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Problems of students in conducting effective physics practical in senior secondary schools in Kebbi State, Nigeria

S Mamuda[1], A Abubakar[2]
[1] Department of Science Education, Kebbi State University of Science and Technology Aliero, Kaura, Nigeria
[2] Kebbi State College of Nursing Sciences, Birnin Kebbi, Nigeria

Abstract
This study is an in-depth research on the problems that are facing students in the conduct of physics practical. The research adopted a descriptive survey research design, the population of the study constitutes of about (150) students, and (20) teachers were randomly selected as the sample. During the Research, a lot of problems have been discovered, which were: problem in identifying physics apparatuses, setting the apparatuses, making observations, taking readings, plotting of graph, lack of standard physics laboratory, inadequate laboratory apparatuses, lack of supervision, and lack of appropriate time allocation to physics practical among others. The recommendations made after this study include provision of a standard physics laboratory, and provision of adequate laboratory equipment's among others.

Keywords: physics, student's problem, practical, laboratories, observations

Introduction

Physics occupies the highest position among the empirical sciences. Nelkon (1999) [11], defined Physics as a basic natural science which deals with the behavior of matter. Some of its branches are: electricity, optics, heat, sound, properties of matter and atomic physics. Writing on "The Nature of Physics" Young and Freedman (2009) [13], stated that Physics is an experimental science which studies phenomena of nature and try to find patterns and principles that relate these phenomena. From the foregoing, it is obvious that physics cannot be effectively thought without proper exposure of students to practical. Physics is multidimensional and its applications in various areas of science and technology are numerous. The varied areas of application of science and technology has made the Federal Government of Nigeria to put a lot of premium on youths

Acquiring scientific literacy and the ability to adapt to a scientific and technological culture through science education (Ivowi, 1990) [7].

These subjects are so important that the Federal government National Policy on Education (2004) in specific terms states that "the secondary school Education shall provide trained manpower in the applied sciences and technology' 'Students performs poorly in physics, lack of practical work may be an important reason for students for poor content knowledge and understanding of physics at secondary school level in Nigeria (Millar, 2004).

There is a serious shortage of students and teachers of physics in Nigerian secondary schools, this is generating concern among science educators, and researchers are increasingly exploring why students avoid the subject, over the years student of physics in secondary school have found it extremely difficult to perform well in the subject (Nelkon & Ogbon, 1988).

According to Eze C. U, (2009) [5], the main purpose of laboratory work in science education is to provide students with the conceptual and theoretical knowledge to assist them learn specific concepts and scientific methods to understand the nature of science. Nelkon and Ogbon, (1980), stated that practical work is regarded as any learning experience which involves student participation in activities such as observing, counting, measuring, experimenting, recording and carrying out fieldwork. Therefore, in this study physics practical work is referred to by the researcher as the process of learning through which students are engaged in the learning process with the use of apparatus for the purpose of observation, measurement and understanding of what was theoretically taught in class. The professional knowledge, skills, and dispositions of physics teachers should be grounded in what the physics students will need to know and be able to do in order to contribute meaningfully to life in a democratic society. Ideally, the teacher would have learned basic content knowledge through methods of inquiry thereby acquiring practical knowledge. The teacher should have had an opportunity to experience the processes of scientific investigation: observing, asking questions, defining a problem; hypothesizing from an evidence base; making predictions; creating an experiment; identifying and controlling variables; collecting, graphically representing, and interpreting experimental data; conducting error analyses; drawing inferences and conclusions from data; and communicating results.

Today we are living in the age of science and technology. Scientific inventions and discoveries have revolutionalised our lives. Science is nothing but knowledge so obtained by observations, readings, experimentation and realization.

1. Statement of Problem

Senior School Certificate Examination (SSCE) and National Examination Commission (NECO) syllabuses clearly specified the practical and theoretical content of physics. In the practical aspect of the subject, students are expected to carry out experiments in the following broad areas: Electricity, optics, heat, mechanics and sound. The researcher made personal visit to some schools in the area under research and found out that in the schools no period was allocated for physics practicals. This clearly casts doubt on how well students are exposed to physics practical. Supporting this view WASSCE Chief Examiners report (2009) indicates that candidates show weaknesses in recording measured variables and evaluations to the required number of decimal places/significant figure, plot points correctly on graph to the required degree of accuracy, state precautions in precise language among others.

Okoye (2009), stated that a boy who had a credit pass in physics in West African Senior School Certificate Examination (WASSCE) was reported not to know how to fix an electric bulb to a socket. He further stated that it was because he had not acquired the necessary practical skills.

2. Purpose of Research

The purpose of this study is to make a critical appraisal of the problems hindering the conduct of physics practical and advance suggestion that will enhance the effectiveness, and efficiency of the conduct of physics practical in senior secondary schools within Kebbi State.

3. Research Questions

In line with stated objectives, the following research questions were generated to guide the study.

1. What are the problems/challenges facing students in conducting physics practical?
2. What are the solutions to the problems facing students in the conduct of physics practical in senior secondary schools?
3. Does an insufficient practical material or equipment's hinder effective conduct of physics practical in senior secondary schools?
4. Are the periods allocated to physics practical in senior secondary schools appropriate and sufficient?

4. Research Design

The design used in this research was a descriptive survey research design where by data were collected, analyzed, and interpreted based on the prevailing circumstances.

5. Sample and Sampling Technique

The sampling procedure was based on simple random sampling of different teachers and students among the ten (10) selected secondary schools in Kebbi State.

Fifteen (15) physics students and two (2) physics teachers were selected from different science classes of each school. This means that a total of (150) students and ten (20) teachers were selected to represent the entire physics students and teachers in the Kebbi State.

The schools and the number of students and teachers selected per each school are shown in the table below:

Table 1

S/N	Name of School	N. of teacher selected/ sch.	N. of students selected/sch.
1.	Nagari College B/Kebbi	2	10
2.	Govt. Girls Unity College B/K	2	10
3.	Army Day Sec. Sch. B/Kebbi	2	10
4.	Govt. Sci. College, Aliero	2	10
5.	Govt.Sci. & Tech. College Bunza	2	10
6.	Kanta Unity College, Argungu	2	10
7.	Govt. Day Sec. Sch. Jega	2	10
8.	Emi HarunaRasheed Sec.Sch.B/k	2	10
9.	Govt. Science College, Koko	2	10
10.	Govt. Science College Yauri	2	10

Source: Field Survey, (2020)

Instrumentation

The instrument used for the data collection in this research study was a two set of structured questionnaire for senior secondary school teachers and students.

The questionnaire consists of (25) questions, ten (10) questions for students and fifteen (15) questions for teachers. The students questionnaire ask questions on students problems in conducting physics practical which

include their observed areas of difficulty in conducting and presentation of physics practical experiment i.e. identifying physics apparatus setting apparatus, making observation, taking readings, preparing table of values, and plotting graph among others.
The teacher's questionnaire ask question based on the adequacy of laboratory equipment, laboratory condition, time allocated to physics practical class, and their suggestion on the possible solution to the problems in their schools.

Procedure for Data Collection
Compilation of data was done through the administration of questionnaires to the selected senior secondary schools. In order to make the study quicker, and easier, the researchers visited the area of the study and administered the questionnaires by themselves.

Procedure for Data Analysis
The statistical techniques used in analyzing and quantifying the data are: Frequency distribution and Percentages. These techniques were employed for easy computation of results collected from the respondents.

Data Presentation and Results Analysis
Presentation and analysis of data was presented in two parts. Part A: the simple frequency table and simple percentages for the responses to the questionnaire of students; Part B: the simple frequency tables and simple percentages for the responses to the questionnaire of teachers.

Part A (Student's Questionnaire Analysis)

Table 2: Practical Text Book and Practical Manual:

Response	Frequency	Percentages (%)
Yes	29	19.3%
No	121	80.7%
Total	150	100%

Source: Field Survey, (2020)

Table 2 reveals that 19.3% responded yes while 80.7% responded no. This shows that there is lack of sufficient practical text books and practical manuals to guide the students. This may be due to inadequate materials.

Table 3: Identifying Physics Apparatuses

Response	Frequency	Percentages (%)
Yes	48	32%
No	102	68%
Total	150	100%

Source: Field Survey, (2020)

Table 3 reveals that 68% responded No while 32% responded yes. This shows that there is problem in identifying physics apparatuses. Which may be due to lack of pre-requisite knowledge and vision impairment.

Table 4: Problem in Setting the Apparatuses

Response	Frequency	Percentages (%)
Yes	123	82%
No	27	18%
Total	150	100%

Source: Field Survey, (2020)

The table above indicates that 82% responded yes while 18% responded no. This shows that the students have problems in making observations during experiment which may be due to lack of proper supervision, vision impairment, and inadequate lightning in the laboratory.

Table 5: Problem in Calculation Related to Practical

Response	Frequency	Percentages
Calculations of Gradient/ slope	35	23.3%
Questions and Calculations related to practical	90	60.0%
Relating physics Equation to graph for calculation	25	16.7%
Total	150	100%

Source: Field Survey, (2020)

Table 5 indicates that relating physics equation to graph for calculation is another problem, which has 60.0%, calculation of slope has 23.3%, and question and calculations related to practical has 16.7%. This may be due to lack of adequate knowledge in mathematics, inadequate supervision and lack of interest among the students.

Table 6: Problem in Writing Conclusion and Practical Reports

Response	Frequency	Percentages (%)
Yes	129	86%
No	21	14%
Total	150	100%

Source: Field Survey, (2020)

From the table above the result shows that 86% of the students are having problem in writing conclusion and a good practical report based on the experiment they have carried out in physics practical. This may be due language problem.

Part B (Teacher's Questionnaire Analysis)

Table 7: Teacher's Qualification

Response	Frequency	Percentages
N.C.E	**8**	**40%**
Diploma	**3**	**15%**
BSc. Ed	**5**	**25%**
BSc.	**4**	**20%**
Total	**20**	**100%**

Source: Field Survey, (2020)

Table 7 indicates that 40% are NCE holders, 15% are Diploma holders, 25% are B.S.Ed. holders and 20% are B.Sc. holders. This gives them the required qualification to answer the questionnaire.

Table 8: Adequacy of Laboratory Equipment

Response	Frequency	Percentages (%)
Yes	4	20%
No	16	80%
Total	20	100%

Source: Field Survey, (2020)

Table 8 shows that 80% of the teachers responded No while 20% responded yes. This shows that there is inadequate physics laboratory equipment's in the schools, which makes the conduct of practical more difficult if not impossible.

Table 9: Periods allocated to physics practical per week

Response	Frequency	Percentages
Once	13	65%
Twice	5	25%
Thrice	2	10%
Total	20	100%

Source: Field Survey, (2020)

Table 9 reveals that 10% responded that they are conducting physics practical thrice in a week, 25% were also conducting physics practical twice in a week, and 65% responded that they were conducting physics practical once in a week. This shows that there is inadequate time allocation to students for the proper conduct of physics practical.

Table 10: Periods allocated to physics practical per week

Response	Frequency	Percentages
30mins	5	25%
45mins	12	60%
1hr	3	15%
Total	20	100%

Source: Field Survey, (2020)

The table above shows that 25% responded that the time allocated to practical class is 30 minutes, 60% responded that the time allocated to practical class is 45 minutes and 15% responded that the time allocated to practical class in their school is 1 hour. This information shows that there is inadequate period allocation to student in conducting physics practical.

Table 11: Suitable and Appropriate time for Conducting Physics Practical

Response	Frequency	Percentages (%)
Morning	13	65%
Afternoon	7	35%
Total	20	100%

Source: Field Survey, (2020)

Table 11 indicated that 65% responded morning while 35% responded afternoon as the suitable time for conducting physics practical. This is because in the morning the body and brain of the students is fresh while, in the afternoon they are likely to be tired due to the sunlight and activities before the period.

Table 12: Provision of a Standard Physics Laboratory

Response	Frequency	Percentages (%)
Yes	17	85%
No	3	15%
Total	20	100%

Source: Field Survey, (2020)

This table shows that 100% of the teachers responded yes, which indicates that provision of a standard physics laboratory could be a solution to the problems in conducting physics practical.

Discussion of the Result

From the above analysis it was observed that students had difficulty in having good physics practical text books. Text book is very important to students learning. Physics practical books are scarce and the few available ones were costly for the students. Students need good text books to read in preparation for practical work. These books serve as aid when used together with practical manual. These books assist the students to understand the theory of physical laws and concepts when read and later come to laboratory for practical. Laboratory condition is essential to good performance in physics practical, that is why Aina, (2011) [1] stressed that physics laboratory must be built following an acceptable standard. When physics laboratory is not built properly with correct facilities, learning practical in such laboratory will be hindered and it will be reflected in student's performance. There are facilities that physics laboratory must contained and should not be compromised under any condition (Aina, 2010) [2].

Laboratory apparatuses are central and very important to physics practical, where such apparatuses are not adequately provided student's performance is affected. The analysis above agrees with the submission of Ajileye, (2006) [3], that insufficient laboratory equipment affect student's performance in science. Allocation of appropriate and adequate time to physics practical is very significant and also care should be taken in choosing the suitable time of the day for the conduct of physics practical. Every experiment must have conclusion and report that is why students should be able to infer correctly from all the experimental activities carried out in physics laboratory.

There should be good inference showing that students understood the title of the experiment he/she performed. Physics students should know how to write practical report.

Conclusions

This study has revealed that there are problems militating against effective conducts of physics practical in senior secondary schools in Kebbi State. Having collected and critically analyzed the information gathered, the researchers here by draw the following conclusions.

Physics is a science subject which cannot be well grasped without practical work. It occupies a unique provision among other science subjects in terms of its applications in various areas of human Endeavour. As Nigeria is struggling to join the rest of the world in developing her technological potentials, the teaching of practical physics must be a top priority.

This will help to put the country on a path towards her scientific development and ensure the realization of some her millennium development goals.

Recommendations

From the results of this research, the following recommendations are made:

1. Qualified physics teachers should be employed and posted to our secondary schools to help this situation in the teaching and learning of practical physics.

2. Government should ensure that functional laboratory equipment's are provided in our secondary schools.
3. The school authorities should ensure that practical physics should have its own period in the time table like every other subject.

Suggestions for Further Studies

Practical work is very significant in physics Education, despite its importance there is less research work in the area in Nigeria. Hence, the in-coming researchers are hereby urged to take off from the following:

- Effect of practical knowledge on the academic performance of students in physics.
- Attitudes of students toward physics practical
- The role of practical work in physics.

References

1. Aina JK. Relationship between student's Academic performance in theory and practical Physics in colleges of education in Kwara State, Nigeria. (Unpublished master's thesis) University of Ilorin, Ilorin Nigeria, 2011.
2. Aina JK. The prospective physics teacher. Basic concepts in science 2, Ilorin, Nigeria: Integrity publication, 2010.
3. Ajileye OO. Toward effective Science Education:Issues in Universal Basic Education Programme. Journal of sport management and Educational Research,2006:1(2):337-342.
4. Chief Examiner's Report on the May/June 2009 West African Senior School Certificate Examination (WASSCE) on physics.
5. Eze CU. An investigation into scientific literacy level of non-science students of Nigeria Universities: A case study of University of Nigeria Nsukka J. STAN,2009:38(182):51-57.
6. Federal Republic of Nigeria. National Policy on Education Lagos: NERDC Press, 2004.
7. Ivowi UMO. The philosophy and objectives of the science and mathematics curriculum at the senior secondary school level in Nigeria J. STAN,1990:26(2):3-8.
8. Millar R. The role of practical work in the teaching and learning of science. University of York, 2004. Available at: www7.national academics.org/bose/millar_draft
9. Nelkon M, Ogborn J. Advance level practical physics. Ibadan Heinemann Educational Books (Nig) Ltd, 1998.
10. Nelkon M, Ogborn J. Advance level practical physics. Ibadan Heinemann Educational Books (Nig) Ltd, 1980.
11. Nelkon M. Principles of Physics. Longman group Ltd. England, 1999.
12. Okoye NE. Availability and adequacy of physics laboratory in Aguata Education Zone Anambra State. Journal of Empirical research in Science and Technology Education, 2009, 2(1).
13. Young HD, Freedman RA. University Physics Dorling Kindersley pub. India PVT LTD, 2009.