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Difficulties Students Encounter in Reporting Physics Practical at the Senior Secondary School level in Rivers State, Nigeria.

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ABSTRACT- ***The poor performance of senior secondary school physics students in external examinations has been a major problem in the teaching and learning of physics. This study therefore seeks to investigate the difficulties encounter by senior secondary physics students in reporting of physics practical in Rivers State. Using a survey research design and simple random sampling technique, 124 physics teachers and 8 secondary schools were utilized for the study. Data collecting instrument includes Physics Practical Apparatus Checklist (PPAC) and Physics Teachers Questionnaire on Reporting Practical (PTQRP) which adopted the four point Likert scale. Simple mean was used for data analysis with a criterion mark of 2.50. Results of the study revealed that: there is insufficient physics apparatus in the schools, students lack understanding of instructions during physics practical activities, Students are not able to tabulate obtained value appropriately, Scale choosing is a major problem encountered by students while interpreting data graphically etc. The study therefore suggested that the physics laboratories in the secondary schools school be equipped because it is an essential aspect of practical physics and reporting physics practical should be included in the physics curriculum so that students can possess the knowledge in carrying out such activities, amongst others.***

Key words: physics practical, curriculum, reporting, difficulties.

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1. INTRODUCTION

The term curriculum has various interpretations formulated by scholars in the field of curriculum development. These interpretations might differ from one another in accordance with core emphasis and views from the experts concerned. Tanner and Tanner (1980) defines curriculum as the planned and guided learning experiences and intended outcomes, formulated through the systematic reconstruction of knowledge and experiences under the auspices of the school, for the learner's continuous and willful growth in personal social competence.

Gbamanja (2000) also describe curriculum as the totality of experience given to the learner by the school. The definitions highlight the school as the centre for curriculum evaluation and implementation. The curriculum as the core of education is structured to achieve national educational goals with the stage of development of the learners and conformance with society. The physics curriculum utilized in Nigerian secondary schools before and after the independence in 1960 was traditionally oriented, the content was insufficient of learning experience and the teaching of physics was teacher-centered (Okonkwo, 2006; Ogunleye, 1999). By implication, there was little or no avenue for experimentation, evaluation was based on recall of facts leading to rote memorization therefore reducing student's enthusiasm and enrollment in physics.

In 1985, the Federal Government of Nigeria (FME, 1981) introduced the 6-3-3-4 education programme in Nigeria. As a result, there were critical adjustments made in the secondary school physics curriculum. The general objectives of the physics curriculum as stated in the curriculum document (FME, 2009) are to:

(i) Provide basic literacy in physics for functional living in the society
(ii) Acquire basic concepts and principles of physics as a preparation for further studies
(iii) Acquire essential scientific skills and attitude as a preparation for the technological application of physics
(iv) Stimulate and enhance creativity.

The general sense for the secondary school physics programme encompass three main objectives; acquisition of relevant knowledge with understanding, ability to handle and process information and problem solving through acquired knowledge, experimental skills and scientific investigation. Contrary to the intentions of the general objectives of physics, far many students that sat for the external examination are still below the total pass at credit level in physics. It is evident that developed countries like United States of America, Japan, Russia, China, etc have enjoyed rapid transformation in both their economic, political and technological ventures. This is as a result of refurbishing of their physics curriculum to meet the needs and aspiration of the learner and society, thereby ensuring shift in content delivery from theoretical consumption of science content to practical application of physics principles. The main purpose of practical work in physics is to provide students with conceptual and theoretical knowledge so as to help them understand physics principles.

Reid and Shahi (2004) highlighted the general importance of practical work as follows: supporting or strengthening theoretical knowledge, expressing the pleasure of discovery and development of psychomotor skills, improve higher order thinking skills, developing manual dexterity by using equipment, allowing student to apply skills instead of memorizing. Effective practical work enable students to build a bridge between what they can see and handle (hands-on) and scientific ideas that account for their observations (brains-on). Then it is imperative that students handle practical apparatus, develop skills of practical activities and most importantly report such activities. Reporting practical work in physics is an important aspect that should be consider in the teaching of physics. This implies that a good practical activity that has been carried out without reporting it comprehensively is as good as not indulging in the practical activity.

2. OBJECTIVE OF THE STUDY

This study is to investigate students' difficulty in reporting physics practical in Nigeria secondary schools. Pursuance to this goal, the objectives of the study are

i. find out if there are sufficient physics laboratory apparatus in the schools.
ii. determine if students are able to collect data during physics practical.
iii. determine if students can tabulate data during physics practical.
iv. determine students can interpret data graphically.
v. determine if students can deduce information from graph to draw conclusions.

3. RESEARCH QUESTIONS

The following research questions where stated to guide the researcher in carrying out the study.

1. Are there available physics practical apparatus in the secondary schools?
2. What is the difficulties students encounter in collecting data during physics practical?
3. What is the difficulties students encounter in tabulating data?
4. What is the difficulties students encounter in interpreting data graphically?
5. What is the difficulties students encounter in deducing information from the graph to draw conclusion?

4. METHODOLOGY

The research methodology used for this study is survey research design. The research design was employed to obtain both qualitative and quantitative data for the study. The population comprises of all physics teachers in Port Harcourt Local Government Area of Rivers state. A simple random sampling technique was employed for the study. The secondary schools were grouped into two zones (Port Harcourt south zone and Port Harcourt north zone). Four (4) schools were randomly chosen from each of the zones, making a total of eight (8) schools used for the study. While one hundred and twenty-four (124) physics teachers were randomly selected for the study.

5. INSTRUMENT FOR DATA COLLECTION

Two set of questionnaires were employed for the study which includes: Physics Practical Apparatus Checklist (PPAC) and Physics Teacher Questionnaire on Reporting Practical (PTQRP). The PPAC consists of physics apparatus expected to be in the secondary school physics laboratory. The PPAC was designed to obtain data for the availability of physics apparatus in the schools used for the study. The PTQRP is a questionnaire consisting of two sections. Section A includes personal data of the teachers which includes sex, teacher's qualification and year of teaching experience. While section B primarily focused on difficulties students encounter while reporting physics practical. A total of twenty (20) items statement where presented to elicit information from the respondent. The instrument was personally administered by the researcher to obtain 100% retrieval.

The questionnaire was subjected to a pilot study using test-retest method. The purpose of the pilot study was to ensure that the item statements of the questionnaire were comprehensive and consistent in measuring what is suppose to measure. The pilot study was conducted in Ikwerre Local Government Area to fifteen (15) teachers that were not part of the study. The Pearson Product Moment Correlation Co-efficient (deviation from mean) method was used to calculate the reliability of the instrument. The reliability of the instrument was 0.94.

6. METHOD OF DATA ANALYSIS

This section is concerned with how data was analyzed according to the research question set for the study. Research question one (1) was analyzed using the checklist to obtain data for the availability of physics practical apparatus in the sample schools. The four Likert scale was utilize to analyzed data for research two to five (2-5). A criterion mark of 2.50 was employed for decision making for the Likert scale. Therefore, a calculated mean greater than or equal to 2.50 ($\bar{X}$cal. ≥ 2.50) is accepted; while a calculated mean less than 2.50 ($\bar{X}$ ≥ 2.50) is rejected.

7. RESULT AND FINDINGS

Research question 1: Are there available physics practical apparatus in the secondary schools?

Table 1: Showing physics practical apparatus in the laboratories

Apparatus	Minimum quantity required	Quantity available in school							
		A	B	C	D	E	F	G	H
Laboratory thermometer	35	3	-	2	-	1	1	-	-
Vernier calipers	35	3	6	2	-	4	-	1	-
Micrometer screw gauge	35	1	2	-	-	-	1	-	1
Calorimeter	35	1	-	-	1	-	-	1	-
Incline plane	35	-	-	-	-	1	-	-	-
Masses	35	16	8	5	12	6	4	3	7
Glass block (rectangular)	35	12	10	12	10	8	5	4	6
Triangular prism	35	6	7	3	4	6	2	2	6
Semi circular glass block	35	-	-	-	-	-	-	-	-
Lever balance	35	-	-	-	-	-	-	-	-
Chemical/beam balance	35	-	1	-	-	-	-	-	-
Ray box	35	-	-	1	2	1	1	-	-
Resistance box	35	-	3	-	2	4	2	3	-
Rheostat	35	-	-	-	2	-	1	-	-
Ammeter	35	4	7	7	3	4	4	3	2
Potentiometer	35	5	2	3	3	7	1	1	2
Meter bridge	35	-	-	-	-	-	-	-	-
Galvanometer	35	4	6	3	1	3	7	2	4

The alphabet A-H were used for identification of the schools.

Table 1 show the list of some physics practical apparatus used in the secondary schools. The minimum requirement for each school is thirty-five (35). However, a critical look at the table revealed that the schools do not have available physics practical apparatus. The absence of this apparatus can hinder practical activities and by extension propel failure rate in physics.

Research question 2: What are the difficulties students encountered in collecting data during physics practical?

Table 2: Responses of the teachers on practical data collection

S/N	Item statement	Mean	Decision
1.	Students lack understanding of instruction during physics practical	3.42	Accepted
2.	Students are able to set up practical apparatus as instructed	2.12	Rejected
3.	Students can identify laboratory apparatus	3.13	Accepted
4.	Students collect accurate values from an ongoing practical work	2.13	Rejected
5.	Students find it difficult to relate the theory section to the practical	3.17	Accepted

The findings in table 2 reveal that item statement 13 and 5 with mean ($\bar{X}$) 2.12 and 2.13 were rejected. The implication is that students lack understanding of practical instruction, they are not able to set up practical apparatus collect accurate values from an ongoing practical work and find it difficult to relate the theory section to the practical activities. However, the respondent indicated that the students could identify physics laboratory apparatus.

Research Question 3: What are the difficulties students encountered in tabulating data?

Table 3: Responses of teacher on tabulating of Data

S/N	Item statement	Mean	Decision
1.	Students are able to tabulate obtained value appropriate	2.08	Rejected
2.	Students find it difficult to include units on their table of values	3.21	Accepted
3.	Students find it difficult to record readings to the appropriate number of decimals on the table	2.50	Accepted
4.	Students find it difficult to write out the symbol of physics parameters	2.79	Accepted

The result of the analysis of difficulties students encounter in tabulating data is shown in table 4 above. It was revealed that item statement 2,3 and 4 with mean $(\bar{X})$ of 3.29, 2.50 and 2.79 were accepted while item statement 1 with mean $(\bar{X})$ 2.08 was rejected. This shows that students are not able to tabulate obtained value appropriately, units are not properly included on the table of values, record readings to approximate number of decimals and find it difficult to write symbols used for physics parameters.

Research Question 4: What are the difficulties students encountered in interpreting data graphically?

Table 4: Responses of teachers on graphical interpretation of data.

S/N	Item statement	Mean	Decision
1.	Students find the interpretations o graph sheet difficult	2.75	Accepted
2.	Students can write the appropriate units in the axes	1.71	Rejected
3.	Scale choosing is a major problem encountered by students while interpreting data graphically	3.04	Accepted
4.	Plotting of points is a major problem that students find difficult	2.04	Rejected
5.	Students do not find it difficult to draw the best line of fit	2.30	Rejected

The result in table 4 revealed the responses of the teachers on graphical interpretation of obtained data when reporting physics practical. Item statement 2, 4 and 5 were rejected having a mean of 1.21, 2.04 and 2.30.The results shows that students finds the interpretation of graph sheet difficult, student don't write appropriate write on the axes, scales choosing a major problem encountered by the students and plotting of line of best fit were identified as the challenges students face in graphical interpretation of data. However, the respondent also indicated that plotting of point was easily done by students.

Research Question 5: What are the difficulties students encountered in deducing information from the graph to draw inferences or conclusion?

Table 5: Response of teachers on difficulties students encounters in deducing information from graph.

S/N	Item statement	Mean	Division
1.	Students finds it difficult to determine the gradient from the graph	3.17	Accepted
2.	Determination of intercept is a problem encountered in deducing information from graph	2.67	Accepted
3.	Mathematical operations makes it difficult for students to deduce information	2.96	Accepted
4.	Students can deduce the equation of the graph	1.96	Rejected
5.	Students are able to state precautions taken during practical	2.86	Accepted

6.	Reporting of physics practical is a topic in the physics curriculum used in secondary schools	1.25	Rejected

The finding in table 5 shows the responses of teachers on problems encountered by students when deducing information from the graph to draw inferences. Item statement 1,2,3 and 5 were accepted with mean $(\bar{X})$ 3.17, 2.67, 2.96 and 2.86 respectively; while item statement 4 and 6 were rejected with mean $(\bar{X})$ 1.96 and 1.25. The findings indicate that student find determination of graph, intercept, utilization of mathematical operations, and deduction of equations from graph difficult. The respondents indicated that students can state precautions during practical activities. Conclusively, the respondent expressed that reporting of physics practical is not included in the physics curriculum and as such, not taught as a topic in physics.

8. RECOMMENDATION

The importance of reporting of physics practical is the focal point and means of scientific communication and as such emphasis should be placed on this issue. However, the study identified major constraints in the aspect of physics practical that as emerged as a result of inappropriate reporting of practical activities. In light of this, the research makes the following recommendations; provision and equipping of physics laboratories in the secondary schools is an essential aspect of practical physics, practical activities should be done alongside the theoretical class as both would enhance students performance in physics and reporting physics practical should be included in the physics curriculum as a topic so that students can possess the knowledge in carrying out such activities independently when the need arises.

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