

Science Practicals on Effective Teaching and Learning of Junior Secondary School Sciences in Ogbia L.G.A. Bayelsa State

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Abstract

This study investigated the impact of science education on effective teaching and learning of junior secondary school sciences in Ogbia Local Government Area of Bayelsa State. It was facilitated by two research questions. The research adopted a descriptive survey design and the population for the study involved all the science education students in ten (10) selected secondary schools in Ogbia Local Government Area of Bayelsa State, with total of 50 respondents achieved through the aid of simple random techniques. Data was collected using a structured questionnaire designed in 5 points rating scale. The instrument was validated by two experts in the field and the reliability co-efficient of 0.65 was established using Cronbach alpha method, while mean and standard deviation were used to answer the research questions. Findings revealed that there is impact of science practical's on effective teaching and learning of junior secondary school sciences in Ogbia Local Government Area of Bayelsa State, and recommends that; Activities that will enhance engagement of students in science practicals should be given enough encouragement by science instructors, The government should budget and allocate finance that will be used to build and equip our laboratories to a world class standard, Science education curriculum should be structured to embrace science practical's, Teaching and learning of science should be intensifying from junior secondary to senior secondary levels, Science students should encourage to demonstrate practically on what they have learnt.

Introduction

Background to the Study

Science is the field in which the content of science and the processes of science learning no longer is obvious but has to be given justification. According to Robin (2004), the word 'science' is variously used in ordinary discourse in English to refer to a product (a body of knowledge), to a process (a way of conducting enquiry) and to an enterprise (the institutionalized pursuit of knowledge of the material world). The distinctive characteristic of scientific knowledge is that it provides material explanations for the behaviour of the material world, that is, explanations in terms of the entities that make up that world and their properties. Through its choice of questions to address, and the kinds of answers to accept, its methods of enquiry, and its procedures for testing and scrutinizing knowledge claims, the scientific community has succeeded in building up a body of knowledge which is consensually accepted by that community and often also beyond it. Maranan (2017), exerted that science process skills are the things that scientists do when they study and investigate, observing, classifying, communicating, measuring, inferring, and predicting are among the thinking skills used by scientists, teachers and students when doing science. Much of the pleasure of both learning and teaching science is experiencing science. Mastering these process skills will help in developing the kind of science programmes that mirrors real science. On the other hand, practical's can be described as the aspect of education which is concerned with the incorporation of the relevant technical skill in a particular field of study. It is the method of education, training or retraining which is directed towards developing the learner to become productive in that area of study as well as equipping the students with in-dept. knowledge of that area of study. It is therefore the bedrock in which a country's socio - economic, technological and cultural advancement must be built. We value science (as a product, as an enquiry process and as a social institution) because of its success in explaining phenomena in elegant and parsimonious ways, which are intellectually satisfying and which often facilitate the purposeful manipulation of objects materials and event.

The primary objectives of integrated science are as follows:

- i. It provides students with the ability to participate in activities designed to arrest their interest and lay solid foundation for their study of science of higher levels of education.
- ii. To stimulate creativity and reflexive thinking
- iii. To be creative on attitude to life.
- iv. To continue the process of concepts building for acquiring a science.

For Robin (2004), the term 'practical work' is referred to any teaching and learning activity which at some point involves the students in observing or manipulating the objects and materials they are studying. He also preferred not to use the term 'experiment' (or 'experimental work') as a general label, as this is often used to mean the testing of a prior hypothesis. Whilst some practical work is of this form, other examples are not. The close interdependence of the two main aims of science education identified above – improving students' scientific knowledge and their knowledge of science as a form of enquiry – has led many science educators to argue that science education should combine and integrate them into a 'seamless' whole. The idea is that students are taught to carry out their own scientific enquiries and so acquire scientific knowledge for themselves. Clearly practical work has a central role in any such vision of science education.

Therefore, upon the prevailing background, the present study is based on investigating the Science Practicals on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State.

Statement of the Problem

Science as a core subject in the secondary schools is designed to equip students with the knowledge of relevant concepts and scientific skills. The main center for the study of sciences in junior secondary schools is science laboratory which is supposedly to equipped learners with knowledge involving hands on practiced. According to Maduabum (1992),

The laboratory is a place where scientific exercises are conducted by the science teachers for the benefits of the students (learners). The laboratory exercises include; experiments, and other activities which help the students in acquiring scientific skills. Igwe (2013) observed that a laboratory can be in-door such as the sufficiently designed and equipped room found most in schools or outdoor involving such places as riverside, workshop, field and even market for carrying out scientific studies. The laboratory is the heart of a good scientific programme which allows students in schools to have experience that are consistent with the goals of scientific literacy. Therefore, the problem of this study is to investigate the impact of Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State.

Purpose of the Study

The purpose of the study generally is to investigate science practicals on the effective teaching and learning of junior secondary schools sciences in Ogbia Local Government Area. The study specifically seeks to investigate;

- 1 The impact of science practical's on effective teaching and learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State.
- 2 The strategies to enhance science practical's on effective teaching and learning of Junior Secondary schools Sciences in Ogbia Local Government Area of Bayelsa State.

Research Questions

For the study, the following research questions were formulated by the researcher;

- 1 What are the impacts of science practical on effective teaching and learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State?
- 2 What are strategies to enhance science practicals on effecting teaching and learning of Junior Secondary schools Sciences in Ogbia Local Government Area of Bayelsa State?

RESEARCH METHODOLOGY

The research design is a descriptive survey to investigate the impact of science practical on effective teaching and learning of junior secondary schools sciences in Ogbia Local Government Area of Bayelsa State. The population of the study involved science students from ten (10) selected junior secondary schools in Ogbia LGA of Bayelsa State.

A total of 50 students were used as respondents for the study from ten (10) selected junior secondary schools in Ogbia Local Government Area with the aid of sample random techniques.

The major research instrument used is the questionnaires titled; “Science Practicals on Effective Teaching and Learning of Junior Secondary Schools Sciences” (SPETLJSSS). It was divided into sections, A and B. Section A, contains respondents personal information, then, section B, contains the questionnaires items.

The questionnaire that was used as the research instrument was subjected to face and contents validity by 2 experts in the field. Their contributions and corrections were included into the final draft of the research instrument. The data collected were presented in tables and the analyses was facilitated with the use of mean and standard deviation using Likert’s five point’s scales of Strongly Agreed (SA) - 5 points, Agreed (A) - 4, Undecided (U) - 3, Disagreed (D) - 2, and Strongly Disagreed (SD) - 1

Results and Discussions

The data analyses are presented in tables according to the research questions.

Research question 1: What are the impacts of science practical on effective teaching and learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State?

Answer to research question one is presented in Table 4.1

Mean and SD of Impact of Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State

S/N	STATEMENT	MEAN	SD	REMARKS
1	It enable Students hands on scientific activities	3.60	0.49	Agreed
2	Achievement of learning objectives (curriculum)	3.16	1.01	Agreed
3	Acquirement of the right science process skills	3.22	0.97	Agreed
4	In – depth knowledge of area of the study	3.00	1.03	Agreed
5	Students gained understanding of established body of scientific knowledge appropriate to their needs	3.16	0.88	Agreed
6	Students participate in activities designed to arrest their interests	3.34	0.87	Agreed
7	Laid solid foundation for students studying of science at higher levels of education	3.00	0.96	Agreed
8	Developed understanding of methods by which knowledge has been gained	3.62	1.10	Agreed
9	It aid socio – economic growth	3.45	1.09	Agreed
10	It encouraged continuous research activities	3.32	0.84	Agreed

Grand mean	3.30	0.92	Agreed
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Data in Table 4.1 above showed that respondents agreed on all items, and there are impacts of Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State.

Research question 2: What are Strategies to enhance Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State?

Answer to research question two is presented in Table 4.2.

Mean and SD of strategies to enhance Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State.

S/N	STATEMENT	MEAN	SD	REMARKS
1	Adequate training of science instructors	3.34	0.87	Agreed
2	Learning objectives should have students based activities	3.45	1.09	Agreed
3	Research based learning	3.00	0.96	Agreed
4	There should well built laboratories for practical works	3.62	1.10	Agreed
5	Practical facilities should be updated	3.32	0.84	Agreed
6	Sufficient time allocated to science subjects,	3.28	0.87	Agreed
7	Dominance of teacher-centred teaching,	2.38	1.09	Disagreed
8	Inadequate teacher training and workshops,	2.15	1.11	Disagreed
9	Availability of experimental tasks.	3.04	1.07	Agreed
10	Creativity and innovation to improvise materials	3.24	0.86	Agreed
	Grand mean	3.10	0.87	Agreed

Data in Table 4.2 above showed that respondents agreed on all items, except for item 7 with mean of 2.38 and SD of 1.09, and item 8 with mean 2.15 and SD of 1.11 which indicates disagreed to the variables of dominance of teacher – centred teaching and inadequate teacher training and workshops. The grand mean of 3.08 and SD of 0.87 results supports the need to enhance Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State

Discussion of Findings

Impact of Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State.

From findings, with grand mean results of 3.28 and SD of 0.92 in table one indicates that all respondents responded to agreed on all the 10 items on impact of Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Baylesa State. This is in line with the study of Rebecca and Nsimeneabasi (2017), that practical activities may be defined as an act of science students engaging and equipping themselves on hand-on skills. It is also supported by Lazarowita and Tamir (2006) who opined that practical work is important because it provides opportunities for students to perform

various hand-on-activities. These practical works also give students many opportunities to use their minds to discover general laws and principles of science.

to Practical activities promote conceptual change, motivation and excitement for enriching science learning. Furthermore, the findings of the study agrees with the work of Kulshretta (2013) who noted some advantages of practical activities in science to include; skills development, planning, manipulation of equipment, observation, analyzing, evaluating, experiential learning, testing out own ideas, testing out theories, developing of problem solving strategies and team work.

Strategies to enhance Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State

From findings, with grand mean of 3.08 and SD of 0.87, there were eight (8) respondents of items 1, 2, 3, 4, 5, 6, 9 and 10 who attested to agreed, while items 7, and 8 responded to disagreed on variables of research question, which supported Strategies to enhance Science Practical on Effective Teaching and Learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State.

The findings of this research is supported by the study of Twahirwa, et al (2021), that trending teaching and learning approaches in the 21st century includes learner-centered methodologies such as induction method, project-based learning, inquiry and several other methods that have been seen to be promising in teaching and learning endeavours. The results also is in affirmation with a study conducted by Pratama, Ranti, Usmeldi, & Syafriani (2019), with the assertion that learners who do not actively participate in the knowledge and skills construction do not learn optimally whereas in project-based learning, learners are the primary source of information which develop learner's accountability and cognitive capacities.

Summary, Conclusion and Recommendation

Summary

Trending teaching and learning approaches in the 21st century includes learner-centered methodologies such as induction method, project-based learning, inquiry and several other methods that have been seen to be promising in teaching and learning endeavours. Presentation of instructions is not an easy task as one can imagine. It requires the instructor to devise the method that facilitates the learner to look for patterns in a specific manner and then based on careful observation, the learner may draw conclusion that may be generalized to similar patterns. This approach is referred to as induction or bottom-up approaches as opposed to deduction methods, which uses top-down approaches from general inferences to specific ones.

The problem that led to the study was to investigate the effects of science practical on effective teaching and learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa. Literatures for this study were reviewed in line with the purpose of the study to establish the effects of science practical on effective teaching and learning of Junior Secondary Schools Sciences in Ogbia Local Government Area of Bayelsa State. The study also focused on the theories of cognitive and constructivist as foundation to the literatures. Two research questions that formed the research questionnaire were analyzed by the mean and standard deviation and the discussion of findings were made appropriately. The population of the study involved science students from some selected junior secondary schools in Ogbia LGA of Bayelsa State.

While a total of 50 students were used as respondents for the study from ten (10) selected junior secondary schools in Ogbia Local Government Area with the aid of simple random techniques. The distinctive characteristic of scientific knowledge is that it provides material explanations for the behaviour of the material world, that is, explanations in terms of the entities that make up that world and their properties. Through its choice of questions to address and the kinds of answers to accept, its methods of enquiry, and its procedures for testing and scrutinizing knowledge claims, the scientific community has succeeded in building up a body of knowledge which is consensually accepted by that community and often also beyond it. Whilst this is always open to revision, its core elements are stable and beyond reasonable doubt. We value science (as a product, as an enquiry process, and as a social institution) because of its success in explaining phenomena in elegant and parsimonious ways, which are intellectually satisfying and which often facilitate the purposeful manipulation of objects, materials and events.

Conclusion

The impacts science practical on effective teaching and learning of junior secondary school sciences in Ogbia Local Government Area of Bayelsa State, should be regarded as a very paramount engagement needed to facilitate and authenticate scientific investigations. Practical activities should be seen as an act of science students engaging and equipping themselves on hands-on skills and practical work is important because it provides opportunities for students to perform various hands-on- activities. These practical works also give students many opportunities to use their minds to discover general laws and principles of science. More so, the strategies to enhance the impacts of science practical on effective teaching and learning of junior secondary school sciences can better be suited with trending teaching and learning approaches in the 21st century which includes learner-centred methodologies such as induction method, project-based learning, inquiry and several other methods that have been seen to be promising in teaching and learning endeavours. It requires the instructor to devise the method that facilitates the learner to look for patterns in a specific manner and then based on careful observation, the learner may draw conclusion that may be generalized to similar patterns.

5.4 Recommendation

The researcher therefore recommends that:

1. Activities that will enhance engagement of students in science practical should be given enough encouragement by science instructors.
2. The government should budget and allocate finance that will be use to build and equip our laboratories to a world class standard.
3. Science education curriculum should be structured to embrace science practicals.
4. Teaching and learning of science should be intensifying from junior secondary to senior secondary levels.
5. Science students should encourage demonstrating practically on what they have learnt.

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