

**EFFECT OF STANDARDISED AND IMPROVISED TEACHING AIDS ON SENIOR
SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN PHYSICS,
ADAMAWA STATE, NIGERIA**

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Abstract

The study examined effect of standardized and improvised teaching aids on the academic achievement of secondary school physics students in Girei local Government Area Adamawa State, Nigeria. Quasi-experimental design was adopted. 136 SS II students using two co-educational students. Physics Achievement Test (PAT) adopted from WAEC past questions from 2009-2014. One research question was raised and three hypotheses were formulated and tested. Hypotheses were analysed using ANCOVA. Findings revealed that there was no significant difference in the achievement of students taught physics using standardised and improvised teaching aids. Students taught with improvised aids obtained similar scores with the standardized group { $F = 0.089$, (df 2,190); $P = 0.766$ }. There was no significant effect of gender on students 'achievement in Physics. The researcher concluded that the improvised teaching aids can stand in the absence of the standardised teaching aids especially in the northern part of Adamawa where schools were destroyed due to insurgency.

Keywords: Improvised Teaching aids, Standardized Materials, Students' Academic Achievement

1.1 Background of the Study

Science is the study of the natural world based on facts learned through experiment and observation, nowadays, nations all over the world including Nigeria are striving hard to develop

technologically and scientifically, since the world is turning scientifically and all proper functioning of lives depend greatly on technology. According to Ogunleye (2002) science is a dynamic human activity concerned with understanding the workings of our world. This understanding helps man to know more about the universe. Without the application of science, it would have been difficult for man to explore the other planets of the universe. Science comprises the basic disciplines such as physics, chemistry, mathematics and biology. Esiobu (2005) has shown that secondary school students are exhibiting dwindling interest in science. Besides, physics as one of the science subjects remains one of the most difficult subjects in the school curriculum according to the Nigeria Educational Research and Development Council, NERDC (Isola, 2010).

physics is the branch of science concerned with the nature and properties of matter and energy. The subject matter of physics includes mechanics, heat, light and other radiations, sound, electricity, magnetism, and the structure of atoms. What makes physics difficult? Many students think and say, "Physics is difficult." A major student-related factor, such as not studying more have the most influence on student's success in physics. Students find physics difficult because they have to compete against different representations such as experiments, formulas and calculations, graphs, and conceptual explanations at the same time (Webster Dictionary, 2004)

The mastery of Physics concepts might not be fully achieved without the use of instructional materials. The teaching of Physics without instructional materials may certainly result in poor academic achievement (Bassey, 2002). Insufficient resources are major cause of poor performance in science as highlighted by Ajileye (2006); the insufficient resources include laboratories, science equipment, and specimens to be used as teaching aids, Ukwuoma (1990) in his investigation of factor impair science education pointed out that over 80% of failure in science and technology is due to the inability of students to do well in practical Researchers such as Obioha (2006) and Ogunleye (2002) reported that there were inadequate resources for teaching Science subjects in secondary schools in Nigeria. They further stated that the available ones are not usually in good conditions. There is the need therefore, for improvisation.

Gender related issue in science education is one of the variables of great concern to researchers. Gender can be said to refer to stereotyping, a collection of commonly held beliefs or opinions about what are appropriate behaviors and activities for males and females. In the view of Oladele (as cited in Haig, 2004), the whole idea of gender and stereotyping permeates all human activities and colour our expectations of capabilities of individuals thereby limiting their aspirations.

Improvisation is a case of making available substitutes in science materials in case of emergency or lack in the process of teaching and learning of science. The use of such materials have been researched to be useful to the teaching and learning of science as it influences the activities of the teacher as well as the interest of the students. However, their availability has not been fully encouraging; hence, most teachers do improvise the materials while others do not (Chudi, 2013).

1.2 Statement of the Problem.

The dearth of teaching aids occasioned by decline in finances has made improvisation a necessity in our education system. Similarly some standardized teaching aids are too expensive. If teachers are to improvise teaching aids for teaching physics, it becomes necessary to investigate the effects of improvised teaching aids and standardized teaching aids materials on students' academic achievement. Hence, the problem of this study is to investigate the effect of standardized and improvised teaching aids on the academic achievement of physics students in Girei Local Government Area of Adamawa state.

1.3 Purpose of the Study

The purpose of the study was to examine the effect of standardized and improvised teaching aids on students' academic achievement in physics in Adamawa State. Specifically, the study sought to:

- (i) Determine the academic achievement of secondary school students when taught physics with Standardized and improvised teaching aids.
- (ii) Determine gender difference in the academic achievement of secondary school students when taught physics with standardized and improvised teaching aids.
- (iii) Determine interaction effect of treatment and gender on students' achievement in physics.

1.4 Research Question

What are the mean differences of senior secondary school students when taught physics using standardized and improvised teaching aids.

1.5 Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance.

H₀₁: There is no significant difference in the academic achievement of senior secondary school students when taught physics using Standardised and improvised teaching aids

H₀₂: There is no significant gender difference in the academic achievement of senior secondary school students when taught physics using standardised and improvised teaching aids.

H₀₃: There is no significant interaction effect of treatment and gender on student's achievement in physics.

2.1 Concept of Teaching Aids

According to Abdullahi (1982) teaching aids are materials or tools locally made or imported that could make tremendous enhancement of lesson impact if intelligently used. Ikerionwu in Isola, (2010) referred to them as objects or devices, which help the teacher to make a lesson much clearer to the learner. Teaching aids are also described as concrete or physical objects which provide sound, visual or both to the sense organs during teaching (Agina-obu, 2005). Instructional materials are the different teaching aids or apparatus which a classroom teacher employs to facilitate his or her teaching for the achievement of the stated objective (Nwike and Onyegbudo2013). Agun (1992) defined instructional materials as those materials which are helpful to the teachers and students and which maximize learning in various areas. The importance of teaching aids are in the teaching and learning process cannot be over-emphasized; as without them teaching and learning will not be lively, meaningful and understandable. In support of the above fact, Uzoegwu (2001) maintained that teachers should employ instructional materials in their teaching in order to make sure that teaching is more permanent in the minds of the learners. The components of instructional materials available to teachers and students are in large numbers and also vary according to the functions of each of them

2.2 Teaching Aids and Gender

Isola (2010) studied on gender difference in academic achievement of primary school pupils in English language and Mathematics in relation to the results obtained, observed significantly difference among female and male students in the two subjects and the difference was in favor of using instructional materials. The results also agree to the view of Moronfola (2002) who stressed that science subjects should be taught primarily as a practical subject. Omosewo (2008) ascertained that in a modern science curriculum program, students (male and female) need to be encouraged to learn not only through their eyes or ears but should be able to use their hands and head to

manipulate apparatus. Mbah (2013) in his researched on instructional materials found out that both male and female students perform better when taught with instructional materials.

3.1 Research Design

The research design adopted for the study was the pre-test, post-test and non control group quasi-experimental design. This is because there was no randomization of students to the groups. The mean scores of the test were used to test each of the hypotheses.

3.2 Sample and Sampling Techniques

Purposive sampling technique was used in selecting the two (2) schools; the purpose behind the selection is because in Government secondary School Girei the school laboratory is well equipped with the standardized materials while Government Secondary School Vunokland does have the real materials, the school is always depending on other schools when it comes to practical class. Schools selected were: Government Secondary School Girei and Government Secondary School Vunoklang. Both schools had only one class each that is offering physics; called science class. Therefore all the intact classes were used for the study. The schools were co-educational, both girls and boys are involved in treatment because of these all the students were suitable for the study. In Government Secondary School Girei, a total of 65 students' were in SS 11 and all of them offer physics, out of which 32 are male students while 33 are female students. Lastly in Government secondary school Vunoklang 71 students offer physics, such that 36 are male students while 35 are female students. Thus, a sample of 136 SSII Students (68 males and 68 females) participated in the study. The two schools served as experimental groups

Table 2: Sample of the Study

School	Student No.		Total Sample
	M	F	
GSS Girei	32	33	65
GDSS Vunoklang	36	35	71

3.3 Instrument for Data Collection

The instrument that was used in this study was Physics Achievement Test (PAT). The Physics Achievement Test (PAT) contains 60 multiple choice objective test items with one key and three distracters. The instrument was adopted from West African Examination Council (WAEC) Syllabus and WAEC physics past questions from 2009-2014. The questions covered all the content of the selected topics in which the test was designed to test the students' achievement.

4.1 Results and Discussion

4.1.1 Test of Research Question and Hypotheses

One research question was formulated and analyzed using descriptive statistics, three hypotheses were also formulated and tested using ANCOVA and tested at 0.05 level of significance.

Research Question 1: What are the mean differences of senior secondary school students when taught physics with standardized and improvised teaching aids.

Finding: From Table 1, the mean difference in the pre-test and post-test score of the standardized group was 37.21 while the mean difference in the improvised group was 35.37 which is almost the same while the mean difference in female standardized group was 19.76 while the female in the improvised group scored 18.15 which are almost equal to the female in the standardized group. The male in the standardized group scored 17.45 at their mean difference while male in the improvised group scored 17.22 which is almost the same with that of the female in the standardized group. The total difference in the standardised pre-test group was 25.13 while the total.

pre-test for the improvised group was 25.87 and the mean difference of both the pre-test group was 0.74 while the mean difference of both post test was 0.10.

4.1.2 Hypotheses testing

HO₁: There is no significant difference in the academic achievement of senior secondary school students when taught physics using standardized and improvised instructional materials

Findings: The results of the analysis in Table 4 shows that, there is no significant difference between standardized and improvised teaching aids on students' achievement in physics $F = 0.089$ (df 1,135), $P = 0.766$. Since the computed p-value (0.766) is greater than 0.05 level of significance, therefore, the null hypothesis of no significant effect is not rejected, which means there is no

significant difference between improvised and standardized instructional materials on students' achievement in physics.

HO₂: – There is no significant gender difference in the academic achievement of secondary school students when taught physics using standardized and improvised instructional materials.

Findings: From Table 5, the gender difference on students academic achievement when taught physics is not significant $F= 0.76$ (df 1,135), $P=0.38$. Since the computed P-value (0.38) is greater than 0.05 level of significant, therefore, the null hypothesis that there is no significant gender difference is not rejected. This means that gender does not have any significant effect on the type of teaching aids used. The partial eta of 0.002 indicates that gender did not cause increase in students' achievement

HO₃: There is no significant interaction effect of treatment and gender on student's achievement in physics is not sensitive to gender and will be effective irrespective of student gender.

4.1.3 Discussion of Results

The aim of the study was to investigate the effect of standardized and improvised teaching aids on senior secondary school student's academic achievement in physics in Adamawa State. PAT was administered to both the standardized and the improvised instructional groups. The pretest and the post-test mean scores revealed that there was no significant difference in the student's achievement in physics. All the students in the standardised group as well as those in the improvised group performed or scored almost the same as their post test scores were 20.98 and 20.14. This means that improvised teaching aids can be used in the absence of the standardized teaching aids. This finding is contrary to the findings of Oladejo, Gbolagade, Amos and Olawale (2011). Their result revealed that there was a significant difference in the achievement of students taught physics using standard instructional materials and those taught with improvised instructional material. Thus, the students taught with improvised instructional materials obtained the higher achievement score at post test ($F=74.94$), followed by those with standard instructional materials ($F=63.07$). Similarly, Onasanya and Omosewo (2011) found that there was no significant difference between the students taught with standard instructional materials and those taught with improvised instructional materials. The findings also showed that gender had no effect on performance of the improvised group, which means that both male and female students performed equally in their groups. Mbah (2013) in his research on instructional materials found out that both male and female student performed better

when taught with instructional materials, this is also the same with my findings which also revealed that there was no significant gender difference in students' academic achievement when taught physics using improvised and standardized teaching aids. Isola in his research also found out that there was no significant effect on gender achievement in physics. It implies that both male and female students achieved equal under the same condition during teaching process since achievement has to do with mental and intellectual ability and not gender. Thus, the effect of treatment was significant but the interaction effect with gender was not significant, it then means that the treatment does not depend on gender to be effective as revealed by the partial eta of 0.004. In other words, the treatment is not sensitive to gender and will be effective irrespective of students gender.

5.1 Conclusion

The study revealed that there was no significant difference in the performance of secondary school students when taught physics with improvised and standardized teaching aids, in Adamawa State. Both male and female students showed improvement in their performances when they were taught with improvised teaching aids while Students gender did not account for any increase in their performance in the standardized group. This implies that the quality of teaching aids had no effect on achievement because both the standardized and the improvised teaching aids did not affect gender performance. Lastly, there was no interaction effect of treatment and gender on students' achievement in physics.

5.2 Recommendations

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

- 1) Improvised and standardized instructional materials should be used in teaching physics
- 2) Teachers and students should be encouraged to form the habit of improvising instructional materials to make up the shortfall in supply
- 3) There is the need for teachers to be resourceful in instructional materials selection and utilization.
- 4) Sufficient time should be created for science teachers to improvise. In this regard excess work load of those that wish to improvise should be reduced to allow them more time to think and carry out the act.
- 5) Science teachers in educational institutions should be granted in-service training to acquire more knowledge and skills, which can help them to improvise equipment.

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