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The Status of Material Resources for Effective Teaching of Physics in Secondary Schools in Akwa Ibom State of Nigeria

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Abstract
The study investigated the status of material resources for the teaching and learning of physics in Akwa Ibom State Secondary Schools. It adopted survey design. A sample size of 1400 SS3 Physics students took part in the investigation. Mean was used in answering the three research questions raised to guide the investigation. Findings revealed that some resource materials are available and adequate for the teaching and learning of physics. The study showed a low frequency of use of the available resource materials. Recommendation made was that adequate provision of resource materials should be made by state government to schools for meaningful teaching and learning of physics. Physics teachers should make use of material resources during lessons.

Introduction

It is a widely held view that the scientific development of any nation is enhanced by the quality of physics education in its schools. In this world of change, Nigeria and indeed Akwa Ibom State have become dominated by science and technology that there is hardly any economic activity which is not fuelled and produced by science and technology.

In Akwa Ibom State, there are well-articulated curricular provisions for the attainment of physic education at all levels of the state's education system (primary, secondary and tertiary). At the secondary level, which is the concern of this study, there is the state curriculum for secondary schools which is adoption of National Curriculum, FME (1998). The curriculum clearly spelt out the objectives, instructional media, as well as the methods/strategies for effective teaching and learning of physics. Much as the physics curriculum appears laudable, the fact still remains that the successful implementation of any educational programme is, to a large extent contingent on the availability of the appropriate resource materials. To ensure effective teaching and learning of physics, in our secondary schools therefore, appropriate and sufficient resource materials are required for the implementation of physics education curriculum. It is only by so doing that the recipients of physics instructions will be sufficiently groomed and equipped with the knowledge, skills, attitudes and competencies that are expected of them at that level of education. Resource materials are described as information carriers designed specially to fulfill objectives in teaching-learning situation. The indispensability of resource materials for teaching physics cannot be overemphasized. Empirical studies have established that students achieve greater learning as evidence in acquisition of cognitive and psychomotor skills when resource materials are used for instructional purpose (Ifeakor, 2000).

One can infer from the foregoing that an important aspect in the delivery of physics education is materials employed in transmitting knowledge. Furthermore, the National Policy on Education (FRN, 2004) specifies measures in achieving the objectives of physics education through the establishment of Teachers Resource Centres, Educational Resource Centres and Science and Mathematics Centres and Workshops.

Inspite of the above steps aimed at improving science instructions, a review of literature revealed that there is a fluctuating trend in students' performance in physics at secondary school level (Nworgu, 1997; Ayodele, 2002).

Okafor (2000) explained that the poor capital investment in terms of provision of science resources contribute to students' low level of academic performance. This remark from literature review has raised a concern for this study to investigate on the status of resource materials used by physics teachers in the delivery of their lessons in Akwa Ibom State secondary schools.

Research Questions
The following research questions were raised to guide the investigation.

1) To what extend are the resource materials available for the teaching and learning of physics in Akwa Ibom State Secondary Schools?
2) Are the available resource materials adequate for the teaching and learning of physics?
3) How often are the available resource materials used in the teaching and learning of physics in the secondary schools in Akwa Ibom State?

Purpose of the Study
The purpose of this study is to find out empirically the extent of availability, adequacy and frequency of use of resource materials for the teaching and learning of physics in Akwa Ibom State Secondary Schools.

Significance of the Study
The study will provide the empirical data on availability, adequacy and frequency of use of resource materials for the teaching and learning of physics to Akwa Ibom State Government for proper implementation of physics curriculum.

Methodology
The design for the study was descriptive method of survey. Akwa Ibom State of Nigeria was the study area. Akwa Ibom State shares boundaries with Cross River State in the north, Abia State in West, River State in the South and Cameroon in the east.

The population of the study was all senior secondary three (SS3) physics students of 2010/2011 academic session of one hundred and twenty (81 public and 19 private schools) secondary schools. This class was chosen for the study since the students are in their final year of the study and had, had a fair knowledge and exposure on physics practical. The students therefore were in a better position to assess the availability, adequacy and frequency of use of resource materials for the teaching and learning of physics than any other class in school. This set of students chosen gave a population size of two thousand four hundred and thirty one physics students.

Stratified random sampling technique based on the three senatorial districts of the state was used to select seventy schools. Thirty out of the seventy schools were selected from Uyo Senatorial District and twenty five schools

each from Eket and Ikot Ekpene Senatorial districts of the state. Simple random technique was used in selecting twenty SS3 physics students from each of the sampled schools. This gave a sample size of 1400 SS3 physics students.

A researcher-made instrument, Available, Adequate and Frequently used Physics Resource Materials Questionnaire (AAFPRMQ) was used in generating the data for the study. It was a sixty-item questionnaire that measured availability, adequacy and frequent use of resource materials for the teaching and learning of physics in secondary schools. It was divided into three sections. Sections one, two and three give information on availability, adequacy and frequency of use of the resource materials respectively.

A four point Likert scale of highly available, available, moderately available and sparingly available was used in assessing the degree of availability and adequacy while always used, often used, seldom used and never used Likert scale was used in assessing the frequency of use of resources materials. Always used, often used, seldom used and never used were respectively scored 4, 3, 2 and 1. Similarly, highly available, available, moderately available, and sparingly available were scored 4, 3, 2 and 1 respectively. An item in the questionnaire that scored a mean of 2.5 and above was regarded as being available, adequate or frequently used for the teaching and learning of physics.

The instrument was given face-validation by six senior secondary three (SS3) physic teachers. It was then administered to a pilot sample of fifty senior secondary three physics students who were not part of the study sample. The instrument was scored as previously discussed and the reliability co-efficient determined using Cronbach Alpha was 0.76.

Nine research assistants were recruited and trained on how to fill the questionnaire. Three of research assistants were sent to each senatorial district of the state to administer and collect back the questionnaire from the respondents. It was ensured that all the questionnaire administered were returned.

Results

Research Question 1: *To what extent are the resource materials available for the teaching and learning of physics in Akwa Ibom State Secondary Schools?*

The analysis of result from column 1 of table 1on mean response of students on availability, adequacy and frequency of use of resource materials for the teaching and learning of physics shows the availability of 31 out of the 60 items on the table. The items considered available for the teaching and learning of physics in Akwa Ibom State Secondary Schools were physics laboratory, dry cells, wet cell, standard resistors, voltmeters, ammeters, light bulbs, galvanometer, connecting wines, resistance wires, potentiometers, jockeys, keys / switches, masses, drawing board, tracing pins, beam balance, spring balance, G-clamps, pendulum bobs, mirrors, calorimeters, thermometers, iron weight, corks, rectangular glass blocks, meter rules, spiral springs, measuring cylinders, thread and capacitors. This forms 51.3% of average resource materials any physics laboratory should have for meaningful teaching and learning of subject.

Research Question 2: *Are the available resource materials adequate for the teaching and learning of physics?*

From the results analyzed in column 2 of the table on mean response of students on availability, adequacy and frequency of use of resource materials for the teaching and learning of physics, it is revealed that 15 out of the 31 available resource materials are adequate for the teaching and learning of physics in Akwa Ibom State Secondary Schools. These include physics laboratory, wet cells, light bulbs, galvanometers, connecting wires, jockeys, keys/switches, tracing pins, G-clamps, calorimeters, mirrors, thermometers, iron weight, meter ruler and spiral spring. This means 48.3% of the available resource materials are adequate.

Research Question 3: *How often are the available resource materials used in the teaching and learning of physics in the Secondary Schools in Akwa Ibom State?*

The results from column 3 of the table on mean response of students on availability, adequacy and frequency of use of resource materials for the teaching and learning of physics show that only five out of the thirty one available resource materials are frequently used in the teaching and learning of physics in Akwa Ibom State Secondary Schools. The resource materials frequently used are Galvanometers, masses, G-clamps, calorimeters and capacitors. This means 16.1% of the available resource materials are often used in physics lessons by the teachers. The inference here is that physics teachers do not averagely use the resource materials available.

Discussion

From the analyses of results shown in the table, it was discovered that some resource materials are available and adequate while some are not. The problem lies on their usage. For example, column 3 of the table showed a mean of 2.20 for the use of physics laboratory. This is quite below the mean of 2.50. The inference here is that if physics laboratory is not averagely used for physics instruction, the recipients are not groomed to acquire the knowledge, skills and attitudes that are expected of them at that level of education. This observation is in agreement with the findings of Ifeakor, (2005c) who observed that some science laboratories are opened only on the WAEC or NECO examination days.

Conclusion

The conclusion of this study is that most of the secondary schools in Akwa Ibom State have no resource materials for the teaching and learning of physics. Furthermore, where they are available, they might not be adequate. Also the usage of these resource materials is low.

Recommendations

Based on the findings of this study, it is recommended that adequate resource materials should be provided to secondary schools by State Government for meaningful teaching and learning of physics. Physics teachers should integrate practicals into theory and make use of physics laboratory during teaching.

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Table 1: Mean responses of students on availability, adequacy and frequency of use of resource materials for the teaching and learning of Physics.

S/N	Resource materials	Column 1 (Availability) $\overline{X}$	Column 2 (Adequacy) $\overline{X}$	Column 3 (Frequency of Use) $\overline{X}$
1	Physics Laboratory	3.80	3.62	2.20
2	Dry cells	2.80	2.10	1.37
3	Wet cells	3.20	2.80	2.10
4	Rheostats	2.10	2.20	1.80
5	Standard resistors	2.80	1.84	1.62
6	Voltmeters	2.60	1.64	1.22
7	Ammeters	3.12	2.10	2.02
8	Light Bulbs	2.80	2.50	1.84
9	Galvanometers	2.56	2.74	2.51
10	Connecting wires	3.60	2.86	1.96
11	Electrodes	1.80	1.12	1.02
12	Magnets	2.10	2.00	1.22
13	Resistance wires	2.50	1.84	1.42
14	Potentiometers	2.60	1.84	2.10
15	Meter bridge	2.16	2.00	1.84
16	Resistance boxes	2.12	1.84	2.10
17	Jockeys	3.20	2.58	1.84
18	Keys/switches	3.40	2.64	1.82
19	Vernier calipers	2.16	1.62	1.64
20	Beam balance	2.12	1.46	1.62
21	Pulleys	1.82	1.42	1.24
22	Masses	2.80	1.84	2.50

23	Drawing boards	2.86	1.74	1.96
24	Tracing pins	3.60	2.60	1.84
25	Beam balance	3.12	1.84	1.26
26	Spring balance	2.71	1.96	1.42
27	Stop watches	2.10	1.64	1.54
28	Stop clocks	1.97	1.20	1.26
29	G-clamps	2.58	2.52	2.50
30	Pendulum bobs	3.20	2.14	1.62
31	Lenses	1.28	1.22	1.12
32	Mirrors	2.74	2.52	1.25
33	Calorimeters	2.86	2.62	2.52
34	Thermometers	3.06	2.72	1.82
35	Triangular prisnes	1.84	1.64	1.22
36	Tuning forks	2.36	1.86	1.62
37	Sonometers	1.28	1.10	1.22
38	Lens holders	1.54	1.16	1.02
39	Iron weight	2.84	2.50	1.82
40	Resonance tubes	1.22	1.02	1.22
41	Rubber tubes	2.10	1.84	1.62
42	Corks	3.12	2.24	1.82
43	Electric heaters	1.26	1.08	1.12
44	Lagging materials	1.36	1.22	1.22
45	Milliammeter	1.74	1.64	1.02
46	White screen	1.96	1.62	1.26
47	Rectangular Gloss blocks	2.56	1.52	1.32
48	Meter rules	3.54	2.58	2.52
49	Spiral springs	2.84	2.52	1.82
50	Knife edges	2.10	1.82	1.26
51	Measuring cylinders	3.56	1.92	1.24
52	Ticker-timer	1.58	1.26	1.02
53	Bunson burners	1.54	1.24	1.22
54	Tripod stand	1.68	1.26	1.08
55	Beakers	2.16	1.84	1.24
56	Slide projector	2.10	1.88	1.62
57	Micro-meter screw gauge	1.86	1.24	1.42
58	Threats	3.25	2.82	2.02
59	Capacitors	2.82	1.48	2.52
60	Head accumulators	1.64	1.54	1.26