Effects of Availability and Utilization of Instructional Materials on the Teaching of Physics in Senior Secondary Schools in Ekiti State, Nigeria

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ABSTRACT: This study examined the effects of availability and utilization of instructional materials in the teaching Physics in secondary schools in Ado local government area of Ekiti state. This study employed descriptive research design. All students offering physics as a subject in public schools in the study area formed the population of the study. Simple random sampling technique was used for the study. A total number of twenty (20)teachers were used as sample for the study. A research questionnaire was used for the study as an instrument. Three research questions and hypotheses were formulated for the study. The data were analyzed using simple percentage and mean. The findings of the study revealed that; There was significant difference in availability instructional material for teaching and learning of Physics in secondary schools, There was significant difference in the use of instructional materials for teaching and learning of Physics in secondary schools and There was significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools. It was recommended that; the school administrators should encourage government to provide instructional materials in the schools. The school administrators should also encourage individuals and NGO's who are interested in supporting the schools to donate instructional materials. The instructional materials should be used during classroom interactions as they enhance all Physics learner’s contact with the target education without going abroad to study. Finally, it is suggested that enough instructional materials in the teaching Physics should be provided in secondary schools.

Key Words: Availability, Utilization, Instructional materials, teaching of Physics

Introduction
Science is the bedrock on which modern day technological breakthrough is hinged. Different authors according to their own understanding have defined Science. Igwe (2012) defined science as a systematic study of the nature of the behavior of the material and physical universe through observation, experimentation, measurement and recording. In addition, Esu (2014) defined science as a systematic, precise, objective way to study the natural world. Science is often an exciting and satisfying enterprise that requires creativity. Fape (2010) defined science as rationally structured knowledge about nature, which embraces systematic methods of positive attitudes for its acquisition, teaching, learning and application.

According to dictionary definition, "Physics" is the study of matter, energy and the interaction between them. But what that really means is that Physics is about asking fundamental questions and trying to answer them by observing and experimenting. Physics can also be defined as the study of energy and matter in space and time and how they are related to each other. Physics studies how things move, and the force that makes them move. For example, velocity and acceleration are used by Physics to show how things move.

A statement adopted by IUPAP March (2009) Physics – is the study of matter, energy and their interactions- is an international enterprise, which plays a key role in the future progress of humankind. A statement adopted by IUPAP March (2009) Physics – is the study of matter, energy and their interactions- is an international enterprise, which plays a key role in the future progress of humankind.

Learning involves the acquisition of new knowledge, ideas, skills, values and experiences which enable the individual to modify and or alter his actions (NTI Manual, 2014). Learning is a gradual process and presenting any learning concept to learners must be done to appeal to students of varied interests and abilities, moving from the known to the unknown and encouraging active class participation. The teacher cannot be said to have achieved his instructional objectives until there is the desired change in the student’s behaviour. Effective teaching and learning require a teacher to teach the students with instructional materials and use practical activities to make learning more vivid, logical, realistic and pragmatic (Akinleye, 2010). The teacher is therefore expected to use all within his/her reach to make the learner learn by using

This definition is in tandem with Isola (2010) which states that instructional materials are objects or devices that assist teachers to present their lessons logically and sequentially to the learners, while Adu (2011) add that instructional materials are all things that are used to support, facilitate, influence or encourage acquisition of knowledge, competency and skills. In addition to these definitions one can add that instructional materials are those things that a teacher or the learner uses in the course of learning to make learning simple, easy to understand, retain and recall whenever it is necessary. As good and necessary as instructional materials are, Enaigbe (2013) observed that basic materials such as text books, chalkboard, and essential equipment like computer, projector, television and video are not readily available in schools.

Smiths (2012), opined that the idea of using materials and equipments to enhance effectiveness in the instructional process is as old as mankind, the wise teacher will always use equipment or aids in form of instructional materials to help the learners understand and learn better. The unavailability of instructional materials in our primary schools and the little or no use of the available ones has impacted on the performance of children at the primary level, (Marks, 2011). In the recent years, there has been discussions and debates on the falling standard of education. The blame has been shifted from one education variable to another. Teachers, parents and pupils share the blame, ministries of education are often to blame from the deteriorating condition in schools, (Samuel, 2011).

Instructional materials are doubtlessly useful tools hence when applied effectively by a teacher help to enrich his teaching and stimulate in his student the desire to learn, (Adegoke, 2010). Intelligent handling of these materials in classroom is necessary. For effective utilization of instructional materials teachers must understand how to use and control instructional materials. Millous (2010), explained that unless the classroom teacher uses these devices and directs the pupils attention to what they should look for, the pupils will not learn as much as intended form the devices.

Instructional materials can be divided into three major categories, namely, audio, visual, audio-visual and ICT (Information and Communication Technology). Audio instructional materials are those that appeal to the auditory senses such as radio, audio tapes, VCDs, DVDs and others, (Makinde, 2014). Visual instructional materials appeal to the sense of sight and they come in the form of pictures, prints, real objects (models) etc. Audio-visuals combine the auditory and visual senses to appeal to the learner and heighten interest such materials take the form of films, television, audio-visual tapes and CDs. Eze (2010) pointed out that ICT has delivered several packages that can aid teaching and learning to achieve desirable learning objectives. These packages are found in mobile devices like smart phones, personal computers, internet facilities and the likes.

Since most students consider physics as an abstract subject, the use of audio-visual resources should be a requirement for every physics teacher if the aim of the teacher is to guide the student to master concepts in the subject (physics). Quellette (2014) sums up tenaciously those words may easily be forgotten but mental pictures will long be remembered. It is therefore important to prepare illustrative materials and short demonstrations or other visual materials which are effective means of helping students to understand and thereby facilitating learning. Therefore, this study intends to examine effects of availability and utilization of instructional materials in the teaching Physics in secondary schools in Ado Ekiti local government area of Ekiti State, Nigeria.

Studies have also revealed that the performance of students in physics in most Nigerian secondary schools was generally and consistently poor over the years (Isola, 2011. Tamakloe, Atta, and Amedahe (2015) observed that it is not all those who teach students that are considered in the traditional sense as teachers. In their opinion, the teacher is the one who understands what his or her students need to learn and their capabilities of learning. Thus the teacher must be able to judge just how much intervention students will require in their learning activities.

The physics teacher is therefore supposed to be one who would facilitate the learning process of learners. He/she ought to be a professional who will make use of any available resources to enhance teaching and learning. Based on the foregoing, this study intends to investigate effects of availability and utilization of instructional materials in the teaching Physics in secondary schools in Ado local government area of Ekiti state.

Research Hypotheses

The following research hypotheses is formulated from the research questions and tested at 0.05 level of significance.

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1. There is no significant difference in availability instructional material for teaching and learning of Physics in secondary schools.

2. There is no significant difference in the use of instructional materials for teaching and learning of Physics in secondary schools.

3. There is no significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools.

**Research Method**

The survey design of the descriptive type of research is used for the study. The design involves critical consideration of each variable involved in the study without any manipulation. The research considers the type of design suitable for the study because it allows a wide coverage within a limited time.

The target population of the study consist of entire senior secondary school Physics teachers in Ado Ekiti Local government area of Ekiti State, Nigeria. It cut across both male and female teachers.

For the purpose of this study ten (10) secondary schools in Ado Ekiti local government area are selected. The sample sizes of twenty (20) teachers are used for this study. Two (2) teachers are selected from each school. Simple random sampling technique is used in selecting the teachers that constitute the sample.

A research instrument tagged Physics Instructional Materials Questionnaire (PIMQ) is used for the study as a structured questionnaire. PIMQ has two (2) sections, A and B. Section A will be used to elicit information on the bio data of the respondents which includes: Name of schools, gender and class taught. Section B will be used to elicit information on the research variables.

The face and content validity of the instrument will be done by the researcher's supervisor. The correction pointed out will be effected in the final drafts of the questionnaire.

The reliability of the instrument will be carried out using the test re-test method of reliability. The instrument is administered to the respondents after two weeks the second administration is done. The two set of data are analyzed using Pearson product moment correlation in order to determine the value (r) at 0.05 level of significance.

The administration of questionnaire will be done by the researcher. The researcher distributes the questionnaires to the respondents, reasonable time was given to the respondents to complete the questionnaires and the questionnaires will be collected immediately after it is completed.

All the questionnaires were collected from the respondents as soon as they finished with their responses. Their responses were scored and organized in tabular forms. The modified four Point Likert-types rating scale was adopted for the questionnaire, responses were of the types Strongly Agreed, Agreed, Disagreed and Strongly Disagreed. Simple percentages and means were used to analyse the data. In decision making, any calculated mean (x) that is above the mean rating (Xr) of 2.50 is “Accepted” while calculated mean (x) below the mean rating (Xr) of 2.50 is “Rejected”.

**Results and Discussion**

**Hypotheses One**

There is no significant difference in availability instructional material for teaching and learning of Physics in secondary schools.

To test this hypothesis, a list of instructional materials was presented to the respondents and they were requested to indicate the ones that were available in their schools. Using simple percentage, the findings were presented in Table 1.

<table>
<thead>
<tr>
<th>S/N</th>
<th>ICT Facilities</th>
<th>A</th>
<th>A%</th>
<th>NA</th>
<th>NA%</th>
<th>DECISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Map</td>
<td>18</td>
<td>90</td>
<td>2</td>
<td>10</td>
<td>Available</td>
</tr>
<tr>
<td>2</td>
<td>Diagrams, charts</td>
<td>20</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>Available</td>
</tr>
<tr>
<td>3</td>
<td>Photographs</td>
<td>15</td>
<td>75</td>
<td>5</td>
<td>25</td>
<td>Available</td>
</tr>
<tr>
<td>4</td>
<td>Posters</td>
<td>20</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>Available</td>
</tr>
<tr>
<td>5</td>
<td>Slide and projectors</td>
<td>9</td>
<td>45</td>
<td>11</td>
<td>55</td>
<td>Not Available</td>
</tr>
<tr>
<td>6</td>
<td>Text book &amp; work book</td>
<td>16</td>
<td>80</td>
<td>4</td>
<td>20</td>
<td>Available</td>
</tr>
</tbody>
</table>
From Table 1 above, the availability instructional material for teaching and learning of Physics in secondary schools are Map Diagrams, charts, Photographs, Test book & work book, Journal, Newspaper, Bulletins, Television Set & Video Tape Slide & Television Projectors Cassettes and Tape Recorder, Record player, Amplifier, Pendulum Bob, Stop Watch, Vernier Caliper and Micrometer. Only, Posters Slide and Projector models that is not available. Hence, there was significant difference in availability instructional material for teaching and learning of Physics in secondary schools.

**Hypotheses Two**

There is no significant difference in the use of instructional materials for teaching and learning of Physics in secondary schools.

To test this hypothesis, a list of statements on use of instructional materials for teaching and learning of Physics in secondary schools and they were requested to indicate their level of agreement or otherwise based on a four-point rating scale of “Strongly Agree” Agree” “Disagree”, and “Strongly Disagree” representing 4, 3, 2, and 1 respectively. A mean rating was used to determine their agreement. The result is shown on Table 2.

**Table 2: Responses on the use of instructional materials for teaching and learning of Physics in secondary schools.**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Benefits of ICT</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>X</th>
<th>DECISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Teachers always use modern instructional materials while teaching Physics.</td>
<td>4(17)</td>
<td>3(2)</td>
<td>2(1)</td>
<td>1(0)</td>
<td>3.80</td>
<td>Agreed</td>
</tr>
<tr>
<td>22</td>
<td>Teachers use of instructional materials assist the teacher in his task, helping him increase his effectiveness in the classroom</td>
<td>4(15)</td>
<td>3(4)</td>
<td>2(1)</td>
<td>1(0)</td>
<td>3.70</td>
<td>Agreed</td>
</tr>
<tr>
<td>23</td>
<td>Teachers in our school can only use locally made instructional materials in teaching Physics.</td>
<td>4(8)</td>
<td>3(10)</td>
<td>2(2)</td>
<td>1(0)</td>
<td>3.3</td>
<td>Agreed</td>
</tr>
<tr>
<td>24</td>
<td>Teachers use appropriate charts and diagrams for the immediate illustration of Physics lesson.</td>
<td>4(11)</td>
<td>3(8)</td>
<td>2(0)</td>
<td>1(1)</td>
<td>3.45</td>
<td>Agreed</td>
</tr>
<tr>
<td>25</td>
<td>The use of instructional materials by teacher helps communicate information effectively, promote the acquisition and longer retention of knowledge</td>
<td>4(5)</td>
<td>3(2)</td>
<td>2(3)</td>
<td>1(10)</td>
<td>2.60</td>
<td>Agreed</td>
</tr>
</tbody>
</table>

**Source:** Authors’ Field Survey, 2019. **Key:** A = Available, NA = Not Available (If X ≥ 2.5 ‘Agree’ otherwise ‘Disagree’).
of Physics in secondary schools. Data presented on Table 2 showed that the mean ratings of items 21-25 are 3.80, 3.70, 3.30, 3.45, and 2.60 respectively. Most of the mean ratings are above the cut-off point of 2.50. The respondents with of 3.80 agreed that teachers always use modern instructional materials while teaching Physics, with mean of 3.70 they agreed that teachers use of instructional materials assist the teacher in his task, helping him increase his effectiveness in the classroom.

The respondents agreed with mean of 3.30 that agrees that teachers in their school can only use locally made instructional materials in teaching Physics. Equally, they agreed with mean of 3.45 that teachers use appropriate charts and diagrams for the immediate illustration of Physics lesson. The respondents agreed with mean of 2.60 that the use of instructional materials by teacher helps communicate information effectively; promote the acquisition and longer retention of knowledge. The table revealed that the respondents agreed with all the items in the table with the mean of 3.80, 3.70, 3.30, 3.45 and 2.60 for item 21, 22, 23, 24 and 25 respectively.

Hypothesis Three

There is no significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools.

To test this hypothesis, a list of problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools were stated.

Table 3: Responses on the problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools

<table>
<thead>
<tr>
<th>S/N</th>
<th>Benefits of ICT</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>X</th>
<th>DECi</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Lack of trained personnel to handle instructional materials in Physics.</td>
<td>4(3)</td>
<td>12</td>
<td>3(11)</td>
<td>33</td>
<td>2(4)</td>
<td>8</td>
</tr>
<tr>
<td>27</td>
<td>Physics teachers’ incompetence in the use of instructional materials.</td>
<td>4(5)</td>
<td>20</td>
<td>3(11)</td>
<td>33</td>
<td>2(2)</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>Inadequate provision of instructional materials by school management.</td>
<td>4(3)</td>
<td>12</td>
<td>3(9)</td>
<td>27</td>
<td>2(7)</td>
<td>14</td>
</tr>
<tr>
<td>29</td>
<td>Poor maintenance of instructional materials by physics teachers and laboratory attendants.</td>
<td>4(3)</td>
<td>12</td>
<td>3(11)</td>
<td>33</td>
<td>2(4)</td>
<td>8</td>
</tr>
<tr>
<td>30</td>
<td>Lack of thorough supervision of proper use of available instructional materials in Physics.</td>
<td>4(15)</td>
<td>60</td>
<td>3(4)</td>
<td>12</td>
<td>2(1)</td>
<td>2</td>
</tr>
</tbody>
</table>

\(X \geq 2.50 \) ‘Agreed’ otherwise ‘Disagreed’

Data presented on Table 3, showed that the mean ratings of items 2.75, 2.95, 2.70, 2.75 and 3.7. All the mean ratings are above the cut-off point of 2.50. The result presented in Table 4 revealed that the grand mean of 2.97 greater than 2.50 decision level. The table showed in item 26, that the respondent agreed that lack of trained personnel to handle instructional materials in Physics is problem to the use instructional materials. Other problems, they agreed with are; in item 27 with mean value of 3.09 they agreed that Physics teachers’ incompetence in the use of instructional materials. With mean value of 3.01 in item 28, the respondents concurred that inadequate provision of instructional materials by school management is a challenge. In item 29, with mean 2.98, the respondents were in support that poor maintenance of instructional materials by physics teachers and laboratory attendants hindered the use of instructional materials.

In tem 30, the respondents disagreed that lack of thorough supervision of proper use of available instructional materials in Physics hinders the use of instructional materials. This is established by the respondents with their low mean response value of 2.40. Therefore, there was significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools.

Discussion of Findings

Hypothesis one revealed that there was significant difference in availability instructional material for teaching and learning of Physics in secondary schools. Table 2 reveals that the availability instructional material for teaching and learning of Physics are Map Diagrams, charts, Photographs, Test book & work book, Journal, Newspaper, Bulletins, Television Set & Video Tape Slide & Television Projectors Cassettes and...
Tape Recorder, Record player, Amplifier, Pendulum Bob, Stop Watch, Vernier Caliper and Micrometer. Instructional material and facilities ought to be provided in the schools because according to Osuagwu (2010), Instructional material is applied to education enhances the delivery and access to knowledge, and improves the curriculum. It produces richer learning outcomes compared to education without Instructional materials.

Hypothesis two revealed that there was significant difference in the use of instructional materials for teaching and learning of Physics in secondary schools. The instructional materials used in the teaching and learning of Physics in schools: Table 3 reveals that instructional materials are used in the teaching and learning of Physics. Even there is an urgent need for awareness on the use of instructional materials in teaching and learning Physics in schools because they make teaching and learning more effective. Akabogu (2013) maintained that in these instructional materials dominated era, science teachers must be ready to step into the status quo as well as advance the teaching profession by infusing technology as instructional materials into their teaching.

It therefore means that there is a significant difference in the level of use of instructional materials between professional and nonprofessional physics teachers. The findings of this study show that most of the instructional materials that could aid the teaching and learning of physics in schools were not sufficiently available. This finding is consistent with the earlier research findings of Buari (2011) and Ajayi (2010) who found out that the instructional materials availability in most schools are grossly inadequate. Further findings of this study also reveal that there is a significant difference in the use of available instructional materials by different cadres of physics teachers in senior secondary schools. Also, there is a significant difference in the use of instructional materials by professional and non-professional physics teachers.

This shows that the professional teachers make effective use of the instructional materials than the non-professional teachers. This finding buttresses the point by Anikweze (2008) that a professional educator does not only possess the knowledge alone but equally have the ability on how to impart the knowledge through effective use of the resources available at his disposal.

Hypothesis three indicated that there was significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools. The factors that impede the effective use of instructional materials in the teaching and learning of Physics in schools: Table 4 reveals that several factors impede the effective use of instructional materials in the teaching and learning of Physics in schools. The factors include: lack of trained personnel to handle instructional materials in Physics, Physics teachers’ incompetence in the use of instructional materials, inadequate provision of instructional materials by school management, poor maintenance of instructional materials by physics teachers and laboratory attendants. Okebukola (2012) declares that those who are designated to use instructional materials in Nigeria do not receive adequate training, and at worst, do not receive any training at all.

Summary

This study is concerned with the effects of availability and utilization of instructional materials in the teaching Physics in secondary schools in Ado Ekiti local government area of Ekiti State. Three (3) research hypotheses were used to obtained relevant information. The study specifically, identified the availability instructional material for teaching and learning of Physics in secondary schools, assess the use of instructional material for teaching and learning of Physics in secondary schools and pinpoint the problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools.

The study reviewed several literature of the following sub-heading: meaning of instructional materials, types / classification of instructional materials, the importance of instructional materials to the teacher, the importance of instructional materials to the students, uses of instructional materials, the availability of instructional materials, conceptualization of instructional materials and utilization, the extent of usage of these instructional materials and utilization of instructional materials.

A sample size of twenty (20) teachers was used for this study. A questionnaire was administered to the teachers. The data was analyzed using simple percentage and mean scores. From the analysis and discussion of findings, the research indicated that there was significant difference in the use of instructional materials for teaching and learning of Physics in secondary schools and there was significant difference in problems hindering the effective utilization of instructional materials for teaching and learning of Physics in secondary schools.
Conclusion

The study has shown that when appropriate instructional materials are integrated into the curriculum to complement the traditional method, higher learning outcomes in terms of achievement scores would probably result. The study has shown that the use of instructional materials enhances student achievement in Physics. Physics teachers should therefore be encouraged to adopt the use instructional materials in their teaching. It is also suggested that researchers and Physics teachers should explore the use of instructional materials to teach other physics areas not covered by this study in order to determine its effectiveness and possible adoption as a major instructional strategy. The delivery of quality instruction in the classroom in any education system depends largely on the quality and competence of the teachers.

This is because the teachers are expected to perform the important function of guiding, directing, evaluating, imparting, asking and answering questions among others for maximum benefits of the learners. The implication is that the teacher is the stronghold on which the business of educators rests upon the world over. The competent electronics teacher who is curious of effective instructional delivery sees instruction materials not as a gadget like textbooks, chalks, chalkboard but as every necessary resources and objects which the teacher develops and improvises for use in the process of instructional delivery to concretize his lesson for effective and more reliable understanding by the learner about skills and knowledge of electronics lesson.

Recommendations

Based on the findings of this study, the following recommendations were made:

i. The school administrators should encourage government to provide instructional materials in the schools.

ii. The school administrators should also encourage individuals and NGO's who are interested in supporting the schools to donate instructional materials.

iii. The instructional materials should be used during classroom interactions as they enhance all Physics learner’s contact with the target education without going abroad to study.

iv. The staff and students should be adequately trained at cheaper or no cost for proper utilization of instructional materials.

v. There should be constant supply of electricity to schools or generating plants as alternatives, for effective use of instructional materials in case of power failure.

vi. Secondary school administrators should allot enough funds for the instructional materials used in teaching electronics and other practical-oriented subjects.

vii. Administrators should prioritize the purchase of instructional materials for instructional purposes of the student and teaching staff members.

viii. Workshops and seminars should be organized from time to time for electronics teachers where they would be taught not only how to produce instructional material but also how to use them effectively for the achievement of educational goals.

ix. Teachers of electronics should be resourceful enough to procure instructional materials and that are lacking in the schools.

x. Teachers should check the instructional materials often to ensure that it is still working and in good running condition.

xi. Resources centers should be established at strategic locations within an educational area and be well equipped with instructional materials from where teachers could loan from.

References

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