ISSN:2229-6107

INTERNATIONAL JOURNAL OF PURE AND APPLIED SCIENCE & TECHNOLOGY

E-mail :
editor.ijpast@gmail.com
editor@ijpast.in

www.ijpast.in

INTERNATIONAL JOURNAL OF PURE AND APPLIED SCIENCE & TECHNOLOGY
IJPAST

ISSN 2229-6107 www.ijpast.in
Vol 6,Issuse 2 . 2016

Implications for Educational Policy Based on Physics Textbook Quality and Student Achievement

Oladejo, Maruff A. (PhD), Olosunde, Gbolagade R. (PhD),

ABSTRACT

The study examined the effect of using standardized and improvised instructional materials on Academic Achievement of Secondary School Physics Students in Oyo State, Nigeria. The research design adopted was quasi-experimental of the pretest – post test non-randomized control group. Purposive sampling was used to obtain a sample of three co-educational secondary schools. Each school provided one S.S. III class for the study. Two instruments were used in the study, the Physics Achievement Test (PAT) to measure students' achievement and Teachers Instructional Guide (TIG) to train the teachers in the experimental groups. The instrument was pilot tested to ascertain reliability. The reliability coefficient was 0.76. Three hypotheses were formulated and tested at 0.05 level of significance. Data were analysed using ANOVA and ANCOVA. Findings revealed that there is a significant difference in the achievement of students taught using standard instructional materials, those taught with improvised instructional material and those in the conventional instruction. Thus, the students taught with improvised instructional materials obtained the highest achievement score at post test (F=74.94), followed by those with standard instructional materials (F=63.07), while the control group scored the lowest (F=39.89). Also, there was no significant effect of gender on students' achievement in Physics although, females did better than males. Finally, there was no significant interaction effect of treatment and gender on student achievement in Physics. Thus, Physics teachers need to be resourceful in instructional materials selection, planning and utilization so as to reduce the cost of production and maintenance of instructional materials. The researchers conclude that the utilization of improvised instructional materials promote and enhance effective teaching-learning process, thus, Physics teachers should be encouraged to use them in secondary education programme.

Key words: Physics, Improvised instructional materials, Standardized instructional materials, Academic achievement

Introduction

It is generally agreed that scientific inquiry provides the foundation upon which technological progress is made today. To keep up with the rest of the world and ensure their citizens' quality of life in today's more scientific world, nations like Nigeria are investing heavily in technology and scientific development.

Ogunleye (2002) argues that science is an evolving human endeavor.

interested in deciphering how things in the real world function. Mankind benefits from this comprehension by learning more about the cosmos. Man's journey to the stars and planets would have been far more challenging without the scientific applications that made it possible. Physics, chemistry, mathematics, and biology are all considered part of the larger umbrella term "science." Many studies have shown that students' enthusiasm for Science is declining, particularly amongst those in high school (Esiobu, 2005). Furthermore, the Nigeria Educational Research and Development Council (NERDC) (Isola, 2010) reports that Physics, as one of the Science disciplines, remains one of the most challenging topics in the school curriculum. Akanbi (1983) and Omosewo (1999) report that throughout time, Nigerian students' performance in Ordinary Level Physics has been continuously low. Students' low Physics grades were linked to a number of causes, one of the most prominent being the teachers' methods.That means it's possible that learning Physics without textbooks and lectures won't be enough. Without proper resources, it's possible that students won't learn much from physics classes. Franzer, Okebukola, and (1992) argued that it doesn't matter how well-trained a scientific teacher is if they don't have access to the resources they need to put their expertise into effect in the classroom.

Science, according to Bassey (2002), is "resource intensive," hence it may be hard to obtain hold of the necessary technological devices and equipment to teach Physics in schools during a recession. Since imported high-tech materials and equipment are sometimes too costly or unnecessary, domestic production is essential. The problem is exacerbated by the country's rapid rate of inflation.

Inadequate materials for teaching Science were identified by researchers like Obioha (2006) and Ogunleye (2002) in Nigeria's secondary schools. They also noted that the readily accessible ones are seldom in fine shape. Consequently, improvising is essential. However, as Adebimpe (1997) and Daramola (2008) pointed out, improvising calls for risk-taking. Problem Statement

Such abilities can only be achieved via a well-planned training course on improvisation, which requires originality, curiosity, and patience on the side of the instructor.

Despite the fact that everyone wants technology to advance, Physics is a very important topic, and as a result, its teaching and learning, as well as students' low academic performance, have become a major cause of worry. The purpose of this research is to examine Statement of the Problem how students' Physics performance changes when they are exposed to improvised teaching methods.

Review of the Literature

Following is a chronological breakdown of how we went about doing the literature review for this specific topic. This is done so that a firm groundwork may be laid for the research.

Definition of Course Materials

Different writers have offered their own definitions of instructional materials. For instance, Obanya (1989) considered them to be instructional aids designed to facilitate education. Instructional materials, as defined by Abdullahi (1982), are any resources, whether domestic or foreign, that may be utilized to improve the quality of education. To paraphrase what Ikerionwu (Isola, 2010) called "objects or devices," they aid in making a lesson more transparent to the student. Concrete or tangible things that deliver sound, visuals, or both to the sense organs during education are sometimes referred to as instructional materials (Agina-obu, 2005). There are many different types of educational resources, including some that are purely auditory, purely visual, or a hybrid of the two. Therefore, radio, audio tape recordings, and television are all examples of audio instructional resources since they rely only on the sense of hearing to convey information. The blackboard, chart, slide, and filmstrip are all examples of visual educational tools that primarily target the visual sense. However, a combination of technologies that appeal to both hearing and sight, such as television, film, and the computer, constitutes audio-visual instructional material. When comparing the images used in the classroom to the audio and audio-visual materials, the visuals win out. Learning Outcomes and the Quality of Course Materials

Several studies have looked at the correlation between textbooks and student success. For instance, Momoh (Isola, 2010) studied how various teaching aids influenced students' performance.

how well students in Kwara State fared in the

West African Senior Certificate Examinations (WASCE). He found a link between students' access to material resources and their performance in 10 different subject areas. Teachers were surveyed to get information on the methods and materials they use in the classroom. Students' success in WASCE over the previous five years has been correlated with the quantity and qualityof instructional materials at their disposal. He came to the conclusion that students' performance in all disciplines was significantly impacted by the availability of material resources.

Similar study was conducted by Moronfola (1982) in the Ilorin LGA of Kwara State. She collected data on the material resources available for the teaching of some selected subjects in ten secondary schools using questionnaires and found a correlation between the amount of resources available for the teaching of the subjects and the achievement of students in those subjects. The results indicated that students' performance in these disciplines was significantly affected by the availability of material resources.

Similar research was conducted by Popoola (1990) on the impact of classroom materials on student performance in Ogun State. This research used five Abeokuta secondary institutions. For each of the three school topics he looked at, he designed a questionnaire to elicit feedback on pedagogical resources for use in the classroom. Over the course of five years, he gathered WASC test data and contrasted the performance of pupils attending schools with sufficient and schools with poor material resources. The results he got for the two groups of pupils were quite different. The schools that had sufficient teaching resources outperformed those that did not.

Influences on the Use of Spoken Word in the Classroom

According to Balogun (2002), there are primarily two obstacles to the effective improvising of Science equipment. These include both technological and human elements. There are technical considerations, such as how much precision and accuracy can be achieved with makeshift tools, and human considerations, such as how well teachers are able to create resources and tailor them to their students' needs.

Another barrier to making good use of local resources for Science education is a lack of proper professional training, according to Maduabunmi (2003). Next, Oyediran (Isola, 2010) emphasized the need of a well-defined and organized improvisation training program for educators. In order to keep Science instructors up-to-date and competent, he proposed that they attend frequent, useful workshops on improvisation method.

Method Design.

The study used a quasi-experimental approach to research. Selected secondary institutions in Ibadan, in the north-east of Oyo State, implemented a pre- and post-test, non-randomized control group design.

Sampling Method and Sample Size

A simple random selection method was used to choose a sample of 60 students studying Physics in their last year of secondary school. Three groups (Improvised, Standard, and Control) were created using the collected data. There were ten pupils in each of the groups.

Instruments

In this investigation, an original Physics Achievement Test (PAT) was employed. The Physics Achievement exam (PAT) is a 30 question, 5 choice objective exam used to measure academic progress in physics. The pupils were given five choices, one of which was the right response. Both the pre- and post-tests employed PAT to evaluate the pupils' progress. One of the researchers and the Physics instructors at the schools where the study took place helped to regulate several intervening factors that were not central to the investigation, such as the teacher effect and the group interaction effect. In all, there were 30 questions, with 14 pertaining to the balance of force and center of gravity, 8 to the comparison of e.m.f. and application (uses of potentiometer), and 8 to the application of light waves (microscope).

Hypotheses

The following hypotheses were developed for the research project. The threshold of significance used in the tests was 0.05.

Ho1: There is no statistically significant difference between students who were taught using traditional teaching, improvised instruction, or standard instructional materials. The accomplishment scores of men and women in the test and control groups do not vary significantly, refuting Hypothesis 2.

Ho3: The impact of therapy and gender on students' Physics performance does not interact significantly.

Strategy for Analyzing Data

Statistical tests including the mean, standard deviation, and t-test were used. The scores of the various groups were calculated, and those were put to use in the hypothesis testing. The study used a P value of 0.05 as the threshold for statistical significance. Each hypothesis was either rejected or not rejected based on this degree of significance. Discussion & Results

Verification of Theories

Both the experimental and control groups took a pre-test to compare their academic performance to that of the other group. The Physics PAT, a 30-item multiple-choice exam, was used. Allotted time for the exam was

40 minutes. The purpose of the exam was to compare the academic performance of the study's experimental and control groups.

Ho1: There is no substantial distinction between conventional teaching, improvised instruction, and student-taught instruction using regular instructional materials.

Finding: Table 1 shows that there is a significant (F=115.969; P.05) influence of treatment (types of instructional material) on students' success in Physics. This indicates that the performance of pupils taught with conventional training, improvised instruction, and the standard instruction is significantly different.

Table 2 presents the Multiple Classification Achievement table, which may be used to compare the results of the two treatment groups with the control group.Table 2 shows that the students who were taught using makeshift resources had the greatest post-test achievement scores (F=74.94).The lowest scores were seen in the control group (F=39.89), followed by those who used conventional instructional materials (F=63.07). This demonstrates that the improvised training materials were the most successful, followed by the standard group and the conventional group.

The considerable main impact of therapy on students' Physics performance was further investigated using the Duncan post hoc analysis. Table 3 shows statistically significant differences between each of the three potential pairs: standard against improvised (F=63.07), standard versus control (F=39.89), and improvised versus control. As a result, the statistical significance shown for treatment's effect on Physics performance may be attributed to all compared pairings.

The accomplishment scores of men and women in the test and control groups do not vary significantly, refuting Hypothesis 2.

Table 4 shows that there is no statistically significant difference in Physics grades between male and female students (F=.065, p>.05). So, we can't exclude out H2. This suggests that there is no major gap between male and female levels of success. Table 4's MCA, on the other hand, reveals which gender fared better. The results showed that women fared better than men (F=59.52 vs. F=59.04). It was already shown that this difference is not substantial.

Ho3: The treatment and gender impact on Physics grades is not significantly different.

Results for the 2-way interaction between therapy and gender are shown in Table 3, and they are not statistically significant (F=1.927, P>.05). Therefore, H3 cannot be dismissed.

Discussion

The results of this research showed that students' performance in Physics improved after receiving therapy. Results from the PAT showed that students who were taught using the improvised materials outperformed their counterparts who were taught using the normal materials and the traditional teaching approach. Therefore, it can be shown that employing improvised educational materials helps the instructor economically and also encourages students to engage, which results in improved student achievement. It requires creative thought on the part of both teachers and pupils.

Students do better on tests when they are required to use improvised materials because it encourages creativity, brings learning closer to home, and is frequently more suited to the climatic conditions of the local region. The results of studies like Olosunde's (Isola, 2010) are supported by these findings. The study's

Physics educators may have been adept at using makeshift resources, and students may have had no trouble grasping the concepts presented in locally adapted materials. This result, however, goes against the findings of According to Bassey (2002), pupils who were taught using the standardized materials achieved at the greatest levels.

Students' performance in Physics showed no discernible differences between the sexes. Given that mental and intellectual capacity has nothing to do with gender, this means that male and female students accomplished equally under similar conditions throughout the learning and teaching process. This finding corroborated the opinion of Moronfola (2002), who argued that Science classes should focus more on hands-on learning. According to Omosewo (2008), a contemporary Science curriculum program should encourage students of both sexes to study using all of their senses, not only their eyes and ears.

According to Okoboli (Isola, 2010), there is a significant difference between the performance of female and male students in English language and Mathematics at the primary school level, and this difference is in favor of using instructional materials. Finally, there was no gender-by-treatment interaction impact on Physics grades.

Summary, Implications, and Suggestions

Conclusion

It is impossible to overstate the importance of high-quality educational resources in making any curriculum a success. A teacher's interest in a broad range of learning activities is piqued by instructional materials, which also serve to extend the range of experience accessible to students and support and complement the teacher's verbal explanations.

Learning is facilitated by the use of instructional resources because they augment, clarify, invigorate, accentuate, and improve the delivery of education. Because of this, physics educators need to be creative and think on their feet. Teachers who are able to substitute "local" resources for "standard" ready-made ones see an uptick in student accomplishment. Several Repercussions for Policy

The current study's findings have bearing on educational policy makers. Among them is the need for the establishment of policies that would guarantee sufficient availability of both international and domestic instructional materials.In order to improve the quality of education in the scientific disciplines, educators in these fields should be regularly exposed to and educated in the art of improvisation of instructional materials.

Recommendations

In light of the aforementioned analysis and conclusions, the following suggestions are made:

Teachers must be creative in how they find and use educational resources. This is done to lessen the burden on budgets everywhere by making it easier to create and maintain inexpensive forms of education. Therefore, it is suggested that educators undergo continuous training and refresher courses.

Teacher attitudes about the usage of educational tools for their pupils also need to improve. Their skill level will naturally increase as a result of this.

It is important that many different parties be able to pay the expense of acquiring educational resources.

Governments at all levels should initiate programs to regularly distribute educational materials.

References

Ilorin, Nigeria: Atoto Press, 1982. Abdullahi, A. Science Education in Nigeria.

There was an article published in 1997 by Adebimpe, A.O. Making Do with Makeshift Science Classroom Materials. Reference: Kano, Nigeria, pp.55-60, Proceedings of the 40th Annual Conference of STAN (PACS'97).

Authors: Agina-Obu, T.N. To be published in Robert-Okah, I., and Uzoeshi, K.C. (Eds.), The Role of Instructional Materials in the Classroom. Teaching Theories as Classroom Practice, Harey Publication, Port Harcourt. Integrated Science Teachers' Use of Laboratory and Other Resources and the Money They're Allowed to Spend by Bernadette C. Aguisibo. Afro-American Journal of Education, 1(29-36).

In I.A. Akanbi & Co. Reasons for Fewer Students Taking Physics in Nigerian High Schools, with Emphasis on Ogbomoso L.G.A. Research paper written for the B.S. in Education majoring in Curriculum Studies and Educational Technology (CSET), but never published. School of Ilorin, in the city of Ilorin. According to Akintayo (1980), "A survey of the Learning and Teaching Problems of History in Secondary Schools in Central Local Government Area of Ondo State of Nigeria," this is a problem in the region's secondary education system. A Bachelor of Education Dissertation Never Before Presented for Publication.

Orukota, A., and A. Akinyemi, 1995. Ibadan, University Press, "Science and Society."

E.O. Akuezillo, 1995. Teaching Strategies and Science Learning Outcomes: An Experiential Study. 26 (1), pp. 76–81, Journal of the Nigerian Association of Science Teachers.

In 1985, T.A. Balogun said that there was a growing interest in STEM education in Nigeria. Nigerian Teachers' Association Journal, Volume 23 Numbers 1 and 2, Pages 92–99.

The Availability of Science Education Resources in Public Secondary Schools, Bassey, M.P., 2002. A Look at a Sample of Secondary Institutions in the Alimosho Local Government Area as a Case Study.

Author: Daramola, S.O. Preferences for Physics Among Kwara State College Students and Their Mathematical Thinking. 28th Annual Conference of the Science Teacher Association of Nigeria. Edited by A. Abdullahi.

The Effects of Low Achievement in Physics on a Country's Economic Growth, O.U. Egbugara 1986. Ayorinde, D. (Ed. National Conference on Mass Failure Proceedings, pages 228-235.

Genre Problems in the Progress of Science and Technology Education Esiobu, G.O. NERDC Press, Lagos, pp. 137-156, Science and Technology Education for Development, Uwowi, U.M.O. (Ed.).

Frazer, B.J.; Okebukola, P.A.O.; and Jegede, O.J.; 1992. Evaluations of the Instructional Practices in Nigerian Science Labs. Sci. Educators' Journal of Nigeria, Volume 27.

Isola, O.M. (2010). The Impact of Standardized and Adapted Instructional Materials on Secondary School Physics Learners' Achievements. University of Ibadan Master of Education Thesis.
In 2002, B. Moronfola wrote a paper titled "Effects of Instruction Resources on the Academic Achievements of Secondary School Students in the Ilorin Local Government of Kwara State." Thesis submitted for the Master of Education degree but never submitted for publication.
STAN Physics for Senior Schools. Obioha, N.E., 2006. Nigerian publishers Heinemann Educational Books.
Assuring Efficient and Efficient Use of Resources for Physics Education in Schools, Ogunleye, B.O., 2002. University of Lagos, Nigeria, STAN'00 Proceedings, pp. 215-220. STAN is the Science Teachers' Association of Nigeria.
E.O. Omosewo, 1999. Effects of Post-Laboratory Discussion Planning on Physics Learning Outcomes. 116–121 in the 4(2) issue of the Journal of Educational Foundations.
As cited in Omosewo (1993). Examining Kwara State's High School Physics Enrollment Trends. Education Research in Ife, Nigeria, Volume 6 Issue 1 (pp. 141–150).
Theresa A. Popoola (1980). Examining the Connection Between School Funding and Student Achievement in Secondary Education in the Abeokuta LGA, Ogun State, Nigeria" Unpublished Master of Education Thesis.

Table 1: Assignment of Samples into Treatments Groups

Group	Pre-test	Treatment	Post-test
Experimental group (1)	01	X_1	04
Control group	02		05
Experimental group (2)	03	X_2	06

Table 2: Summary of ANCOVA of Post Test Achievement by Treatment and Gender

Hierarchical Method					
Source of Variance	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Covariates PRE	163.013	1	163.013	3.298	.075
Main Effects (Combined)	11465.799	3	3821.933	77.334	.000
TREATMENT	11462.611	2	5731.306	115.969	.000
SEX	3.188	1	3.188	.065	.800
2-way Interactions TREATMENT		2	95.233	1.927	
SEX	190.466				.156
Model	11819.277	6	1969.880	39.859	.000
Residual	2619.323	53	49.421		
Total	14438.600	59	244.722		

Significant at PTable 3: Multiple Classification of Post Test Achievement by Treatment and Gender.