

INFLUENCE OF INSTRUCTIONAL RESOURCES ON SENIOR SCHOOL STUDENTS' PERFORMANCE IN PHYSICS IN ILORIN, NIGERIA

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Abstract

For any nation to develop scientifically or technologically, the knowledge of physics is required. Despite this crucial role of physics in national development, the performance of students in the subject is poor requiring urgent revival. Since physics like other science subjects is believed to be meaningfully taught and learnt when appropriate instructional resources are available and used, this study therefore investigated the level of availability of physics instructional resources in senior schools in Ilorin and its influence on the students' academic performance in physics. The study was a descriptive survey and a total of six hundred and twenty five students participated in the study. Proportional random sampling technique was used to select forty senior schools in the three local government areas that constitute Ilorin. A validated proforma and checklist were used to collect the record of students that sat for 2014 WASSCE in physics and check the available instructional resources in the selected schools respectively. Data obtained were converted to scores and were analyzed using mean, percentage and t-test statistical techniques. It was found out that physics instructional resources have a positive significant influence on the academic performance of senior school students in physics and that there was moderately high level of availability of instructional resources in private schools while there was low level of instructional resources in public schools in Ilorin. It was therefore recommended among others that government should provide adequate physics instructional resources in order to improve the academic performance of the students in physics.

Key words: Teaching, Learning, Instructional resources

Introduction

Teaching and learning are very important concepts involved in the process of education. Education involves the all round development of an individual to be useful to self and the society. Education as the process individuals undergo through the acquisition of knowledge, skills, abilities, and attitudes that are necessary for effective living in the society. Teaching and learning could be a rigorous task but can be facilitated with certain aids known as instructional resources (Obomanu & Akporehwe, 2011). Instructional resources are the human and non-human materials, supports or aids that teacher uses to pass information to the learners in his or her own class (Abolade, 2009). Instructional materials are print and non-print items designed to impact information to students in educational process. They include items such as kits, textbooks, magazines, textbooks, pictures, recordings, slides, transparencies, videos and online services. When appropriate instructional materials are used to introduce and develop teaching and learning process, it will help in focusing the attention and motivation of the learner (Abolade & Olumorin, 2004).

Aina (2012) posited that instructional materials are very important in teaching and learning science if adequately used. He further stressed it that where these resources are absent, it will affect students' performance and eventually reduce enrolment in science. The investigation of Aina and Adedo (2013) revealed that instructional materials among others influence enrolment of students in physics at secondary school level.

Instructional materials are in various classes, such as audio or aural, visual or audiovisual (Aina, 2013). In the field of science, Achimugu (2006) classified instructional resources into classroom/laboratories equipment/chemicals and textual/audiovisual materials. Audio instructional materials refer to those devices that make use of the sense of hearing only, like radio, audio tape recording, and television. Visual instructional materials on the other hand, are those devices that appeal to the sense of sight only such as the chalkboard, chart, slide, and filmstrip. An audio-visual instructional material however, is a combination of devices which

appeal to the sense of both hearing and seeing such as television, motion picture and the computer. Similarly, Obomanu and Akporehwe (2011) classified instructional resources into classified into material and human resources. The influence of instructional resources had also been recognized in research studies. Omosewo (1999) observes that teachers use lecture method for teaching science subjects in secondary schools. The immediate impact of this method on the learner is that it often leads to lack of understanding and this usually resulted into poor performance and low enrolment of students in the subject. Also, Aina, (2012) posited that instructional materials are very important in teaching and learning science if adequately used.

Physics is one of the core science subjects for scientific and technological development worldwide. Both developed and developing countries such as USA and Nigeria respectively have realized the impact of physics in national development (Adeyemo, 2010). Thus, for national development in technology, basic concepts and principles of physics are indispensable (Jegede, 2013). The teaching of Physics in secondary schools is intended to produce young scientists who would be able to design the technological devices that would make day-to-day activities easier and living more comfortable (Ajayi, 2008). Therefore, to ensure a good and more comfortable environment for any society, the knowledge of physics is needed. In other words, physics can directly contribute to the much needed scientific and technological development necessary for providing a good working environment and hence national development.

Nigerian Government has recognized science and technology as a powerful tool towards social, political and economic liberation and advancement of the country. This is reflected in the policies put up by the government on Science, Technology, Engineering, and Mathematics (STEM) education. According to the Science, Technology, Engineering and Mathematics (2002), the policies guiding STEM education are as follows;

Science shall be taught to all children in primary and secondary levels;

The teaching and learning of science shall be done in such a way as to develop the child in the three domains (cognitive, affective & psychomotor) of educational objectives;

Equal opportunities in terms of provisions of curriculum materials, resources, persons and laboratory facilities shall be given to all;

Every child shall take at least one science subject at the end of the senior secondary course examination;

Local production of science equipment and the practice of improvisation shall be pursued rigorously.

These policies were laid down in order to attain national development through adequate provision and training of the students in the country using science and technology as a medium.

In Nigeria, science teaching commenced in 1859 with Nature study (Adeyemo, 2010). This was later expanded to Physics, Chemistry and Biology. Olawale (2001) identified three main branches of science as Physics, Chemistry and Biology. However, Omiwale (2011) noted that science comprises the basic disciplines such as Physics, Chemistry, Mathematics and Biology. Physics is a branch of science that deals with the fundamental constituents of the universe, the forces they exert on one another, and the effects of these forces (Omiwale, 2011). Chemistry is the study of composition, structure, properties and interaction of matter and Biology is the study of living things and their vital processes (Udoh, 2012).

Physics is crucial for effective living in the modern age of science and technology. Physics as one of the science subjects taught at the senior secondary level of the Nigerian educational system offers the students an opportunity to think critically, reason analytically and to acquire the spirit of enquiry. For this reason, physics is an important discipline and a fundamental ingredient of technology (Omosewo, 1999).

Physics education is designed to train the students to acquire proper understanding of the basic principles of physics as well as their applications (Omosewo & Ogunlade, 2012). For instance, the knowledge of physics is required in interpreting the results obtained from astronomy, geology, engineering and communication (Ivowi, 1993). The knowledge of physics is also required in the production of some useful equipments and apparatus such as telescopes, microscopes, the development of robots as well as other innovative gadgets, all which are been used to gain a proper insight into natural phenomena and also allow for mans' convenience in the society. All these are achieved through quality teaching and learning of relevant concepts in physics.

The crux of the problem is that the academic performance of students in Physics determines the availability of personnel in science and physics related discipline. Thus, if a nation experiences problem with academic performance in physics, it means that such nation stands a risk of being alienated from the global village. It therefore becomes imperative for global, national and local actions to be taken to checkmate the academic performance of students in science subjects at all levels of the educational system through research and reforms. It is in the light of the above that this study was carried out to find out the availability and influence of instructional resources on senior school students' performance in physics.

The low enrolment of students in the basic technology according to Onasanya, Fakomogbon, Shehu and Soetan (2010) is a cog in the cowheel of scientific and technological progress in Nigeria. Many students because of their exposure to science at the junior secondary school level perceive physics as too abstract to comprehend, thereby resorting to memorization or rote learning. Aina and Adedo (2013) investigated the perceived causes of students' low enrolment in science in secondary schools. A questionnaire was used to sample the opinion of 80 secondary school students in a local government council. Findings from the study revealed that lack of qualified science teachers, lack of instructional materials, low student interest and lack of motivation among others caused low enrolment in science.

Adeyemi (2012) conducted an assessment of the influence of universal basic education (UBE) facilities on pupil enrolment, in Ogun state public primary schools of Nigeria. Data were collected using school records collection sheets (SRCS) from 32 public primary schools selected for the study. Findings of the study indicated that there was significant positive influence of UBE facilities on pupil enrolment. Ajayi (2008) found out that the level of available resources was indeed a plus to the teachers and went to show the level of ingenuity and commitment of the teachers toward effective delivery of lessons. Akinfolarin (2008) identified resources as a major factor contributing to academic performance in the schools system. A study conducted by Ayodele (2000) found that a positive relationship existed between availability of facilities and student academic performances. The availability of resources induced students' learning, stimulated their interest and consequently facilitated their willingness to take up a subject as time went on.

It has been observed that students performed poorly in physics at the secondary level of education (Adeyemo, 2010; Udoh, 2012). Physics which is one of the science subjects is also not left out (Udoh, 2012). The identified reasons for the poor performance include inadequate qualified teachers, poor method of teaching, inadequate availability of textbooks and other teaching/learning aids (Jenard, 2006). Other factors that influence academic performance in physics include gender, school type, school location and class size.

Availability of instructional resources is a very crucial factor that might influence the academic performance of senior school students in science (Aina, 2012) and therefore was the focus of this research in order to proffer recommendations towards improving the academic performance of the students in the subject with a view to developing the nation scientifically and technologically.

Purpose of the Study

The main purpose of this study was to investigate the influence of instructional resources on senior secondary students' performance in Physics in Ilorin, Kwara State, Nigeria.

Specifically, this study investigated the:

1. Level of available instructional resources in senior schools in Ilorin and
2. Influence of instructional resources on senior school students performance in physics in Ilorin.

Research Questions

The following research questions guided the study:

1. What is the level of availability of physics instructional resources in private and public senior schools in Ilorin?
2. Is there any difference in the academic performance of senior school students in schools with and those without instructional resources in physics in Ilorin?

Research Hypotheses

The following research hypotheses were tested:

HO₁: There is no significant difference in the availability of physics instructional resources in private and public schools in Ilorin.

HO₂: There is no significant difference in the academic performance of senior school students in schools with and those without instructional resources in physics in Ilorin.

Research Method

The study investigated the level of availability of instructional resources for the teaching/learning of physics and its influence on senior school students' academic performance in physics in Ilorin. Ilorin consists of three Local Government areas namely; Ilorin East, Ilorin South and Ilorin West. The target population for this study was all senior school physics students in Ilorin. The sample for the study was all physics students that sat for May/June 2014 West African Senior School Certificate Examinations in selected forty senior schools in Ilorin. Proportional random sampling technique was used to select the sampled schools on the basis of school type (private and public) and school location (local government areas) in Ilorin. A

total of 625 students were involved in the study comprising of 302 and 323 students from private and public senior schools respectively.

Two instruments were used in the course of this study; a proforma and a checklist. The proforma was used to gather information on academic records of physics students that sat for May/June West African Senior School Certificate Examinations in 2014 while the checklist was used to check physics instructional resources available in the selected schools. The instruments were subjected to face and content validity by two experts in science education and two physics teachers. Test and retest method in non-participating schools was used to test the reliability of the instruments at an interval of two weeks and the data obtained was analyzed using Pearson product moment correlation statistic where a coefficient of 0.91 was obtained.

The performance of the students obtained through the proforma and the available physics instructional resources in the selected schools which were converted to scores formed the data for this study. The data then analyzed using mean, percentage and t-test statistical techniques.

Analysis and Results

Research Question 1: What is the level of availability of physics instructional resources in private and public senior schools in Ilorin?

To answer this research question, 112 instructional resources recommended in the New Nigerian Physics Curriculum were checked for its availability in the selected senior schools in Ilorin metropolis. Table 1 presents the summary of the available instructional resources that were available in the selected senior schools based on school type.

From table 1, the total number of instructional resources available in the 23 selected private senior schools was 1,576 while 716 instructional resources for teaching and learning physics were available in all the 17 selected public senior schools. By percentage, the level of availability of instructional resources for teaching and learning physics in private and public senior schools in Ilorin were

61.18% and 37.60% respectively. This shows that level of availability of physics instructional resources was moderately high in private but low in public senior schools in Ilorin.

Table 1:

Availability of instructional resources for physics teaching and learning in selected senior schools in Ilorin based on school type

Variables	No	Total available	Mean	Percentage (%)
Private Schools	23	1576	68.52	61.18
Public Schools	17	716	42.11	37.60

HO₁: There is no significant difference in the available physics instructional resources in private and public schools in Ilorin.

Table 2 shows the analysis of available instructional resources in private and public senior schools in Ilorin. It can be seen from Table 2 that the calculated p-value (0.029) was less than the 0.05 level of significance with degree of freedom of 38. Therefore the research hypothesis HO₁ was rejected. This means that there was significant difference in the level of availability of instructional resources in private and public schools. Comparing the means, we can see that private schools ($\bar{x}$ = 68.52, SD = 13.55) had high physics instructional resources as compared with public schools with low instructional resources ($\bar{x}$ = 42.11, SD = 16.24).

Table 2

t-Test Analysis of the difference in the level of available instructional resources in private and public senior schools.

Variables	No	Mean	Standard Deviation	df	Cal t-value	p- value	Decisio n
Private Schools	23	68.52	13.55	38	1.72	0.029	S
Public Schools	17	42.11	16.24				

$P < 0.05$

Research Question 2: Was there any difference in the academic performance of senior school students in schools with and those without instructional resources in physics in Ilorin?

H_{O2} : There would be no significant difference in the academic performance of senior school students in schools with and those without instructional resources in physics in Ilorin.

It can also be observed from table 3 that the calculated p-value (0.031) was less than the 0.05 level of significance with degree of freedom of 623. Therefore the research hypothesis H_{O2} was rejected. This means that there was a significant difference in the academic performance of senior school students from school with available physics instructional resources and those from schools without physics instructional resources. To ascertain where the significant difference lies, the mean of the academic performance of senior school students from schools with available physics instructional resources was compared with the mean of the academic performance of the senior school students from schools without physics instructional resources. From table 3, the mean score of the senior school students from schools with available instructional resources (72.93) was greater than the mean score of students from schools without instructional resources (48.92). This implies that the academic performance of senior school students from schools with instructional resources in physics was better than the academic performance of

senior school students from schools without instructional resource in Ilorin, Kwara State.

Table 3

t-Test Analysis of the difference in Physics Scores of Students in Schools with and without Instructional Resources

Variables	No	Mean	Standard Deviation	df	Cal t-value	p- value	Decision
Available	276	72.93	13.66	623	1.97	0.031	S
Less available	349	48.92	16.05				

$P < 0.05$

Summary of Findings

The major findings of this study as obtained from analysis of the data collected are as follows:

There was a significant difference in the level of availability of instructional resources for physics in private and public senior schools in Ilorin. Instructional resources for teaching and learning physics were found to be moderately high in private but low in public senior schools.

There was a significant difference in the performance of students in schools with available physics instructional resources and their counterparts in schools with fewer instructional resources. Students in schools with available instructional resources for teaching and learning of physics were found to perform academically better in physics than their counterparts in schools with fewer instructional resources.

Discussion

The type of school which a learner attends depends on some factors which in turn are expected to influence the academic performance of the learner. Factors such as government policy, educational background and financial capacity of the parent, proximity of school to student's home and school population have influence on the choice of school a student attends. Johnson (1999) found that majority of the parents believed that public schools did not provide a safe, orderly environment and adequate instructional materials for teaching and learning. This explains why fewer instructional resources for teaching and learning of physics were found in public schools. Public schools which are owned and managed by the government are expected to be better funded and provided with all that is required for efficient and effective teaching and learning.

Private schools which are profit oriented could do anything required to maximize their effectiveness and efficiency towards maximizing their profit. This might account for the reason why private schools are better managed than private schools as found by Adeyemi (2012) and the high level of availability of instructional materials for teaching and learning of physics as observed in the present study.

This study also revealed the importance of instructional materials in the teaching and learning of physics. This was reflected from the significant difference between the performance in physics of senior school students in schools with instructional resources and their counterparts in schools with fewer instructional resources for teaching physics. Students in senior schools that had instructional resources for teaching and learning physics had higher mean score and hence, performed academically better than their counterparts in senior schools with fewer instructional resources in physics. This indicated that instructional materials which are in various classes, such as audio, visual and audiovisual can enhance students' understanding of physics concepts especially those that are abstract in nature such as *wave* and *electric field*. Omosewo and Ogunlade(2012) observed that the poor performance of senior school students in physics was as a result of unavailability of instructional resources for teaching physics which makes some

teachers revert to the use of lecture method in their teachings. This result is inline with the findings of Aina (2012), Akinfolarin (2008), Ayodele (2000) and where they found positive influence of instructional resources on students' performance.

Conclusion

Based on the results and findings of this study, it was concluded that:

Instructional resources for physics were found to be more available in private schools than in public schools. There was a moderately high level of availability of instructional resources for teaching and learning physics in private but low in public senior schools in Ilorin.

Availability of instructional resources influenced senior school students' performance in physics as schools with physics instructional resources performed better in physics than their counterparts in schools with fewer instructional resources.

Recommendations

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

Government should provide the public schools with adequate teaching and learning instructional materials for physics;

School proprietors should also improve the provision of private senior schools with more instructional resources in order to have a high level of availability of the instructional resources.

Physics teachers in public schools should work extra miles to facilitate learning so as to catch up with private senior school students in terms of their academic performance in physics.

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