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The Effects of Improvised Materials on the Study of Science in Basic Schools in Aowin Municipality - Ghana

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Abstract
The primary objective of the study was to investigate the effects of improvised materials in the study of science at the basic schools in Aowin Municipality. The principal issues on which the study focused are the usefulness of improvised instructional materials on the teaching and learning of science and suggested recommendations for school administrators. The instrument used was a structured questionnaire. Data for the study were obtained by administering 200 questionnaires to 30 teachers and 150 pupils. Ten public Junior High schools were selected. 3 teachers and 15 pupils were sampled randomly from each Junior High school making a total of 200. 200 questionnaires were fully answered and returned. The data were analyzed using frequency counts and percentages. The study recommends that in cases where the school does not have original instructional materials and are isolated or inaccessible, instructional materials can be improvised to enhance the teaching and learning of science.
Keywords: Improvised materials, instructional materials, manipulative skills, resourceful

Introduction

Improvised materials are materials that are used in the absence of the real, original or delicate objects to bring about the same learning effect that the real or complicated materials would have brought. These materials can be invented or produced from readily available materials within the environment.

Science instructional materials or equipment are essential, therefore they are needed by teachers to demonstrate and undertake co-operative investigation. Hence science equipment can be improvised from inexpensive materials from the locality in the absence of the original materials. The use of locally produced instructional materials in the teaching learning situation has many advantages. According to Arhin and Asimah (2006), improvised materials are cheaper to produce or buy because the raw materials are obtained from local sources, present objects and models in either two or three dimensional views. It encourages class participation since majority of the raw materials can be sourced by the students themselves, motivate learners through participatory activities during production and arouse the interest of the learners because they are made from raw materials they see daily in their environment.

A very vital opportunity of using improvised materials for experiments is that, it enables children to participate fully in the actual construction of the apparatus and gives them ideas about how such materials work. Using improvised materials in teaching brings home and clarifies unfamiliar concepts and principles of science to students.

Concerns about loss, breakages and repairs are minimized because instructional materials are made locally using materials commonly found in the environment. It helps in the acquisition of appropriate manipulative skills since improvised materials can easily be replaced or repaired when damaged. More so, when science teachers improvise instructional materials for their teaching, their potentials are developed.

The method of teaching science requires every science teacher to provide enough materials in the teaching of science to enable students to learn by using all their senses, since children have different needs that need to be satisfied equally.

Therefore, where the schools are isolated or inaccessible, instructional materials can be improvised to enhance science teaching and learning.

Review of related Literature

Science education imparts a method of inquiry and a systematic way of processing knowledge about the physical world to the learners. For this reason, science education provides part of the foundation for any knowledge-based effort to improve health, nutrition, family planning, environmental, agriculture, and industry.

Science education has two broad purposes. The first purpose is to promote scientific literacy among citizens on matters directly affecting their own lives and the society so that they can make decisions based on information and understanding. This is essential for the sustainable development of a modern, technological society. The second purpose is to build up technological capability by equipping the future workforce with essential science-based knowledge and skills, and by preparing students for scientific disciplines in higher education and science-related careers. Given the potential benefits, the provision of quality science education to

all children will have far reaching consequences on a country's development prospect.

Practical activities in science education are regarded as one of the necessary elements to promote understanding of scientific principles. To accomplish this goal, the equipment and experiment have to be carefully selected to give students the relevant experiences that they may need. The understanding is enhanced if the examples are coming from the daily life of the students.

Provision of relevant equipment is necessary, but not a sufficient condition for successful science teaching. Other factors such as pre-service and in-service teacher training, technical and educational suitability of equipment, distribution, maintenance and supply of consumable instructional materials influence the quality of practical activities.

School environment has been described as an organization where resources are produced, managed and organized in such a way that enables the students to acquire desirable learning competencies. The process of managing and organizing resources is called resource utilization. The utilization of resources in teaching brings about fruitful learning because it stimulates students' sense as well as motivating them.

Denyer (1998) in his study on science games in national curriculum in the United Kingdom reported that games when used as a resource enable less able children to stay on task and remain motivated for longer period. One of the problems confronting science teachers in developing countries, like Ghana, is lack of materials for teaching and lack of money to acquire desirable materials. There is a general genuine problem in teaching science in developing countries and that resourceful teachers need to look for alternatives that can help them carry on with their work (Bajah, 1991; Gbamanja, 1998; Loko, 1998).

Many candidates entering the teaching field cite their love for children and their desire to make a difference as their primary motivation. As soon as they are confronted with the reality of the teaching experience and the challenge of little or no support from the primary stakeholders from whom they should expect support, they quickly forget that investing in the children is their primary motivation. A clear focus on the primary motivation for entering teaching should undoubtedly compel committed teachers to become resourceful in the midst of little or no support. Such teachers should explore all possible resources, materials and equipment that would enable them to carry on with their primary task of teaching and to create conducive learning environment for their beloved students.

Students often tend to see science as difficult to understand and its main ideas as an abstract and remote from everyday life experiences (Braud, 1999). This means that more should be done to make science friendlier and more real to them.

Despite the role of science as a discipline in people's life in our societies, students still do not have interest in the study of science. Probably lack of pupils' interest in science may be as a result of science teachers' inability and lack of interest in the improvisation of instructional materials. Research has shown that effective use of instructional materials arouse students' interest (Agwagah, 1999; Uzoegwu, 2001). It is therefore expected that in the absence of the commercially made instructional materials for the teaching and learning of science, teachers should improvise. Ezegbe (1999) emphasized the importance of the use of objects or materials in our environment in achieving set objectives.

The importance of instructional materials in the teaching and learning process cannot be over-emphasized; hence they make teaching and learning more lively, meaningful and understandable. In support of the above fact, Uzoegwu (2001) maintained that teachers should employ instructional materials in their teaching in order to make sure that teaching is more permanent in the minds of the learners.

Agwagah (1999) rightly noted that instructional materials, if used effectively can arouse interest, foster stimulation, self-activities, increase retention ability, make the subject matter relevant to life and lessen the burden of teaching. In spite of the emphasis on the use of instructional materials in the teaching and learning process, research has shown that science teachers at the basic level teach without the use of instructional materials like acid-base indicators, acids, bases, microscope, etc. for the simple fact that they are not available in the schools.

Ugwu and Ogbu (1998) and Asadu and Ameh (2002) noted that lack of instructional materials is one of the major constraints in the teaching and learning of science in post-secondary schools. This problem can be attributed to a number of factors such as the laissez-faire attitude of some science teachers, insufficient knowledge on the skills and strategies for improvisation as a result of disruption in the academic programmes and lack of financial support from the administrators to encourage teachers improve needed materials.

Research Question

The study is guided by the question below;

1. What are the effects of improvised materials on the study of science at the Basic Schools in Aowin Municipality?

Null Hypothesis: *Improvised instructional materials produce the same learning effect as compared to the originally produced instructional materials.*

Methodology

This study followed mixed-methods research design. The instrument used was a structured questionnaire. The instrument used was a structured questionnaire. Data for the study were obtained by administering 200 questionnaires to 30 teachers and 150 pupils. Ten public basic schools were selected. 3 teachers and 15 pupils were sampled randomly from each Basic school making a total of 200. All 200 questionnaires were fully answered and returned. The questionnaire for the pupils was supervised by the researcher. The data were analyzed using frequency counts and percentages. The researchers explained the purpose of the study and emphasized that the participants will remain anonymous and that their participation is voluntary. The survey questionnaire consisted of four-point Likert scale items where respondents had to choose from Strongly Agree, Agree, Disagree and Strongly Disagree. The items were developed from and linked to the reviewed literature. The researchers explained the purpose of the study and emphasized that the participants will remain anonymous.

Findings and Discussions

Improvisation is a teaching tool that can be accessible to teachers from many backgrounds.

This aspect of the study presents the views of teachers and pupils on the effects of improvised materials on the study of science.

Views of Teachers on the effects of improvised materials

Table 1 presents teachers' view on the effects of improvised materials on the study of science from the Likert type items rated Strongly Agree (SA), Agree (A), Disagree (DA) and Strongly Disagree (SD).

Results from Table 1 show that majority of respondents strongly agree and agree with all items. Item 1 had 29(96.67%), item 2 had 27 (90%), item 3 had 25(83.33%) and item 4 had 22(73.33%) respondents respectively.

Table 1. Views of Teachers on the effects of improvised materials

		Number of teachers = 30			
Item	**statement**	**SA**	**A**	**DA**	**SD**
			(%)		
1.	Improvised materials sustain pupils interest	19(63.3)	10(33.33)	1 (3.33)	-
2.	Improvised materials engage pupils in the learning process	15(50)	12(40)	2(6.67)	1(3.33)
3.	Improvised materials bring the same learning outcome as original one	14(46.7)	11(36.7)	2(6.67)	3(10)
4.	Improvised materials motivate pupils	16(53.33)	6(20)	3(10)	5(16.67)

Source: Field Survey March, 2018.

Views of pupils on the effects of improvised materials

Table 2 presents pupils, view on the effects of improvised materials on the study of science from the Likert type items rated Strongly Agree (SA), Agree (A), Disagree (DA) and Strongly Disagree (SD).

Results from Table 2 show that majority of respondents strongly agree and agree with all the 4 items. Item 1 had 115(76.67%), item 2 had 127(84.67%), item 3 had 107(71.34%) and item 4 had 116(77.33%) respondents respectively.

The above analysis show that improvised materials enhance the study of science

Table 2: Views of pupils on the effects of improvised materials

		Number of teachers = 150			
Item	**statement**	**SA**	**A**	**DA**	**SD**
			(%)		
1.	Improvised materials sustain my interest	65(43.33)	50(33.3)	20(13.33)	15(10)
2.	Improvised materials engage me in the learning process	75(50)	52(34.67)	17(11.33)	6(4)
3.	I understood what was taught with the use of improvised materials	49(32.67)	58(38.67)	22(14.67)	21(14)
4.	Improvised materials motivated me	56(37.33)	60(40)	10(6.67)	24(16)

Source: Field Survey March, 2018.

Conclusion

Effective use of instructional materials enhance the understanding of the students in teaching and learning processes. It was discovered that improvised instructional materials bring the same meaning as compared to the

originally produced instructional materials. It is evident from the analysis that, there is no significant difference between improvised instructional materials and originally produced instructional materials when used in the teaching and learning of science.

Recommendations

It is therefore recommended that, in the absence of originally produced instructional materials, science teachers should have the desire to improvise to motivate, engage, sustain and to consolidate understanding.

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