

# **ASSESSMENT OF APPARATUS AND EQUIPMENT AVAILABLE FOR THE TEACHING OF PRACTICAL PHYSICS AT NCE LEVEL FOR CONTEMPORARY TEACHER EDUCATION: A STUDY OF FEDERAL COLLEGE OF EDUCATION (T) BICHI KANO.**

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## **Abstract**

Adequate provision of apparatus and equipment for practical physics is necessary for effective teaching and learning. But, the haphazard nature of handling practical physics in our Colleges of Education has given room for this study. In this respect, the study aimed at investigating the current status of apparatus and equipment available in the department. The study seeks answer to three research questions. Twenty items questionnaires split into two parts were used to collect data related to the three research questions. The reliability coefficient of the instrument was 0.97 by test-retest method. The population of the study was 200 students. A questionnaire consisting of four point likert type items was the instrument used for the study. The mean was used to answer the research questions. In conclusion, the study revealed that inadequate provision of apparatus and equipments is the major constraint on the effective conduct of physics practical among others. Recommendations were also proffered.

The dream of Nigeria being among the first 20<sup>th</sup> economy of the world cannot be achieved without the production of quality science teachers that will handle the modules of Junior Secondary School Basic science curriculum. The success of science education programme depends largely on the adequate provision of apparatus and equipment for physics practical, that is why, Salami (1995), opined that, "The availability of the resources and effective utilization of the resources are important issues in science education programme. In the view, of Hassan and Ma'aji (2011) physics students usually graduate from the (NCE) programme without acquiring adequate practical skill due to lack of provision of enough equipment and apparatus and poor knowledge of workshop practical.

Practical physics involves carrying out of orderly procedure (experiment) or a set of a carefully arranged instruction with the goal of verifying, refuting or experiment is used to test existing theories or new hypothesis in other to support or disprove them (Devine, 2006, Griffith, 2001). Ajayi (2008) while assessing the level of students' involvement in practical activities in physics laboratories in Nigeria, concluded that only 23.3% of the schools did allow their students to carry out practical activities in physics. The practical activities in various concepts of physics are inadequately performed in schools. One of the objectives of science education in Nigeria is to produce knowledgeable, skilled,, self-reliant graduates who can apply their practical knowledge and vocational skills necessary for solving industrial, agricultural and economic problem of the nation (FRN, 2004). In order to realize this objective, it is important that apparatus and equipments for teaching practical aspect of physics in our colleges of education should be available. Ayala (1987) and Lassa (1984) believed that effective teaching of science and vocational courses depends on how best the available and material resources are harnessed and utilized.

## **Purpose of the study**

The study aimed at finding the adequacy of apparatus and equipment for teaching practical physics. The study also intends to determine the problems associated with the availability, functionality and usefulness of such facilities for teaching practical physics.

## **Research Questions**

The research questions for this study are:

1. Are there enough apparatus and equipment for teaching practical physics?
2. What are the problems associated with practical physics?

3. What are the measures that could be adopted to improve the conduct of practical physics?

### **Population of the Study**

The population of the study consisted of 200 students and lecturers of physics Department at Federal College of Education (T) Bichi in 2013/2014 session.

### **Sample and Sampling Techniques**

The method used for this study is sample random sampling. And the sample size includes 100 students and lecturers from the population who registered for the programmes in the institution under study.

### **Instrument**

A structured questionnaire “Functional Equipment and Apparatus in Physics Laboratory Questionnaire (FEAPLQ) was used to elicit responses from the respondents concerning the assessment of apparatus and equipment available for teaching practical physics in NCE level. It was divided into two parts. Section (A) seeks information of personal data of the respondents while the second part is aimed at obtaining information about the adequacy of apparatus and equipment for teaching practical physics. Also the measures that could be adopted to improve the provision of apparatus and equipment for practical physics. Each question was structured with four point likert scale of strongly agree (SA), Agree (A), Disagree (D) and Strongly disagree (SD).

### **Validation of the Instrument**

Three experts from physic department, FCE (T) Bichi, Kano were used to validated the instrument. These experts were requested to validate the items in term of:

1. Clarity of instruction to the respondents,
2. Functionality of the items in the laboratory
3. Appropriation and adequacy of the items in addressing the purpose of the study.

### **Reliability of the Instrument**

In testing the reliability of the instrument for this study, the test-retest approach was used and the reliability coefficient was obtained to be 0.97. This coefficient, according to Osuala (2001), is usually computed by calculating the correlation coefficient between the two frequency distributions obtained at two different items on the same populations.

### **Method of Data Collection**

The instrument was administered and collected by the researcher. An interval of two days was allowed for the respondents to complete the instrument after which the researcher will go round to retrieved the completed instruments. All the 100 questionnaires administered were collected by the researcher

### **Method of Data Analysis**

Research question 1,2 and 3 were analysed using likert scale. Items with a mean (X) value of 3.5 or above were accepted, while items with a more value below 3.5 were rejected.

Research Question 1

Are there enough apparatus and equipment available for teaching practical physics? To answer this question the data analysis for the research question are represent in

### **Table I**

Mean responses of the respondents on the availability of Apparatus and equipment necessary for teaching practical physics.

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Item no	Variable	S.A	A	D	S.D	Grand Total	Remark
1.	Standard laboratory	1.26	2.56	2.7	1.99	2.14	Disagree
2.	Darkroom for light experiment	1.87	3.01	2.0	1.50	2.10	Disagree
3.	Varnier Caliper and micrometer screw guage	4.33	4.12	3.80	4.25	4.13	Agree
4.	Pendulum Equipment, stop Metre rules	4.00	3.50	3.10	3.60	3.55	Agree
5.	Electromagnet and U-shapeMagnet	4.33	4.14	3.08	4.01	3.89	Agree
6.	Turning forks sonometre & Resonance tubes	3.00	1.21	2.64	2.50	2.34	Disagree
7.	Spherometre and Spectromtre	2.25	2.68	3.50	2.77	2.80	Disagree

**Research Question 2**

What are the problems associated with practical physics? The answer to this research question is presented in table 2

**Table 2**

Item no	Variable	S.A	A	D	S.D	Grand Total	Remark
8.	Lack of adequate and qualified Lecturers often resulted to inability to carryout physics practical	2.88	2.90	2.74	2.55	2.77	Disagree
9.	Lack of adequate workshop attendants, technicians, instructors etc	4.25	3.56	3.75	3.61	3.78	Agree
10.	Lack of standard physics laboratory and Darkroom for light experiment	4.05	3.56	3.41	3.50	3.63	Agree
11.	Most of the apparatus and Equipment in physics Laboratory are faulty	4.25	3.87	3.62	3.00	3.69	Agree

12. Inadequate power supply	4.62	3.45	3.81	3.93	3.95	Agree
13. Inadequate practical guide or manual hinder effective conduct of physics practical	4.62	3.45	3.81	3.93	3.95	Agree
14. Inadequate provision of consumable materials such as plane sheet, dry cell, etc hinder effective conduct of physics Practical	4.68	4.38	4.59	4.55	4.55	Agree

**Research Question 3**

What are the measures that could be adopted to improve practical physics?  
 The data analysis for this research question is presented in table 3

**Table 3**

The mean responses of the respondents on the measures that could be adopted to improve the conduct of physics practical

Item no	Variable	S.A	A	D	S.D	Grand Total	Remark
15.	Provision of standard Physics Laboratory	3.52	3.62	3.71	3.44	3.57	Agree
16.	Appointment of workshop attendants, technicians and instructors	4.42	3.92	3.45	3.51	3.83	Agree
17.	Provision of new apparatus and equipment and proper maintenance of apparatus and equipment	4.32	3.63	3.22	3.67	3.71	Agree
18.	Provision of adequate consumable materials like plane sheet and dry cells	4.11	4.22	3.56	3.24	3.78	Agree
19.	Enhancing visitation to company and industries	3.63	4.23	3.49	3.24	3.65	Agree
20.	Adequate power supply	4.38	4.65	4.62	4.33	4.50	Agree

**Discussion and Findings**

The findings of the study are discussed in line with the research questions on the study. On the availability of Apparatus and equipment necessary for practical physics, the result presented in table I

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showed that the respondents used for this study agree that the department does not possess a standard physics, darkroom for light experiment. The respondents also agreed that the department lack turning forks, sonometre, box, resonance tubes, and also spherometre spectrometer to carryout the experiment associated with it. It was also found that, verier caliper and micrometer screw gauge, pendulum equipment, stop clock and metre rules, electromagnet and U-shape are available.

On the factor/constraints that militate the smooth conduct of practical physics in Federal College of Education Bichi is inadequate power supply. The result presented in table 2 revealed that inadequate, provision of consumable materials is a major constraint on the effective conduct of practical physics. This finding is in conformity with Isah's (2009) view that; inability to provide fund at the beginning of the semester for consumable materials hindered the effective conduct of practical. Inadequate power supply was among factors that contributed to the inability of students to carry out some practicals that required electricity.

The findings also reviewed that lack of adequate workshop attendants, technicians and instructor are also the contributing factors to the smooth conduct of physic practical. Further findings showed that there are inadequate instructional materials i.e practical manual or guide should be made compulsory to all the students register for practical physics.

On the measures that could be adopted to improve the conduct of physics practical at F.C.E (T) Bichi. It was found that all the six items were accepted by the respondents as shown in table 3. Provision of adequate power supply was ranked the most. Without adequate power supply nothing could be achieved as far as practical is concerned. The remaining measures that were agreed by the respondents are to provide standard physics laboratories, appointing workshop attendants, technicians, instructor and trained them, provision of new equipment and apparatus and maintenance of the existing one, enhance students visit to industry and company so that they can appreciate the usefulness of practical and lastly consumable materials should not be left out.

### **Conclusions**

The study investigated the availability of Apparatus and equipment for effective teaching of practical physics, the problems associated with the effective conduct of physics practical and measures that could be adopted to improve the conduct of practical physics.

The study came up with many measures such as provision of equipment like standard laboratory, sonometres which if implemented by the teachers, authorities of College of Education and National commission for Colleges of Education (NCCE) will help in the effective teaching of practical physics.

### **Recommendations**

Based on the findings of the study, the following recommendations were made.

1. The Federal and state ministry of Education should ensure that adequate equipment and apparatus are supplied to physics laboratories.
2. Steady power supply should be made available to physics laboratory
3. Alternative source of energy, preferable solar energy, should be provided in all laboratories for unlimited access to practical activities by the student at any period of the day.
4. Government and other stakeholders like community, NGOS and World Bank should offer assistance by donating some necessary equipment and apparatus lacking in the laboratory.
5. Apparatus and equipment should be properly maintained by students or lab technicians.
6. Workshop attendants and technicians should be employed and physics lecturers handle practical should be sent for training in order to keep them abreast in their area of specification.

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