use of Improvised Biology Materials helps the Biology teachers to capture and sustain the curiosity and interest of the learners towards the lesson in schools, use of

Improvised Biology Materials helps the Biology teachers to motivate students in the subject being taught, use of Improvised Biology Materials in teaching and learning help to improve the overall performance of students in Biology, use of Improvised Biology Materials is not time consuming in the course of lesson presentation in chemistry and that there is much retention of memory of what is taught whenever Improvised or local Biology Materials are used in the teaching in chemistry are some of the benefits of using Improvised Instructional Materials in Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area.

Research Question: 4

What are the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology y in Private Secondary Schools in Potiskum Local Government Area?

Table 4 Mean on the problems faced by biology teachers towards improvisation of instructional materials for teaching and learning of chemistry in private secondary schools in Potiskum local government area

S/N	Items	SA	A	D	SD	X	Remarks
1	Lack of awareness on where to obtain facilities for improvising instructional materials.	17	13	5	3	3.34	Agreed
2	Lack of motivation on part of government for Biology teachers in their efforts towards improvisation of instructional materials for teaching Biology.	12	19	3	4	3.26	Agreed
3	Irregular power supply is a problem to the improvisation of materials (from the Internet)	12	14	7	5	3.15	Agreed
4	Most of the Biology teachers lack technical knowledge on how to improvise instructional materials for their teaching.	10	18	7	3	3.08	Agreed
5	Shortage of community resources person such as blacksmiths, carpenter under the need of Biology teachers on how to improvise instructional materials.	5	18	8	7	3.90	Agreed
6	Lack of private proprietors efforts towards organizing workshop for Biology teachers on improvisation of Instructional materials	15	18	4	1	3.29	Agreed
7	High cost of improvise instructional materials for teaching Biology	15	12	9	1	3.16	Agreed
8	Lack of funds for buying relevant components for improvisation of instructional materials.	11	14	12	1	2.97	Agreed

From table 4 above, the findings of the study also revealed that, lack of awareness on where to obtain facilities for improvising instructional materials, lack of motivation on part of government for Biology teachers in their efforts towards improvisation of instructional materials for teaching Biology, Irregular power supply is a problem to the improvisation of materials (from the Internet), most of the Biology teachers lack technical knowledge on how to improvise instructional materials for their teaching, Shortage of community resources person such as blacksmiths, carpenter under the need of Biology teachers on how to improvise instructional materials, lack of private proprietors efforts towards organizing workshop for Biology teachers on improvisation of Instructional materials, high cost of improvise instructional materials for teaching Biology and lack of funds for buying relevant components for improvisation of instructional materials are some of the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area.

5. Summary of Findings

- The findings of the study shows the Biology teachers have a positive attitude towards improvisation for teaching and learning of Biology. Since, they used to give students group projects, teachers request that students bring materials in the environment, teachers cut calendars and magazines to serve as instructional materials for teaching Biology.
- The findings of the study also shows the Biology teachers utilized the mostly instructional materials such as diagram, charts, posters, pictures and photographs for effective teaching of Biology.
- The findings of the study further revealed that roles played by improvised instructional materials in teaching and learning of Biology cannot be over emphasized, since it the Biology teachers to capture and sustain the curiosity and interest of the learners towards the lesson in schools.
- The findings of the study also revealed that, Biology teachers faced with numerous challenges in the utilization of improvised instructional materials in teaching of Biology among others are inadequate funds, lack of electricity to support the use of improvised instructional materials and lack of motivation on part of government for Biology teachers.

6. Discussion of Findings

The findings of the study revealed that, Biology y teachers give students group projects to produce instructional materials, Biology teachers request that students bring materials in the environment to be used as improvised material during lessons, Biology teachers cut calendars and magazines to serve as instructional materials for teaching Biology, Biology teachers used improvise Biology materials downloaded from the Internet, Biology teachers think to used orange juice instance of real acid, Biology teachers use ash solution as a substitute to base, Biology teachers believe that tomatoes juice can be used as an improvised acid and Biology teachers take colored flowers as a substitute for acid-base indicators are some of the Attitude of Biology Teachers towards production and Improvisation of Instructional Materials in Private Secondary Schools in Potiskum Local Government Area. The findings of the study is in line with the work of (24) who reported that, Biology teacher perspectives about who is capable of learning using improvisation may influence their attitude. He further observed that some Biology teachers see improvisation as something that people either do or do not do. Therefore, attitude is the Biology teacher's expectation of a positive or negative outcome based on social acceptance and student achievement. The findings of the study is collaborated with the work of O(25) who opined that only the highly creative, resourceful, committed and dedicated teachers can resort to acquiring and improvising scarce resources. Teacher's laziness is one of the factors that hinder the use of improvised instructional materials in teaching. This is because preparation is very much intensive when visual aids are to be used as a result; many lazy teachers abandon the use of visual aids soon after they have graduated from their trainings. A conscientious teacher should be able to improvise some of the unavailable instructional materials.

The findings of the study also revealed that, Biology teacher utilized improvised Visual aids like diagram, charts, posters, pictures and photographs for effective teaching of Biology, Biology teachers utilized available resource person in the community to improvised instructional materials, Biology teachers utilized available resources in their community such as plastic, tin, glass and leather materials to improvised instructional materials for teaching Biology, Biology teachers make use of alternative improvised Laboratory equipment like conical flasks, Bunsen burner, reagents for effective teaching of Biology, Biology teachers utilized lime juice instead of real acid, Biology teachers utilized ash solution as a substitute to base, Biology teacher utilized locally improvised Hot plate/Bunsen burner for effective teaching of Biology and Biology teachers utilized colored flowers to produce improvised acid-base indicators are some of the extents Biology teachers utilized Improvised Instructional Materials for Teaching of Biology in Private Secondary Schools in Potiskum Local Government Area. The findings of the study is in line with the work of Joseph, teaching of form, scales, modes, chords, nomenclature, instrumental technique, ear training, rhythm, articulation, forward motion, theory, melodic construction and development, and style all can be approached through the use of improvisation. The findings of the study is in agreement with the work of (26) stressing the need for the use of community resources in Biology teaching, stated that improvisation makes the teacher and the students feel their environment and utilize local resources to attain educational objectives. There is need for Biology teacher to look inward, to explore the opportunities and resources found within the physical and social environment. In many cases, (26) continued, such important resources of the community are often unnoticed by many teachers.

The findings of the study further revealed that, the use of Improvised Biology Materials helps the Biology teachers to capture and sustain the curiosity and interest of the learners towards the lesson in schools, use of Improvised Biology

Materials helps the chemistry teachers to motivate students in the subject being taught, use of Improvised Biology Materials in teaching and learning help to improve the overall performance of students in Biology, use of Improvised Biology Materials is not time consuming in the course of lesson presentation in chemistry and that there is much retention of memory of what is taught whenever Improvised or local Biology Materials are used in the teaching in Biology are some of the benefits of using Improvised Instructional Materials in Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area. Instructional materials can be used to arrest and sustain attention, help the Biology teacher in presentation of fact and information, impact concept and principle, guide thinking and induce transfer of learning that is through the technological invention modification. Learners will form cultural technological base develop reflective thinking, basic behavior pattern in term of skills competence attitude and interest above all, the children does joyfully through various learning task or activities such task includes learning factual information, concept and principles procedure in performing skills perceptual motor act and desirable attitude opinion and motivation. Teaching and learning when instructional media are effectively used become more interesting, challenging, effective and rewarding. This indicated that it stimulates the student's interest in the lesson and help the Biology teachers to use the specified time. Hearing, seeing and listening are primary means of human learning and teaching materials is best and stimulant the direction of learning. Improvised materials provide a cognitive bridge between abstraction and reality to students. Secondly, improvisation enables teachers to think and research for cheaper and faster methods of making students' learning easier. Thirdly, improvisation presents next to real situation to students in the absence of the real materials. Finally, improvisation saves cost and in addition both the teacher and the students make positive effort towards instruction.

The findings of the study also revealed that, lack of awareness on where to obtain facilities for improvising instructional materials, lack of motivation on part of government for Biology teachers in their efforts towards improvisation of instructional materials for teaching Biology, Irregular power supply is a problem to the improvisation of materials (from the Internet), most of the Biology teachers lack technical knowledge on how to improvise instructional materials for their teaching, Shortage of community resources person such as blacksmiths, carpenter under the need of Biology teachers on how to improvise instructional materials, lack of private proprietors efforts towards organizing workshop for Biology teachers on improvisation of Instructional materials, high cost of improvise instructional materials for teaching Biology and lack of funds for buying relevant components for improvisation of instructional materials are some of the problems faced by Biology teachers towards improvisation of Instructional Materials for Teaching and Learning of Biology in Private Secondary Schools in Potiskum Local Government Area. The findings of the study is in line with the (2). Identified two main constraints militating against the successful improvisation of Science equipment. These are the technical and the human factors respectively. While the technical factors relate to the question of degree of accuracy and precision that is possible with the improvised equipment, the human factor relates to the teachers' skill in developing the resources while providing the appropriate learning experience to the learners. Also, (2) reported lack of adequate professional training as a major problem militating against the effective use of local resources for Science teaching. Supported this, (2). Noted that the problem of finance seems to be the most nagging problem facing the improvisation use of instructional materials in Nigeria. He observed that the cost of establishing the educational industry has clearly assumed a critical dimension. This is why the state government finds it very difficult to fund the schools sufficiently.

7. Conclusion

Conclusively, the improvisations of Biology instructional materials are presented as indispensable tasks in the scientific enterprise to enrich the teaching and learning of Biology as a subject. The Biology teacher must improvise, produce and use both materials and ideas to aid instruction at all times. Some issues which could aid adequate training of teachers in improvisation and utilization of available Biology resources should be highlighted in the teacher education curriculum and instructions.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declared no conflict of interest throughout the project, however, there are constructive argument at some point in the research but valid agreement was cemented before publishing the result.

Statement of informed consent

The consent of the participant was adequately seek, all participants were fully aware of the importance of the research and participates with ease. The researchers also seek the consent of the school authorities where the research was conducted. Approval was granted adequately.

References

- [1] Igwe IT. Enriching Science Education. The Place of Improvisation in the Classroom. Science Teachers' Association of Nigeria (STAN) 41st Annual Conference Proceedings. 2010; 51- 53.
- [2] Esu AE. Professional Skills for Effective Teaching. Appraisal of Basic Issues in Educational Foundation. Calabar: Rohoboth Favor Books. 2010.
- [3] Fape OO. Improvising Materials for Science Education in Nigerian Schools. A Paper Presented at the Workshop on Improvisation of Science Equipment. 2007.
- [4] Maduekwe AN. Perspective on Teacher Education and ICTs in the Language Classroom, V. B. (ed). An Introduction to Educational Technologies in Education. Lagos: Sibon books Ltd. 2006.
- [5] Ogunleye AO. Towards the Optimal Utilization and Management of Resources for the Effective Teaching and Learning of physics in Schools. Proceedings of the 41st Annual Conference of the Science Teachers' Association of Nigeria (STAN). University of Lagos. 2006; 215 – 220.
- [6] Alabi TO, Lasisi N. (2015). Effects of Guided Discovery and Problem Solving on Achievement of Secondary School Students' in Volumetric Analysis in Niger State. ATBU, Journal of Science, Technology & Education (JOSTE). 2015; 3(4): 75-87.
- [7] Olorundare AS. Correlates of poor academic performance of secondary students in the sciences in Nigeria. Paper presented at the Virginia State University Petersburg, Virginia United State of America. 2012.
- [8] Esiobu H. An Implementation: An Analysis of Elementary Students and Teaching Attitude towards Science in Process Approach VS. Traditional Science Class. 2005.
- [9] Umoinyang IE. Student Socio – Psychological Factors as Determinants of Achievement in Senior Secondary Mathematics. 2003.
- [10] Folorunso SO. Instructional Materials and Resources for Effective teaching. Nigerian Educational Research and Development Council. 2014.
- [11] Federal Ministry of Education. Selection and use of instructional materials and resources: Basic Education Teacher's Handbook of Nigerian Educational Research and Development Council. 2014; 176-182.
- [12] Okebukola PAO, Jegede OJ. The under-achieving student in science opinions on the actology of the ailment. Journal of the 27th Annual Conference of Science Teachers' Association of Nigeria, August, Owerri. 2006; 57 – 63.
- [13] Bibi, S., & Nawaz, M. H. (2020). A study on the effect of emerging technology on students' academic achievements at secondary level. Journal of Business and Social Review in Emerging Economies, 6(1), 365-378.
- [14] Nwagbo CR. Enriching Senior Secondary School Biology through Integrating Entrepreneurship Activities. 50th Annual Proceedings of Science Teachers' Association of Nigeria (STAN). 2010; 128 – 133.
- [15] Unachukwu CE. Designing Appropriate Methodology in Vocational and Technical Education for Nigeria, Nsukka, University, Trust Publishers. 2009.
- [16] Ibitoye JO, Fape MN. Instructional Materials Utilization for Effective Teaching and Learning of Introductory Technology in the Universal Basic Education (UBE). Nigerian UBE Journal. 2007; 1(2): 351- 354.
- [17] Okebukola PAO. Practical Handbook on Instructional Media. 2nd Edition, Graphcom Publishers, Ilorin. 2002.
- [18] Nzewi UM, Nwosu AA. Course Guide, EDU 236: Biology Methods. National Open University of Nigeria. 2010.

- [19] Nwagbo CR. Enriching Senior Secondary School Biology through Integrating Entrepreneurship Activities. 50th Annual Proceedings of Science Teachers' Association of Nigeria (STAN). 2010; 128 – 133.
- [20] Branchaw, J. L., Pape-Lindstrom, P. A., Tanner, K. D., Bissonnette, S. A., Cary, T. L., Couch, B. A., ... & Brownell, S. E. (2020). Resources for teaching and assessing the vision and change biology core concepts. *Cbe—life Sciences Education*, 19(2), es1.
- [21] Harendza, S. (2020). Improvisation—a new strategy in medical education?. *GMS journal for medical education*, 37(4).
- [22] Biasutti, M., & Habe, K. (2021). Teachers' perspectives on dance improvisation and flow. *Research in Dance Education*, 1-20.
- [23] Phelps, M., White, C., Xiang, L., & Swanson, H. I. (2021). Improvisation as a Teaching Tool for Improving Oral Communication Skills in Premedical and Pre-Biomedical Graduate Students. *Journal of Medical Education and Curricular Development*, 8, 23821205211006411.
- [24] Espeland, Å., & Stige, B. (2021). Teaching repertoires and pedagogical improvisation in music teacher practices. *British Journal of Music Education*, 1-12.
- [25] Long, Z., Linabary, J. R., Buzzanell, P. M., Mouton, A., & Rao, R. L. (2020). Enacting everyday feminist collaborations: Reflexive becoming, proactive improvisation and co-learning partnerships. *Gender, Work & Organization*, 27(4), 487-506.
- [26] Abdullah, F. P. Y., Cheong, K. W., Alizadeh, F., & Poon, C. H. (2021). The Role of Instructional Scaffolding to Facilitate Problem Solving Skills in Music Improvisation. *MIER Journal of Educational Studies Trends & Practices*, 103-117.