

Assessment Of Utilization Of Some Selected Science Laboratory Equipment For Teaching And Learning Of Science

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ABSTRACT

This work, level of utilization of selected science laboratory equipment for the teaching and learning of basic science focused on determining how science laboratory equipment are used in the teaching of basic science. It adopted the survey research design with a sample of fifty five (55) science teachers in twenty three (23) private secondary schools in Ikwerre Local Government area of Rivers state. Data collected were analyzed using mean and standard deviation. The findings revealed that biology equipment had high level of use with mean value of 52 followed by chemistry equipment with mean value of 45.684 and lastly physics equipment with mean value of 41.786. Based on the findings it was recommended that teachers should be encouraged to improve on their level of utilization of laboratory equipment. It was also recommended that periodic workshops and seminars on the effective use of these facilities/equipment should be organized for science teachers.

Keywords: Assessment, Utilization, Laboratory equipment, Teaching and Learning

INTRODUCTION

Globally, Science is seen as a tool for development since it contributes in providing solution to rapid global challenges that mankind face, promoting technological development, improving education, health and human capital development. It is of a great importance both for the economic wellbeing of a country and the need for scientifically literate citizens (Fraser and Walberg, 1995). It is agreed that the gateway to the survival of any country both technology-wise and scientific-wise is hinged on scientific literacy which can be achieved through science education.

In all levels of education, no effective science teaching and learning can take place without the use of laboratory for practical work. Science is an activity-packed field of study that involves inquiry, continuous exploration and verification of facts. It is learnt by doing and experimentation, which deals with investigation of nature. Tytler, (2007) sees practical work as an experiment carried out by the teacher for demonstrations or a number of experimental and observational activities carried out by the students for better understanding of theoretical knowledge using practical activities carried out in the laboratory, field or elsewhere.

Science laboratory equipment is part of the crucial teaching and learning facilities used by science teachers and students to portray ideas without difficulties, thereby making lessons interesting, motivating and easy to understand. Laboratory materials according to Lawal, (2013), promote learning by doing, to making the classroom lively, real and meaningful, which has the potential of making the learning content to be visualized and understood thereby enhancing the students'

performance. He added that utilization of laboratory materials and equipment enable students to acquire practical skills, in effect, it is capable of helping students gain firsthand knowledge about any topic under study, in addition promoting the acquisition of science process skills, problem solving skills, scientific attitudes that can make students to be functional, relevant and self-reliant.

Science Laboratory has been defined differentially by various authors. Omiko, (2007) sees a laboratory as a room or building equipped and set apart for practical or experimental studies. He sees the laboratory as the heart of a good scientific program which allows students in the school to have experiences which are consistent with the goals of scientific literacy. Maduabum, (1992) saw a laboratory as a place where scientific exercises are conducted by science teachers for the benefit of the students, these exercises to him include experiments and other activities which help students in acquiring scientific skills. To Igwe (2003), a laboratory can be in-door such as a designed and equipped room found in most schools, could be outdoor such as the riverside, workshop, field or even market for carrying out scientific studies. Whatever type of laboratory is used in science teaching, to him the important thing is the attainment or acquisition of the same laboratory experience such as observation, participation in all experimental and observational activities which provide opportunity for students to develop understanding of practical and theoretical concepts through solutions of problems. Ezeliora, R. (2001) defined science laboratory as a workshop where science is done or where scientific activities are carried out under good environment. It is also seen as a place where science equipment, materials or instruments are kept for security and safety.

It is very difficult to teach as well as learn science practical activities without science laboratories. The understanding level of students is greater when they are involved in the science laboratory for practical experiment, (Hofstein and Lunetta 2004). Students' abilities and skills are improved when laboratories are effectively used for teaching and learning. These skills and abilities include: ability to formulate hypotheses, ability to undertake scientific experiments, ability to design experiments, ability to converse and defend scientific arguments.

Laboratory activities appeal as a way of allowing students learn with understanding, at the same time engage in a process of constructing knowledge by doing science (Tobin, 1990). Science laboratory is a very important resource for teaching and learning of science; it is also an important predictor of academic achievement among other factors. However, Dahar and Faize (2011) are convinced that the availability of the resources has no value in the attainment of academic objectives until they have been effectively utilized in teaching and learning.

Igboabuchi (2010), investigated utilization of laboratory facilities in secondary schools in Nsugbe and found that biology laboratory facilities were seldom utilized by both teachers and students, the results further showed that the use of biology laboratory facilities had a significant relationship with the students' academic performance in biology. In the same vein, Geleta (2016), in a study to determine the outcome of availability and utilization of science laboratory inputs on students' academic achievement in high school biology, chemistry and physics in Southern Ethiopia found that poor achievement of students is related to shortage and ineffective use of science laboratories.

Oluwasegun, et al. (2015), in their study on the impact of physics laboratory equipment on physics students in Ethiopia West local government area of Delta state, found that effective use of physics laboratory equipment facilitated the teaching and learning of physics, helps in inculcating scientific reasoning and enhances the students' academic achievement in physics. Ihuarulam (2008), examined the perception of chemistry teachers and students on the utilization of laboratory facilities in secondary schools, the results showed that almost half of the respondents agreed that laboratory facilities were adequately utilized during chemistry teaching; more than half of the respondents agreed that laboratory facilities were never utilized during teaching. Neji and Nuoha (2015) in their work on the utilization of laboratory facilities and its relationship with students' academic performance in public schools in Cross River state found out that laboratory facilities were not adequately utilized in secondary schools for teaching chemistry.

Statement of Problem

Science being a practical subject requires science teachers and technologists to give the students the opportunity to practice instructions they are given which involves working in well-equipped laboratories. Laboratories for practical are very important since they help students to understand and internalize theoretical knowledge of science. Research findings have shown that even when the

laboratory materials are adequately provided, successful science teaching is not guaranteed as a result of some factors such as absence of trained laboratory technicians, lack of interest and commitment among science teachers, and these influence the quality of practical activities. This study therefore was aimed at determining the level of utilization of some selected laboratory equipment for teaching and learning of science.

Research Questions

- 1) What is the mean level of use of biology, chemistry and physics equipment in the teaching and learning of science?
- 2) What is the mean difference in the level of use of biology and chemistry equipment in teaching and learning of science?
- 3) What is the mean difference in the level of use of biology and physics equipment in teaching and learning of science?
- 4) What is the mean difference in the level of use of chemistry and physics equipment in the teaching and learning of science?

METHODOLOGY

Study design

The work adopted survey research design. It made use of questionnaire with sets of questions to elicit response from the respondents on the level of utilization of selected laboratory equipment in the teaching and learning of science.

Instrument for data collection

The instrument for data collection was the questionnaire tagged level of utilization of selected science laboratory equipment. This is a thirty (30) item check-list containing 10 items each in biology, chemistry and physics laboratory equipment respectively. The teachers responded by identifying the level of utilization of the various laboratory equipment in the teaching and learning of science. The questionnaire is a four point Likert-like scale with Not used = 1; used once in a while = 2; used sometimes = 3; used always = 4.

Population and sample

The population comprised of all teachers in private secondary schools in Ikwerre local government area of Rivers state who teach science. Simple random sampling technique was used in selecting fifty five (55) teachers from twenty three (23) private secondary schools in the local government area of the state.

Method of data collection

The questionnaire was administered to the teachers in the various schools with the help of some assistants. Some teachers who were able to respond immediately to the questions did so and returned while those who were unable to respond immediately were given some days to respond and return the questionnaire.

Method of data analysis

Data collected were analyzed using mean and standard Deviation.

RESULTS AND DISCUSSION

Research Question 1: *What is the mean level of use of biology, chemistry and physics equipment in the teaching and learning of science?*

Table 1: Mean and standard deviation of the level of use of biology, chemistry and physics equipment in the teaching and learning of science.

Equipment Group	N	Mean	Standard Deviation
Biology	22	52.00	11.710
Chemistry	19	45.684	13.056
Physics	14	41.786	14.843

From table 1 above, it is seen that the mean level of use of laboratory equipment in the teaching and learning of science is highest in biology with mean value of 52.00 and standard deviation of 11.710

followed by chemistry with mean value of 45.684 and standard deviation of 13.056, and lastly by physics with a mean value of 41.786 and standard deviation of 14.843.

Research Question 2: *What is the mean difference in the level of use of biology and chemistry equipment in teaching and learning of science?*

Table 2: Mean, standard deviation and mean difference of the level of use of biology and chemistry equipment in the teaching and learning of science.

LEVEL OF USE OF BIOLOGY AND CHEMISTRY EQUIPMENT			
	BIOLOGY	CHEMISTRY	DIFFERENCE
Number	22	19	
Mean	52	45.766	6.314
Standard Deviation	11.710	13.056	1.34

The table above showed the mean level of use of biology and chemistry equipment in the teaching and learning of science to be: biology mean = 52, standard deviation = 11.710, for chemistry the mean is 45.684 and standard deviation = 13.056.

Research Question 3: *What is the mean difference in the level of use of biology and physics equipment in teaching and learning of science?*

Table 3: Mean, standard deviation and mean difference in the level of use of biology and physics equipment in the teaching and learning of Science.

LEVEL OF USE OF BIOLOGY AND CHEMISTRY EQUIPMENT			
	BIOLOGY	PHYSICS	DIFFERENCE

Number	22	14	
Mean	52.00	41.786	10.214
Std Dev	11.710	14.834	3.12

Table 3 above showed the mean level of use of biology equipment in the teaching of science to be (mean = 52, SD = 11.710) while that of physics equipment is (mean = 41.786, SD, 14.843). The mean difference between the use of biology and physics equipment is 10.214.

Research Question 4: *What is the mean difference in the level of use of chemistry and physics equipment in the teaching and learning of science?*

Table 4: Mean, standard deviation and mean difference in the level of use of chemistry and physics equipment in the teaching and learning of Science.

LEVEL OF USE OF BIOLOGY AND CHEMISTRY EQUIPMENT			
	CHEMISTRY	PHYSICS	DIFFERENCE

Number	19	14	
Mean	45.684	41.786	3.898
Std dev	13.0850	14.843	1.758

Table 4 above showed the mean level of use of chemistry equipment in the teaching and learning of science to be; mean = 45.684 standard deviation = 13.056 while the mean level of use of physics

equipment is, mean = 41.786, SD = 14.843. From the table, the mean difference between the level of use of chemistry and physics is 3.988.

DISCUSSION OF FINDINGS

The findings of the study showed that the level of utilization of biology laboratory equipment in the teaching and learning of science was higher compared to chemistry and physics equipment. This result disagrees with Igboabuchi (2010) whose investigation on utilization of Biology laboratory facilities showed that they were seldom used by both teachers and students during biology classes. This agrees with Geleta (2016) who found a relationship among shortage and ineffective use of Science laboratory equipment and lower academic achievement of students. It is also in agreement with Neji and Nuoha (2015) who investigated the utilization of laboratory facilities and its relationship with students' academic achievement, they found that chemistry laboratory materials were not adequately utilized in teaching and learning. The finding also corroborates the work of Ihuarulam (2008), who examined the perception of chemistry teachers and students on the utilization of laboratory facilities in secondary schools, the results showed that almost half of the respondents agreed that laboratory facilities were adequately utilized during chemistry teaching; more than half of the respondents agreed that laboratory facilities were never utilized during teaching. It disagrees with the work of Oluwasegun, et al. (2015), who found a high level of utilization of physics laboratory equipment in their study and the impact the effective utilization had on physics students in Ethiopia West local government area of Delta state. They found that effective use of physics laboratory equipment facilitated the teaching and learning of physics, helps in inculcating scientific reasoning and enhances the students' academic achievement in physics.

CONCLUSION

The findings of the study showed that the level of utilization of biology laboratory equipment was higher than that of chemistry and physics in the teaching and learning of science. The teachers' level of utilization of these laboratory facilities/equipment determines the students' level of use of these equipment in the learning process. This suggests that if these facilities are adequately utilized, learning of skills and attitudes necessary for achieving scientific and technological literacy will be promoted.

RECOMMENDATIONS

For the promotion of effective teaching and learning of science, teachers are encouraged to improve on their level of utilization of laboratory equipment.

It is also recommended that periodic workshops and seminars on the effective use of this facilities/equipment should be organized for science teachers.

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