

## PERCEIVED EFFECT OF INSTRUCTIONAL MATERIALS ON EFFECTIVE TEACHING AND LEARNING OF SCIENCE IN LAFIAGI METROPOLIS

BY

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### Abstract

*This study was designed to investigate the perceived effects of instructional materials on effective teaching and learning of sciences in some selected senior secondary schools in Lafiagi Metropolis. The study employed descriptive cross-sectional survey design. Respondents for this study comprised 35 Senior Secondary School Science teachers and 120 Senior Secondary School Science students drawn from the selected schools. A 21-item adopted questionnaire was used to elicit response from both teachers and students. A reliability index of 0.72 was obtained. The data were analyzed using frequency counts and percentages, mean and standard deviation. The findings of the study showed that teachers use variety of instructional materials in the teaching of Science. The study also found out that majority of the Science teachers and students agreed that the most commonly used instructional materials includes pictures (mostly diagrams and charts), photographs, real objects, print materials and computers which are useful in effective teaching and learning of Sciences. It is however recommended that all stakeholders should adequately make available relevant and adequate instructional materials for effective teaching and learning of sciences.*

**Keywords:** *Science, Effective teaching, Instructional materials, Learning, Perceived effect*

### Introduction

Science is considered as a country's partner for progress. Whenever one speaks of national development, one can never exclude the role of science. It is one of the main driving forces of the economic growth of nations. Science has its main branches to include Biology, Chemistry, Physics, Computer Science and Mathematics. These subjects are considered as universal science subjects that occupy an important place in the Nigerian educational system and globally. Hence, it is compulsory and prerequisite combination for all science students who wish to further their education in sciences. But, it is disheartening to know that Nigerian students' academic performance in Biology, Chemistry, Physics, Computer Science and Mathematics over the years has been rated by stakeholders in science education as very poor, except for some outstanding students. The big question now is; what caused students to perform so poorly in science subjects? There are several factors adduced to be responsible for the poor

performance of students in sciences in Nigeria over the years. One of the prominent factors is the ineffective use of instructional materials.

Teaching and learning go together. According to Bosswell (2019), they are the opposite sides of the same coin. Over the years, learning of Science has not been easy for students due to some abstract topics in it. Hence, the influence of instructional materials in promoting students' understanding and academic performance is indisputable. Teaching and learning materials (instructional materials) are any materials that can be used to motivate students learning and enhance understanding. Students learn concepts or skills and can make inquiries in sciences when an opportunity is provided for them to obtain information from multiple sources. Instructional materials assist teachers to make their lessons explicit to learners. They are used to transmit information, ideas and notes to learners (Bosswell, 2019). Instructional materials include both visuals and audiovisuals such as pictures, flashcards, posters, charts, tape recorders, radios, videos, television, computers and others. These materials serve as compliments to the normal processes of instruction. Instructional materials are essential and significant tools needed for teaching and learning of school subjects to promote teachers efficacy and improve students' performance. They make learning more interesting, practicable, realistic and appealing.

However, Akinleye (2017) attested that effective teaching and learning requires a teacher to teach the students with instructional materials and use practical activities to make learning more vivid, logical, realistic and pragmatic. Esu, Erukoha, and Umoren, (2014) agreed that instructional materials are indispensable tools for effective teaching and learning activities. Ekpo (2016) also supported that teaching aids are always used in supporting the sense organs. Dangana (2019) also stressed that with instructional materials, teachers can deliver their lesson with vigour, brevity with exactness, as sophisticated and delicate ideas can be expressed with the faintest shades of meaning revealed through instructional media. while Afolabi and Adeleke (2018) identified non-availability, inadequate and non-utilization of learning materials to teach science subjects as a result of teachers' poor skilled knowledge is also responsible for the use of lecture method in teaching sciences. They recommended that all stakeholders should pay more emphasis to the provision of instructional materials for the teaching and learning of science in schools to avoid or reduced poor academic performance in science subjects.

Learning is a complex process which involves a change in behaviour due to encounter with experiences. Learning can occur as a result of newly acquired skills, knowledge, perception, facts, principles and new information at hand (Oko, 2019). Learning can be reinforced with teaching aid of different variety to stimulate, motivate, as well as arrest learner's attention for a while during the instructional process.

### **Statement of the Problem**

Despite the fact that instructional materials are essential tools that can make teaching more practicable and knowledge acquisition much easier than anticipated, they are not readily available in Nigerian secondary schools (Emmanuel, Ebuara, Peter and Inah, 2020). This leads to low level of performance by students in external examinations (Abdu-Raheem 2014). Poor academic performance in science subjects like biology, chemistry, physics, computer science and mathematics could be attributed to many factors among which teachers' strategy itself is considered as a key factor. This denotes that the mastery of science concepts cannot be fully achieved without the use of instructional materials. The problem is, have the various instructional materials used in the teaching of Sciences enhanced effective teaching and learning of science? In the wake of this, the study sought to examine the perceived effect of instructional materials on the effective teaching and learning of science subjects in Lafiagi Metropolis.

### Objective of the Study

The general objective of this study is to investigate the perceptions of both science teachers and students on the effect of instructional materials on effective teaching and learning of sciences. Specifically, the study carried out the followings:

1. To investigate the availability of instruction material for effective teaching and learning of Sciences at the SSS level.
2. The perceptions of science teachers in respect to effects of instructional materials on effective teaching of Sciences.
3. The perceptions of science students as regards to effects of instructional materials on effective learning of Sciences.

### Research Questions

- 1) What instructional materials are available for effective teaching and learning of Sciences at the SSS level?
- 2) What are the science teachers' perceptions about effects of instructional materials on effective teaching of Sciences?
- 3) What are the science students' perceptions about effects of instructional materials on effective learning of Sciences?

### Theoretical Background

Over the years, effective teaching and learning of science have been the prime aim of science educationists and students. Therefore, various instructional materials have been employed to enhance the teaching and learning of science. Teaching and learning of science without adequate and relevant instructional materials is more challenging. Okwo and Ike (2015) described instructional media as aids to effective teaching in the classroom which evoke in students the same mental image as in the teacher, thereby making words comprehensible or understandable.

Rote learning and forgetfulness are usually the results of the overuse of words in learning. In science education, especially in biology, chemistry, physics, computer science and mathematics education, the students should be able to apply real world situation in the lesson or practicalize the lesson so as to enhance understanding. This will go a long way to help the students recall whenever necessary, implying that, the use of instructional materials in lesson delivery improves learning.

### Methodology

The descriptive survey was used for the study. Descriptive survey design seeks to explore and describe events as they are. This provided a better understanding of the research problem. The target population of the study was science teachers and science students in Senior Secondary Schools in Lafiagi Metropolis. The schools that were selected for this research includes Government Day Secondary School (GDSS) Lafiagi, Government Secondary School (GSS)Lafiagi, Lafiagi Secondary School (LSS) Lafiagi and Sommasun Senior Secondary School (SSSS) Lafiagi. The Science students were all Senior secondary school students selected irrespective of their gender. The sample size was made up of 155 respondents, i.e 120 science students and 35 science teachers. The simple random sampling technique was used to select 120 science students for the study and census method was used to involve all 35 science teachers. The instrument used to elicit information from the respondents was adopted from the study conducted by Kaku and Arthur (2020). The instrument included two sets of questionnaires; one set which was responded to by Science students and the other set by Science teachers. Yes or no responses were used for section A while the four-point Likert scaled questionnaire was used for sections B. Statements were scored as Strongly Agree (SA) = 4, Agree (A) = 3, Disagree (D) = 2 and Strongly Disagree (SD) = 1.

The questionnaire was administered to Science students and teachers of the selected SSS in the Lafiagi Metropolis. The questionnaire was administered by the researchers themselves. The researchers assured

the respondents of complete confidentiality and distributed the questionnaire to the respondents, guided them through on how to respond to the items and collected them within 10 to 20 minutes. Data collected were coded and refined with the help of SPSS (version 23). Research question one was analysed using frequency counts and percentages while research questions two and three were analysed using means and standard deviations.

### Presentation of Results

**Research Question 1:** what instructional materials are available for effective teaching and learning Sciences at the SSS level in Lafiagi Metropolis?

From Table 1, the results showed that the majority of the respondents indicated that teachers do not use radio, audio materials, television, public address system films and video in their lessons. Rather, the commonly used instructional materials are pictures (mostly diagrams and charts) (62.9%), photographs (71.4%), real objects (85.7%) print materials(57.1%) and computers (65.7%) in their lesson presentations.

**Table 1: Frequency counts and percentages for Teachers' responses on types of Instructional Materials used**

Resource	Yes (%)	No (%)	Total
Radio	1 (2.9)	34 (97.1)	35
Audio-Tapes	5 (14.3)	30 (85.7)	35
Television(Visual)	2 (5.8)	33 (94.2)	35
PublicAddressSystem	3 (8.6)	32 (91.4)	35
Pictures(Mostlydiagramsandcharts)	22 (62.9)	13 (37.1)	35
Photographs	25 (71.4)	10 (28.6)	35
RealObjects	30 (85.7)	5 (14.3)	35
PrintMaterials	20 (57.1)	15 (42.9)	35
Films	5 (14.3)	30 (85.7)	35
Computer	23 (65.7)	12 (34.3)	35
Video	2 (5.8)	33 (94.2)	35
Television (Audio-Visual)	2 (5.8)	33 (94.2)	35

Table 2 describes the responses from students based on the types of instructional materials used in teaching and learning of science. From Table 2, student's responses indicated that teachers rarely use radio, audio materials, television, photographs, real objects, films and videos in the delivery of their various science lessons but they mostly use pictures (mostly diagrams and charts(58.3%)), print materials(65%), real objects (66.7%), photographs (62.5%), and computers(66.7%) in their lesson presentations and sometimes real objects(47.6%).

**Table 2: Frequency counts and percentages for Students' responses on types of Instructional Materials used.**

Instructional materials	Yes (%)	No (%)	Total
Radio	10 (8.3)	120 (91.7)	120
Audio Tapes	6 (5)	114 (95)	120
Television (Visual)	2 (1.7)	118 (98.3)	120
Public Address System	2 (1.7)	118 (98.3)	120
Pictures (Mostly diagrams and charts)	70 (58.3)	50 (41.7)	120
Photographs	75 (62.5)	45 (37.5)	120
Real Objects	80 (66.7)	40 (33.3)	120
Print Materials	78 (65)	42 (35)	120
Films	10 (8.3)	110 (91.7)	120
Computer	80 (66.7)	40 (33.3)	120
Video	5 (4.2)	115 (95.8)	120
Television (Audio-Visual)	10(8.3)	110 (91.7)	120

**Research Question 2:** What are the perceived effects of instructional materials on effective teaching of sciences?

Table 3 presented the results from the analysis of data provided by science teachers on the perceived effect of instructional materials on effective teaching of sciences. As clearly shown in Table 3, the highest mean value recorded was  $M = 4.10$ ,  $SD = 0.31$ , and is in relation to the statement that "instructional materials make lesson delivery interesting". This implies that majority of the respondents strongly agreed that instructional materials help to carry students along while teaching. On the whole, the science teachers acknowledged that instructional materials have a positive effect on teaching. This is revealed in the result of an Average Mean of 3.43. In addition, an average standard deviation of 0.48 implies that responses are moderately spread from the mean.

**Table 3: Teachers' Perceptions on the Effect of Instructional Materials on effective Teaching of Sciences**

S/N	Statement	Mean	SD
1	Instructional materials help to clarify points better to learners.	3.41	0.41
2	Instructional materials help to present real life experience to students	3.50	0.46
3	Instructional materials make lesson delivery interesting.	4.10	0.31
4	Instructional materials help me to involve learners in lesson presentation.	3.05	0.52
5	I feel at ease when using instructional materials in explaining concept to	3.51	0.46
6	students. Instructional materials make teaching very effective.	3.26	0.56
7	Learners give good responses when instructional materials are used.		
8	Saves time for other matters to be attended to when teaching sciences.	3.41	0.41
	Learners perform better in class exercises and exams when instructional materials are used.	3.12	0.62
9	<b>Average Mean/Average Standard deviation</b>	3.54 <b>3.43</b>	0.55 <b>0.48</b>

**Research Question 3:** What are the perceived effects of instructional materials on the learning of Sciences?

Table 4 presents the results from the analysis of data provided by Science students on the perceived effect of instructional materials on effective learning of Sciences. From Table 4, it can be observed that the highest mean value recorded was on the statement that "instructional materials help to facilitate learning

of science concepts and principles” ( $M = 3.76$ ,  $SD = 0.56$ ) while the lowest mean value on the statement that “instructional materials provide practicability to the learning of sciences” ( $M = 3.11$ ,  $SD = 0.56$ ). Furthermore, an Average Mean of 3.41 was recorded. This implies that most of the respondents agreed that instructional materials have positive effect on the learning of sciences. An average standard deviation of 0.56 indicates that the responses are not too scattered away from the mean.

**Table 4: Students’ Perceptions on the Effect of Instructional Materials on effective Learning of Sciences**

S/N	Statement	Mean	SD
1	Instructional materials arouse interest to learn.	3.54	0.51
2	Instructional materials provide better understanding of science concepts	3.22	0.49
3	Instructional materials provide practicality to the learning of sciences.	3.11	0.56
4	Instructional materials promote attention in class and involve students in lessons.		
	Instructional materials help to easily recall concepts and principles learnt.	3.56	0.72
5	I am always motivated whenever the teacher uses materials to teach.	3.48	0.42
6	Instructional materials facilitate learning of science concepts and principles.	3.34	0.55
7	Instructional materials motivate students to learn.	3.76	0.56
8	Instructional materials help in easy recall of facts.	3.14	0.46
9	<b>Average Mean/Average Standard deviation</b>	3.51	0.76
		<b>3.41</b>	<b>0.56</b>

### Discussion of Results

The findings from study revealed that both science teachers and students of senior secondary school accepted that the most commonly available instructional materials are pictures (mostly diagrams and chats), computers and print materials. This finding is in harmony with the opinions of Okwo & Ike (2015) who emphasized that instructional materials can be classified into three (3) categories, namely, visual materials, audio materials and multi-sensory materials. The visual materials appeal to the sense of sight and include photographs, real objects and all print materials. From the study, computers, real objects and print materials are the instructional materials often used in the teaching and learning of Sciences at the SSS level. Computer falls under multi-sensory or audio -visual instructional materials. Print materials and real objects also fall under visual instructional materials.

Research question 2 sought to find out the perceived effects of instructional materials on the teaching of Sciences at the SSS level. On the whole, the Science teachers indicated that instructional materials are useful. In addition, the findings suggest that the instructional materials have a positive effect on teaching. This finding is consistent with that of Boswell (2019) which asserted that instructional materials help the teacher to classify, establish, correlate concepts and make learning more concrete and thereby removes the remoteness and abstraction which most of the time renders the subject matter uninteresting and difficult to understand.

Research question three was meant to find out the perceived effects of instructional materials on the learning of Sciences at the SSS level. Results of this study revealed that instructional materials have a positive effect on effective learning of Sciences.

### Conclusion

The study was designed to ascertain the perceived effect of instructional materials on effective teaching and learning of Sciences. The findings from the study showed that teachers use variety of instructional materials in the teaching of Science subjects. Computers, real objects and print materials were mostly used. Also, instructional materials had a positive effect on teaching and learning of Sciences.

### Recommendations

It is recommended that Heads of schools, Parent-Teacher Associations, Non-Governmental Organizations and Nigeria Educational stakeholders should provide relevant and adequate instructional materials to facilitate effective teaching and learning of Sciences. This will be helpful in enhancing the effective teaching and learning process.

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