International Journal of Academic Research in Business, Arts and Science (IJARBAS.COM)

Level of Availability and Utilization of Basic Science Laboratory Facilities in Ekiti State Junior Secondary Schools

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Abstract

The study investigated the availability and utilization of laboratory materials in teaching basic science in Ekiti State junior secondary schools. The study adopted a descriptive research design of survey type. The sample comprised 250 teachers drawn randomly using multistage stratified sampling technique. The research instrument used was the 'Survey of Availability and Utilization of Laboratory Materials (SAULM)' with reliability coefficient of $\alpha=0.75$. Two hypotheses were formulated and tested using z-test statistics at 0.05 level of significant. The result revealed that there is a significant relationship between teachers' qualification and utilization of laboratory materials. Also, there was a significant difference (in the utilization of laboratory materials relationship) among male and female teachers teaching basic science in Ekiti State. Based on the findings and conclusions, appropriate recommendations were made.

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Introduction

Science had become a school subject even before the invention of instruments designed specifically for scientific purposes. Most of the scientific equipment in the laboratory in the 1600s was being borrowed from the practical craft and craftsmen whose tools were much better than those that the scientists used during that period before laboratory work became a permanent feature in science teaching in the secondary schools in the nineteenth century. Laboratories have made this world very an advance and scientific in its purposes.

In a laboratory or field learning environment, students work as an individual or in small groups on a question, problem or hypothesis. They use the processes and materials of science to construct their own explanation of biological phenomena. The distinction between laboratory or field learning and traditional classroom learning is that activities are student-centered, where students actively engaged in hands-on, minds-on activities using laboratory or field materials and techniques. This according to Hofstein and Lunetta, (2004) has been known to enhance greater learning outcome in science and improve the understanding level of students.

A laboratory is a place where scientific investigations and researches are carried out. Laboratory could be formal or informal; formal laboratories can be described as those that have standard design, safety and management while informal ones can be referred to as those that are non-conventional, virtual, improvised or makeshift. Olosunde (2013) described science laboratory as one of the physical resource materials or facilities which serves as tools which aid acquisition or transfer of knowledge from the teacher to the student as to determine the effectiveness of teachers' instruction delivery.

To Hofstein and Mamlok-Naaman (2007), science laboratory meant experiences in school settings where students interact with materials to observe and understand natural world. Science laboratory activities have been designed and conducted to engage students individually, while others have sought to engage students in small groups and in large groups' demonstration settings. Nigeria as a developing country, over the years has identified education as a working tool through which one of the national objectives can be achieved: "a united strong and self – reliant nation" (National Policy on Education, 2007).

Popoola and Akinwamide (2013) opined that, for a nation to be strong, and self–reliant, there must be sundry opportunities for all citizens in a technological curious world. The potential benefits of laboratory environment for science practical cannot be underestimated in the contemporary world. Laboratory makes students become active in their learning, provides opportunities for students to construct and understand difficult concepts more easily. The view of Rerr, Rynearson, and Kerr, (2004); was that virtual laboratory affords learners some opportunities to overcome mistakes that occur as a result of such laboratory conditions or misuse of the laboratory and enable them to easily overcome the dangers that can be seen in the real laboratory conditions.

The availability and utilization of laboratory facilities are essential for effective teaching and learning of Integrated Science and consequently lead to a good academic performance of students. View of Rerr, et al, (2004) is that learning can occur through and within one's environment; this is to say that facilities available in their environment can facilitate students learning to give a positive outcome. Students can master better the basic concepts of Integrated Science when they can learn by doing.

Appropriate facilities, equipment and adequate utilization of same are of necessity if school science course is to be successful Pyatt and Sims (2012). This implies that practical should function as the primary learning experience. Gambari, et al (2013) also explained that using

science laboratory increases motivation and desire for the lessons in the process of learning; because it provides easy and ideal working environment. Daramola (2010) aligned with this explanation that through laboratory works, students have the opportunity to acquire skills and attributes of science, like understanding scientific concepts, communicating, organizing, manipulating, planning and inquiry of science methods.

She stressed further that laboratory activities are activities which encourage active participation and doing in integrated science and serve to motivate critical thinking. This assertion could be true and acceptable because one of the objectives of the laboratory activities is to provide concrete experiences to support the theoretical aspect. Laboratory activities are not necessarily only class experiment and demonstrations but include those activities that provide practice in designing experiment, operating and interpreting data and thus lead to acquisition of suitable scientific skills.

The above idea is in line with the view of Agun and Imogie (2001) and Daramola (2010) while emphasizing that it is important to provide effective practical activities in order to enhance better learning and understanding of science; the emphasis may be meaningful and reasonable if activities in junior secondary school science are designed to help students to acquire scientific skill and enhance the theories already learnt. This was recommended in the National curriculum for junior secondary schools produced by the Federal Ministry of Education (FME, 1985) as stated in the National Policy on Education (2004); NPE, fourth edition.

The importance of science in the life of every individual in technological advancement of man cannot be overemphasized. So, the teaching and learning of basic science without necessary instructional materials such as laboratory will surely result in half – baked students. Therefore, the problem of this research is to investigate the availability and utilization of laboratory facilities for teaching basic science in Ekiti State junior secondary schools. The rationale behind this study is to find out the range of laboratory materials' availability and utilization in the teaching of basic science in some selected junior secondary schools in Ekiti State.

Research Hypotheses

The following hypotheses were generated and tested at 0.05 level of significance:

H_{01}:   There is no significant difference in the utilization of laboratory materials among male, and female basic science teachers.

H_{02}:   There is no significant relationship between availability and utilization of laboratory materials among teachers teaching basic science in junior secondary schools.

Methodology

The study employed a descriptive research of the survey type, designed to look into the availability and utilization of laboratory materials/facilities in Ekiti State junior secondary schools. The population for this study comprised all teachers teaching basic science in Ekiti State junior secondary schools.

The sample comprised of 250 teachers drawn from all pubic junior secondary schools in all the sixteen local government areas of Ekiti State. The selection was based on multistage stratified sampling technique. The information obtained from this selection would provide some insight into the general nature of how available is laboratory instructional materials and to what extent are they being utilized. The data for this study were generated through a structured questionnaire tagged "Survey of Availability and Utilization of Laboratory Materials (SAULM)" as the instrument for the study. The instrument was in two parts: section

A sought for information on the types of school, sex, age of teachers, qualifications and teaching experiences, while section B sought to find the level of availability and utilization of these laboratory materials being used by Basic Science teachers.

The method used in validating the instrument were face and content validity procedures. The validity of the laboratory materials was ascertained by the science laboratory technologists and the entire instrument by experts in the area of test and measurement in College of Education, Ikere-Ekiti. Test and retest method was employed to determine the reliability of the instrument. The items were subjected to Cronbach alpha to establish its reliability with alpha ($\alpha=0.75$) which means that the instrument was reliable. In analyzing the data collected, the z-test statistical tool was used to test the hypotheses at 0.05 level of significance.

Results

The results of the data were presented and analyzed on the following tables:

$H0_1$: There is no significant relationship between teaching qualification and utilization of basic science laboratory materials.

Table 1: Table showing z-test of teaching qualification and utilization of laboratory materials

Variables	N	X	SD	df	Zcal	zcrit	remarks
Teaching qualification	250	31.0	2.75	248	1.03	0.98	Significant
Utilization of laboratory materials	250	25	3.52				

p>0.05

Table 1 shows that z-cal (1.03) is greater than z-crit (0.98) at 0.05 level of significance. The null hypothesis is rejected. Therefore, the relationship between teaching qualification and utilization of laboratory materials is significant.

H_{02}: There is no significant relationship between utilization of laboratory materials among male and female integrated science teachers in Ekiti State junior secondary schools.

Table 2: showing utilization of laboratory materials among male and female basic science teachers.

Variables	N	X	SD	df	z-cal	z-crit	Remarks
Male	100	107.26	1.212	248	1.891	0.035	Significant
Female	150	492.10	0.033				

Result is significant (p<0.05)

Table 2 shows that z-cal (1.891) is greater than z-crit (0.035) at 0.05 level of significance. The null hypothesis that stated that there is no significant relationship between utilization of laboratory materials among male and female basic science teachers is rejected. Therefore, the relationship between utilization among male and female teachers is significant.

Discussion

The outcome of the analyzed data showed that there is a significant relationship in the availability and utilization of laboratory materials in the junior secondary schools on Ekiti State. These result is in line with the views of Agun and Imogie (2001); Adeyanju (2003) and Jegede and Daramola (2013), that basic science curriculum requires teachers to use different learning resources and materials for effective implementation of the course.

There are many advantages that could be derived from motivating learners. These advantages indicate the need to develop competencies in effective utilization of different instructional resources. Daramola (2013) asserted that utilization of resources goes beyond identification and selection, but is mainly based on their availability in the junior secondary schools. From the aforementioned, it can be seen that for effective teaching and learning of

integrated science in junior secondary schools, it is essential to have a well-planned, properly designed, adequately equipped, and functional laboratory.

Furthermore, the study has also revealed that there is a significant difference between the utilization of laboratory facilities among male and female teachers in Ekiti junior secondary schools. This is in line with the study of Angling (1995), Amoran (2013) that teachers who are competent, use variety of teaching model with appropriate instructional approaches. The result implies that both male and female basic science teachers had greater tendency to use instructional materials that are available in basic science laboratory.

Conclusion

Based on the findings of this study, it was concluded that utilization of laboratory materials has nothing to do with qualification of integrated science teachers indicating that teachers' quality and learning materials are intimately related. This study has also revealed that availability and utilization among male and female teachers in Ekiti State secondary schools will promote adequate and effective learning of basic science.

Recommendations

Based on the findings of this study, it is recommended that:

1. Since integrated science is an activity – oriented subjected it should be always accompanied with the use of laboratory and other instructional facilities.
2. Standard and modern instructional technology equipment that is relevant for teaching basic science should be provided by the government and stakeholders to replace old ones.

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Cite this article:

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