Impact Of Instructional Aids On Students' Academic Performance In Physics In Secondary Schools In Federal Capital Territory (FCT) Abuja, Nigeria

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Abstract

This research work investigated the extent of availability, application and impact of instructional aids on improving academic performance of physics students in Federal Capital Territory (FCT) secondary schools Abuja. The population of the study was limited to secondary schools in three Area councils of the FCT. The sampled schools used for the research had a total 3,150 students with teaching staff strength of 163. The study was carried out among the senior secondary SS2 and SS3 physics students and their teachers. Descriptive survey method was adopted for this study with 60 items on the questionnaire for students and 15 items for teachers.

Six research questions were asked and analyzed using frequency counts and percentages. The data gathered were further analyzed and interpreted to arrive at findings which showed that the physics teachers in FCT secondary schools were using instructional aids, there was significant difference in academic performance of students taught with instructional aids; findings equally revealed that there were shortfalls in availability of some materials. Recommendations were suggested that government should formulate policy statement on availability, distribution, selection and maintenance of instructional aids in FCT secondary schools.

Keywords: Physics, instructional aids, academic performance, physics teachers, secondary schools, physics students

Introduction

Improved academic performance in physics is a panacea for scientific advancement. Physics is a foundational science whose discoveries have never ceased propelling the engine of technological advancement. (NERDC

2005)The fact that structure of the evolution of the universe and provision of insight into fundamentals forces of nature is controlled by the understanding of physics, therefore academic excellence in physics in this country Nigeria requires national attention. Lederman (2000) said that 'I do not believe there is anything more important to the future of the nation than a population that is more science 'savvy' than we are now. From global climate change to genetic manipulation to the neurosciences' progress on the working of human minds, we have issues which have political, social and economic consequences of vast implications. For this we need physics (science) education.' In the light of this, it is expedient that useful foundation is laid for excellence in the study of physics.

According to the National Policy on Education, academic excellence in physics, science and technological (Federal Republic of Nigeria 2008) defined technology education as tertiary education offered in the university, polytechnic and Colleges of Education (Technical) for the production of high level skilled manpower who can apply the scientific knowledge to solve environmental problem, provide goods and services for the convenience of man. That is to say the importance of physics in the lives of students and nations cannot be overemphasized (Jegede and Adedajo 2005). The student need it to study sciences in tertiary institutions and nations need it for technological development. Adeyemo (2010) was of the opinion that extracurricular activity as effect on academic performance. Students of physics and science generally need not go so far as there are science projects, fairs and laboratory exercises that can hold student attentiveness, attract other students to develop interest in physics while improving the physical and academic performances of existing pupils. Appropriate use of instructional aids would engender executing physics projects thereby allowing students to exceed their personal best in physics. However, secondary schools in Nigeria are showing lukewarm attitude in the subject and therefore performing poorly (Ayelabegan 2003). This goes to show that excellence in academic performance in physics is worthy of investigation (Akanbi 2003). The countries in the world are categorized as developed, developing and underdeveloped nations. It is interesting to note that the above categorization is a measure of how much physics is understood and applied in such nations (Egbugara 1986). It is easy to recognize any nation where excellence in physics is at low level; nations lacking factories of its own, poor communication system, beggars in their cities for lack of innovations, few hospitals, insufficient roads and rail roads, poor banking system, few institutions of higher learning, prevailing poverty with isolated islands of wealth with few people.

Isola (2010) testified to poor performances of secondary school students in physics. Morakinwa (2003) posited that the attitude of physics

teachers to their job is a factor causing poor performance in physics study. So, if we want Nigeria to be advanced in physics, we need to advance the knowledge of the physics students. Mention should be made of Okoronka and Wada (2014) who postulated that poor physics teaching methods were the root causes of poor academic performance in physics in our secondary schools. Other studies have identified various ways through which excellence in physics could be achieved to include improved teachers' strategies and application of appropriate Instructional aids, (Askhia 2010).Therefore, if we are to encourage more students to study physics, we need to identify with instructional aid as an influential factor which cause students to be interested in the study of physics (Aina, 2013).

Instructional aids defined as any object or device used by physics teacher to enhance or enliven the classroom (Eniayeju 2005). The need to make instructional materials available for improvement in academic performance in Physics was demonstrated in the first exhibition of National Festival for Instructional Materials (NAFIM) in the year 2009. The application of instructional aids in improving academic performance in physics was again suggested by Oladejo, Olosunde, Ojebisi and Isola (2011) who categorically averred on its desirability and usefulness. Abubakar (1999) argued that realization of improved academic performance in physics would be a mirage until adequate Instructional materials for schools are provided.

Statement of the Problem

Physics is the bedrock of science and it plays a significant role in development of a nation. Many students are not offering physics in secondary schools, and out of the few offering the subject majority is not doing well (Okeke and Okoye 2013). Provision of instructional aids is for better understanding of the subject, attraction and makes the subject interesting to students. The main purpose of the study is therefore to investigate the extent to which the available physics instructional aids has impact on the academic performance of physics students in Federal Capital Territory, (FCT) Abuja secondary schools.

Research Questions

How much do the students know about the availability of instructional aids in improving academic performance in physics?

How many of the students are conversant and can freely name some of the instructional aids used in physics classroom by their teachers?

Are the physics teachers fully complying with the use of instructional aids in teaching physics in Abuja secondary schools?

Is there any significant difference in academic performance between physics students taught with Instructional aids and those not taught with instructional aids?

What is the level of academic performance of physics students in Abuja secondary schools?

Are there relevant instructional aids in Abuja secondary schools to enhance academic improvement of physics students?

Methodology

Research Design

The study employed the descriptive survey, Creswell (2014) inquiry procedure to collect information from sampled schools.

Population of the Study

The population of the study was 3,150 students with science teaching staff strength of 163. Probability samplings involving multistage sampling technique was adopted.

Sample and Sampling Procedure

The sample was chosen randomly from the science classes that were in SS2 and SS3 physics classes. The researcher involved 60 physics students in the study.

Research Instrument

The Instrument used in the collection of data for this study was titled Impact Instructional aids on Academic Performance of Physics Students (IIAAPPS) questionnaire had three sections 'A', 'B', and 'C' for both Teachers' and Students questionnaires, Section 'A' on both sides requested for information on personal data. Section 'B' contained six YES/No questions for former and seven (7) YES/NO for later. Section 'C' was filling in questions containing Ten (10) for teachers and the seven (7) for students. Students were requested to name instructional aids used by their physics teachers. Finally, the students were given Ten (10) objective achievement tests questions to further separate the students taught with instructional aids from those not taught with instructional aids.

Administration of the Instrument

The research instrument was self-administered and the collected data were analyzed using frequency counts and simple percentages for better understanding. Principle of error of prediction and 't-test' statistical analysis was used to establish the level of academic performance of the students.

Findings and Discussions

Research question one

How much do the students know about the availability of instructional aids in improving academic performance?

Table: 4.3.1 Total Responses and percentage usage of Instructional aids in Abuja secondary schools.

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Do your physics teacher use Instructional aids in teaching physics?	168	8	95.45	4.45
2	Do you know any of the Instructional aids used by your physics teacher in teaching?	164	12	93.18	6.82

Source: Field survey 2017

The table above showed that there were 176 responses to Research Question one and there were 168 in favour meaning 95.45% agreed that the physics teachers in Abuja make use of Instructional aids while 4.45% do not share this stance. Similarly 164 out of 176 responses truly know some of the instructional aids that Abuja physics teachers' uses in their classes.

From the above analysis, it can be deduced that the students know very well about the availability of instructional aids because 95.45% and 93.18% agreed to the usage of the Instructional aids by their teachers.

Research questions two

How many of the students are conversant and can name some of the instructional aids used in physics classroom by their teachers?

Table: 4.3.2 Total Percentage of students who are conversant with instructional aids in Abuja secondary schools.

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Physics students who were able to mention three physics instructional aids used by their teacher.	156	20	88.64	11.36
2	Students who were able to mention additional two instructional aids in physics laboratory.	152	24	86.36	13.64

Source: Field survey 2017

From the values computed in the table above, it showed that 88.64% of the physics students which amounted to 156 out of 176 responses from student of Abuja secondary schools were conversant and could freely mention any three of the physics instructional aids used in teaching them. Similarly

86.36% of the physics students in Abuja secondary schools were able to mention additional two Instructional aids in their laboratory.

The deductions from the above showed that Abuja physics secondary school students were conversant and can freely name Instructional aids being used by their teachers.

Research questions three

Are the physics teachers fully complying with the use instructional aids in teaching physics in Abuja secondary schools?

Table: 4.3.3 Total Percentage of Teachers using Instructional aids.

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Do you have instructional aids available to use whenever you are to teach physics in the class?	100	Nil	100	Nil
2	Have you ever made use of instructional aids in teaching physics?	100	Nil	100	Nil

Source: Field survey 2017

It was shown from two of the research questions in the table 4.3.3 above that all the physics teachers in the schools had instructional aids readily available for use in the physics class lessons. In the same way, the second research question gave 100% compliance response to the question of instructional usage in physics classroom.

Physics teachers in Abuja secondary schools evidently were complying with the use of instructional aids made available during physics lessons.

Research question four

Is there any significant difference in academic performance between physics students taught with Instructional aids and those not taught with instructional aids?

Table: 4.3.4 Teachers' Response toward Improving Academic Performance of Physics Students while using Instructional aids.

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Is the average percentage of student whose performance improves with the use of instructional material increasing?	100	Nil	100	Nil
2	Have you noticed any increase in the academic performance of your student in physics with the use of instructional aids?	100	Nil	100	Nil

Source: Field survey 2017

Above in the table 4.3.4 are two of the research questions put across to the physics teachers. The responses were 100% affirmative of an improvement in academic performance of the students with the use of instructional aids in teaching physics.

Thus there were improved academic performances among the physics students taught with instructional aids.

Research question five

What is the level of academic performance of physics students in Abuja secondary schools?

The principle of Error of Prediction was used to establish the level of academic performance and the level of the significance that was adopted for the analysis was P = 0.05.

Table: 4.3.5a Score Marks from Achievement Test when Instructional aids was not and when it was used

S/N	X	x-X	(x-X)2		S/N	Y	y-Y	(y-Y)2
1	4.0	1.0	1		1	4.0	0	0
2	5.0	2.0	4		2	4.0	0	0
3	3.0	0	0		3	4.0	0	0
4	4.0	1.0	1		4	4.0	0	0
5	2.0	-1.0	1		5	4.0	0	0
6	2.0	-1.0	1		6	4.0	0	0
7	4.0	1.0	1		7	5.0	1	1
8	3.0	0	0		8	3.0	-1	1
9	2.0	-1.0	1		9	3.0	-1	1
10	1.0	-2.0	4		10	3.0	-1	1
11	6.0	3.0	9		11	6.0	2	4
12	1.0	-2.0	4		12	6.0	2	4
	MEAN = 3.08		**Total= 27**			**MEAN= 4.17**		**Total=13**

Source: Field survey 2017

Table: 4.3.5b Summary of calculations from Achievement Test.

	Mean when Instructional aid was not used	Mean when Instructional aid used	Difference in the mean values
Assumed Mean	3.00	4.00	
Calculated Mean	3.08	4.17	1.09
Calculated ‘S’ value			1.82
Calculated ‘t’ value			2.65
5% Significance at N-1 degree of freedom			2.20

From the table 4.3.5b above, the value of ‘t’ calculated is 2.65 which is higher than the table value of 2.20 units. It can therefore be concluded that the level of academic performance is higher when Instructional aids was used in teaching physics in Abuja secondary schools.

'Are there relevant instructional aids in Abuja secondary schools to enhance academic improvement of physics students?'

Table: 4.3.6a Students' Response to availability of Relevant Instructional aids

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Have you (as a physics student) attended any physics lesson that instructional aids were not used?	112	64	63.63	36.36

Source: Field survey 2017

Table: 4.3.6b Teachers' Response to availability of Relevant Instructional aids

	Questions	Total Responses from all Sampled Schools		Percentage Responses from all Sampled Schools	
S/N		YES	NO	% YES	% NO
1	Do you (as a physics teacher) know any instructional aids not readily available to teach physics in this school?	200	100	66.67	33.33

From the table 4.3.6b above, the response of the student to availability of relevant instructional aids during some physics lessons showed that at up to 63.63% periods, relevant Instructional aids were made available for use. The meaning is that up to 36.36% physics periods, relevant or usable instructional aids did not exist, available or accessible.

In a similar way, the same question was put across to the physics teachers and the response showed that only 66.67 % of instructional aids were relevant, available or accessible for physics lessons. In the alternative, in up to 33.33% physics periods some instructional aids are either not available for use or not to have existed in physics lessons.

Discussion of the Findings

The study revealed that instructional aids were available in FCT secondary schools and these items were used in teaching the physics students; the effect of which improved the academic performance of the students. There were significant changes in academic performances of students taught with instructional aids compared with students not opportune to be taught with the materials. The study equally exposed the inadequacy in availability of some relevant and important instructional aids. Specifically, the use of instructional aids and simple technologies in physics teaching (audiocassette players/recorders, CD players, overhead and slide projectors, television sets, and video players) in Abuja secondary schools, seems not prevalent. Considering the relatively high educational qualification of physics teachers

in FCT secondary schools, also is the fairly equipped computer rooms in these schools and the internet dishes left unused could be activated to add to the existing instructional aids needed to enliven the physics teaching.

In addition, some physics training materials can be transformed into web-based modules and be made available to physics teachers through educational websites. This is highly practical and doable, considering the seriousness to improve the academic performance of students of physics in the country.

Recommendations

This research investigated the impact of instructional aids on academic performance of students in physics; the study therefore recommended that there should be policy statement on availability, distribution, maintenance and accountability of physics instructional aids in Abuja secondary schools. Improved academic performance in physics would be guaranteed when equipment in physics laboratories are maintained adequately in the schools. There would be need to encourage, motivate and give incentives to both the physics and laboratory teachers for extra efforts in return for additional lessons and practical classes. As for the computer rooms in Abuja secondary schools, it is suggested that, internet facility should be provided and be strictly guided to enable access to physics training materials already transformed into web-based modules.

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