

Assessment of Physics Teachers' Resourcefulness skills and Students' Academic Performance in Public Secondary Schools in Omoku, Rivers State, Nigeria

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Abstract

This study set out to ascertain physics teacher's resourcefulness skills and how teacher resourcefulness influences academic performance of physics students. An Ex-post facto research design was adopted for the study. The population for the study is 7,479 respondents, comprising 103 physics teachers and 7376 Senior Secondary Two (SS2) physics students in Omoku local government Area of Rivers State. The sample size is 748 respondents, comprising 54 teachers and 734 (10%) SS2 students offering Physics. Simple Random sampling technique was used in selecting participants for the study. The researcher-made instrument was used in generating the data for the study. The instrument was titled "Physics Teachers' Resourcefulness Questionnaire on (PTRQ)". The instrument were given to three experts in Test and Measurement from the Ignatius Ajuru University of Education for content and face validation. The instrument was pretested on 20 teachers and students from Ahoada East LGA to ascertain the reliability. The scores were then subjected to a Cronbach alpha reliability test, which gave a value of 0.87. The instrument was then administered to the teachers to ascertain their resourcefulness. To get students' performance scores, the researcher made use of the test scores given by the teacher for continuous assessment. Mean and standard deviation was used to answer the research questions while t-test was used to test the null hypothesis at .05 level of significance. Findings of the study identified physics teacher resourcefulness skills to include proactive skills, good lesson presentation skills, Effective use of laboratories and instructional aids, Good instructional aids improvisation skills, creativity and a positive personality among others. It was found that students perform better in physics when their physics teachers are highly resourceful. It was recommended that retraining exercise should be carried out for physics teachers on acquisition of generic skills

Keywords: Improvisation, Resourcefulness skills, Instructional materials, Academic achievement, teaching physics

Introduction

Physics is a study of energy and its relation to matter. It is one of the core science subjects offered in senior secondary schools across Nigeria. The application of physics in real life is broad and all encompassing. Physics generally applied in medicine, science and technology, ICT, agriculture, construction, oil and gas exploration, and in other areas of where it has found social applications like in sports

However, even with the outstanding contributions of physics to the sustenance and improvement in technological development, Ukoh (2015) found that physics has been reported to be the less popular science subjects and fewer people go into further studies in

physics in relation to the general population. This has become a concern to school authorities, educational planners and stakeholders as well. A subject with core relevance to technology application being neglected by students poses danger to future development of technology in the country.

Science literacy in which physics forms a core part, is widely considered as indispensable in modern developed and highly technological countries (deBoer, 2011). Supporting students in developing science literacy is supposed to satisfy society's need for open-minded well-educated citizens and the labor market's need for skilled workers in science and science-related fields (Roberts, 2007). Assessment of students' science literacy often focuses on student achievement.

With respect to physics, recent research has reassured that secondary school students not only perceive physics as a difficult and demanding subject (Kessels, Rau, & Hannover, 2006) but also show a considerable lack of interest in the subject physics or in pursuing a physics-related career (Barmby, Kind, & Jones, 2008). Consequently, along with their achievement, students' subject interest is construed as equally important and a desirable outcome of instructional processes (Krapp, 2002).

Student achievement is widely considered the major outcome of students' learning. However, many factors have been seen to influence academic achievement, chief of which has been the teacher. The teacher still remains the central figure in the classroom, the one who translates educational policies into practice, implements educational objectives, the interphase between the school and the students, the classroom manager and leader. Such a role requires resourcefulness in managing classroom activities.

Resourcefulness is the capacity to source for knowledge and use available resources in achieving set goals (Okoye and Caleb, 2019). Resourcefulness will require a teacher to apply knowledge of problem solving to new situations. Resourcefulness will also require a worker to be versatile, smart, articulate, knowledgeable and possess cutting edge skills in his/her area of specialization (MacLeod and Clarke, 2009). Teacher resourcefulness is operationally conceptualized in terms of the teacher to utilize the appropriate language, method, and available instructional materials to bring the best results from the learners (Banjo, 1999). Teachers are said to be resourceful if they are able to apply all the requisite skills, competences and abilities to maximize learning outcomes and achievements, such that the results are observable in practical terms through the behavior and performance of the learner. In other words, the resourcefulness of the teacher is measured by his products. Teacher's resourcefulness certainly affects learning outcomes. Very resourceful teacher are considered to be more able to use the most appropriate methods and materials to teach pupils, as they differ in the abilities, prior knowledge and home backgrounds. Indeed, difference levels of teacher's effectiveness are by-products of their resourcefulness and strong determinant of differences in pupils' learning (Ikoh & Nwankwo, 2013).

Sander (1996) identified key resourcefulness skills to be possessed by a teacher to include knowledge of the subject matter, Humility and sound preparation. One area where the skills of resourcefulness are to be used by the physics teacher is in the improvisation and appropriate use of instructional materials. Instructional materials play an important role in the teaching and learning processes. They have become more like the vehicles that convey learning.

Instructional materials are those materials the teachers uses during the teaching and learning process to enable the students benefit maximally from the learning experiences.

According to Okoye (2013) instructional materials can be regarded as things which a teacher uses at appropriate point in-time during a lesson, which help the teacher to communicate effectively to the student. They include visual and audio aids or Audio visual aids. Okoye (2013) defines instructional materials as those things which are manipulated, seen, heard or talked about plus instruments which facilitate such activity. He said that educational media (instructional materials) are both tools for teaching and avenues for learning. They includes textbooks, charts, chalkboard, model/mock-ups, television, radio etc. Instructional material are necessary because the traditional talk and chalk method are no longer effective in preparing the pupils/students adequately for the life ahead in this technology age.

The challenge is not on how relevant are instructional materials, but the provision and appropriate application by the teachers. As the demand for activity based lessons has increased, so the demand on the teacher to provide instructional leadership through provision and application of instructional materials increases. Evidently, public schools are facing burgeoning enrolments with stagnant and in some cases, dwindling supply of instructional materials and teaching aids. However, learning must go on and has to be done effectively. It is then, the responsibility of the resourceful teacher to improvise the means of supplementing instructional aides with the aim of making learning meaningful. The process of augmenting instructional aides would require the teacher looking inwards (within the school) and outwards (outside the school) for materials within reach, affordable replicas, relevant and readily accessible instructional aids for utilization in the classroom. It is also worthy of note that available of instructional aids and even use in some cases, do not translate into effective instruction. Appropriate utilization of instructional aides is key to effectiveness. Teachers must know when to present teaching aids, which one would be appropriate at the beginning of the instructional cycle or in a just-in-time approach, or presented to groups or individually. It is the skill of resourcefulness that helps in the selection of best approach in instructional material presentation.

Statement of the Problem

Public schools all over Rivers State have had to deal with issues of available and utilization of resources. The issue of adequacy of educational resources has dogged the educational system in Nigeria for so long. More worrisome again for educational administrators has been appropriate use of available resources and the resourcefulness of physics teachers in making the most of available resources. In any environment where resources are not adequate, it requires that effective strategy must be in place to augment available resources. This responsibility is mostly that of the teacher. The teacher has to display resourcefulness in utilizing available materials to achieve educational goals. The effectiveness and resourcefulness of the teacher is measure through student academic outcomes. It is assumed that physics teacher resourcefulness might have a direct and proportional effect on academic outcomes of students. It follows that where teacher fails to display resourcefulness, academic outcomes may plummet. Lack of teacher resourcefulness will also lead to poor utilization of instructional materials and teachers lacking in improvisation of instructional materials.

Purpose of the Study

The purpose of this study was to determine the influence of physics teachers' resourcefulness on students' academic performance in physics. Specifically, the study sought to:

1. Determine the physics teachers' resourcefulness skills essential for effective instruction in physics.
2. Determine the influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics.

Research Questions

The following research questions were stated for the study

1. What are the physics teachers' resourcefulness skills essential for effective instruction in physics?
2. What is the influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics?

Research Hypothesis

The following hypotheses were raised to guide the investigation:

H₀₁: There is no significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics.

Research Methodology

An Ex-post facto research design was adopted for the study. This allowed the researcher to investigate events after they must have occurred. The population for the study is 7,479 respondents, comprising 103 physics teachers and 7376 Senior Secondary Two (SS2) physics students in Omoku local government Area of Rivers State. The sample size is 748 respondents, comprising 54 teachers and 734 (10%) SS2 students offering Physics. Simple Random sampling technique was used in selecting participants for the study. The researcher-made instrument were used in generating the data for the study. The instrument was titled "Physics Teachers' Resourcefulness Questionnaire on (PTRQ)". The instrument were given to three experts in Test and Measurement from the Ignatius Ajuru University of Education for content and face validation. The instrument was pretested on 20 teachers and students from Ahoada East LGA to ascertain the reliability. The scores were then subjected to a cronbach alpha reliability test, which gave a value of 0.87. The instrument was then administered to the teachers to ascertain their resourcefulness. To get students' performance scores, the researcher made use of the test scores given by the teacher for continuous assessment. Physics teachers, based on their responses, were grouped into highly resourceful and less resourceful. On a five point rating scale, a Mean of 3.0 and above was taken as highly resourceful, while a mean below 3.0, the weighted mean was taken as less resourceful. Mean and standard deviation was used to answer the research questions while t-test was used to test the null hypothesis at .05 level of significance.

Presentation of Findings

The findings of the study are hereby presented

Research Question 1: What are the physics teachers' resourcefulness skills essential for effective instruction in physics?

Table 1: Summary of Mean and Standard deviation scores of Teacher resourcefulness Skills Identified by Experts

S/N	Teacher resourcefulness Skills	Mean	Std. dev.	Remarks
1	Proactive skills	3.10	0.91	Agreed*
2	Good lesson Presentation skills	3.03	0.95	*
3	Effective Classroom control and management skills	3.15	0.95	*
4	Effective Use of the laboratory	3.51	0.84	Strongly Agreed**
5	Effective use of instructional aids	3.24	0.98	*
6	Good instructional aids improvisation skills	3.54	0.82	**
7	Good evaluations skills	3.99	0.88	**
8	Adequate classroom preparation skills	3.93	0.99	**
9	A positive personality	3.55	0.50	**
10	Hold the highest standards	3.22	0.72	*
11	Consistently challenge their students to do their best	3.48	0.73	*
12	Creative	3.56	0.50	**
13	Fair to all	3.88	1.11	**
14	Allow all students equal opportunities and privileges	3.33	1.17	*
15	Display a Personal Touch	3.39	0.79	*
16	Have a Sense of Humor	3.48	0.78	*
17	produce instructional materials from locally sourced materials	3.88	1.11	**

*Agreed; Strongly Agreed**

Table 1 shows the summary of mean and standard deviation of the item analysis of respondents on the physics teacher resourcefulness skills. The result shows that all the items have mean responses above 3.0, the weighted Mean. This indicates that all the items were agreed as being physics teacher resourcefulness skills.

Research Question 2: What is the influence of physics teachers’ resourcefulness in instructional aids improvisation on students’ academic performance in physics?

Table 2: Summary of Mean and Descriptive Analysis of Physics Teacher Resourcefulness and Academic Performance of SS2 Students

Extent of resourcefulness	Mean performance in physics	SD	Remarks
Less resourceful teachers	16.2069	4.37	Low performance
Highly resourceful teachers	23.5600	3.85	High performance
Total	19.6111	5.52	Low performance

Table 2 gives the summary of students performance in Physics when distributed based on physics teacher resourcefulness. The result shows that the performance of students in Physics teachers' class with less resourcefulness is 16.21. This is against 23.50 performances for students in Physics teacher's class with high resourcefulness. This shows that students perform better in physics when their physics teachers are highly resourceful. The overall performance of students in physics was low (19.61) compared to those in highly resourceful teachers class. This is because the numbers of less resourceful teachers are more than the highly resourceful teachers.

Null Hypothesis 1: There is no significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics.

Table 3: t-test Analysis of significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance

Variables	N	Mean	Std. Dev.	df	t-cal	p-value	Decision
Less resourceful teachers	33	16.21	4.37	52	6.51	0.001	*
Highly resourceful teachers	21	23.56	3.85				

*Significant at $p < .05$ (.001)

Table 3 shows the summary of the t-test for significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance. The result shows that the calculated t-value is 6.51. At a significant level of .05, the probability value (significance of p) is .001. Since the probability value is less than the significant level of .05 ($p < .05$), the result is statistically significant, hence, the null hypothesis is rejected. Thus, there is a significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics.

Discussion of Findings

The result of analysis identifies physics teachers resourcefulness skills to include proactive skills, Adequate classroom preparation skills, good improvisation skills, effective use of instructional materials, produce instructional materials from locally sourced materials and a good personality among others. This finding is in line with Korur and Eryılmaz (2012) which identified similar and characteristics of resourcefulness and admonished physics teachers to develop them. The research found that teacher resourcefulness had a strong effect on student motivation and achievement. The result of analysis also showed that there is a significant influence of physics teachers' resourcefulness in instructional aids improvisation on students' academic performance in physics. This finding is corroborated by Utibe-abasi(2016) which found that physics teachers' resourcefulness in utilization of improvised instructional materials significantly influenced academic performance of students.

Conclusion

Based on the findings of the study, the identified physics teacher resourcefulness skills are Proactive skills, Good lesson Presentation skills, Effective use of laboratories and instructional aids, Good instructional aids improvisation skills, Creative, a positive

personality among others. It was found that students perform better in physics when their physics teachers are highly resourceful.

Recommendations

Based on the findings of the study, the following recommendations are made

1. Retraining exercise should be carried out by the State Secondary Schools Board for physics teachers on acquisition of generic skills.
2. Adequate provision should be made by the school authorities for instructional materials for the teaching of physics.
3. Where the provision of instructional materials by the school is inadequate, the teacher should be encouraged to improvise.
4. The State Secondary Schools Board in particular should organize for teachers' workshops, seminars and conferences on improvisation and utilization of improvised instructional materials in lesson delivery. Teachers of physics should be made to attend such workshops, seminars and conferences.

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