

**EFFECTS OF IMPROVISATION OF INSTRUCTIONAL MATERIALS ON  
SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN BASIC SCIENCE AND  
TECHNOLOGY IN EKITI STATE, NIGERIA**

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**ABSTRACT**

The research aimed to explore the impact of improvised instructional materials on the academic performance of secondary school students in Basic Science and Technology within Ekiti State, Nigeria. The study employed a quasi-experimental pre-test, post-test, non-equivalent design. The target population comprised all junior secondary school two (JSS2) Basic Science and Technology students in Ekiti State. A sample of 120 students was selected through a multi-stage sampling technique, and data were collected using a self-constructed instrument titled Basic Science and Technology Achievement Test (BASATAT). The instrument's face and content validity were ensured, and its reliability was established through the test-retest method, resulting in a reliability coefficient of 0.75. Two research questions were formulated, leading to two corresponding hypotheses tested at a 0.05 significance level. Research questions were addressed using statistical measures such as mean and standard deviation, while hypotheses were analyzed using t-test and ANCOVA. The findings indicated that students exposed to Basic Science and Technology instruction

with improvised materials exhibited significantly higher academic achievement compared to their counterparts in the conventional group. The study recommends that Basic Science and Technology educators enhance their creativity by incorporating locally available instructional materials from their immediate environment when standard materials are unavailable. This approach is suggested to positively impact students' achievement in Basic Science and Technology.

**Keywords: Key words: Improved instructional materials, Basic Science and Technology, Achievement, Improvisation.**

## **INTRODUCTION**

Education is a wide concept that gives different meaning to different people depending on the context at which we view it. Education can be defined as an accumulation of experiences either positives or negatives that reshapes one's thinking day by day (Anaechi, 2014). It is the process of training, and learning especially in schools or colleges. It is largely dependent on what teachers do and what the learners are able to take from teaching and learning situation and more importantly the extent to which what the learners took away learning situation is able to influence them in a positive way (Dimson, 2011). Hence education is an instrument of positive change for national growth and development.; yet in our country today there are evidences of decline in the standard and quality of education. This has been attributed to poor classroom environment, (Oludipe, 2018), lack of relevant support from school management, (Ajayi, 2018), lack of relevant instructional materials (Aina, 2013) and method of instructional delivery by the teachers (Adegbite, 2017).

To improve the quality of education to a reasonable level, teachers should be resourceful and creative by breaking the monotony of oral instruction in the teaching and learning process; this will make it possible for instructional contents to be presented by teachers in an easy way such that learners will be able to learn with ease and practice what they learnt in the classroom with their day to day activities.

However the reality on ground in the contemporary Nigerian environment today is that most often instructional materials required to delivered lesson content in order to achieve the lifelong education or quality education are scarce and in most cases not available in the schools (Asubiojo, & Aladejana 2019). This has been attributed to serious economic melt-down occasioned by covid19 pandemic and other factors which have been resulted in budget cuts allocated to education sector in Nigeria.

The researcher carried out a review of budgetary allocation to educational sector between 2010-2020 and come out with following data.

<b>Year</b>	<b>Budgetary (NTrillion)</b>	<b>Education Allocation (NBilion)</b>	<b>Percentage allocated to school</b>
2010	5.160	249.09	4.83
2011	4.877	306.30	9.30
2012	4.987	400.15	9.86
2013	4.987	426.53	10.1
2014	4.962	493.00	10.5
2015	5.068	392.20	10.7
2016	6.061	369.60	7.92
2017	7.444	550.00	7.40
2018	8.612	605.80	7.04
2019	8.880	620.50	7.05
2020	10.330	691.07	6.7

Table 1: Nigerian Budgetary Allocation to Education 2010-2020

*Source: Vanguard Newspaper, Nigeria. November 10,2020.*

The table reveals that for 10 years periods, the education sector got an arrange of 18 trillion (7.24%) as against 15.20% recommended by UNESCO. This is grossly inadequate to cater for expenses of both human and materials services in educational enterprise. In this type of situation, the teacher has no alternative than to use their initiative and creative ability to sourceout instructional materials in his immediate environment in order to concretize his

lesson activities and achieve his lesson objectives; this method is often referred to as improvisation.

Oludipe, (2014) defines improvisation as an act of producing and using local resources in the absence of real ones in teaching and learning situations. Improvisation is also the act of using alternative materials and resources to facilitate instructions whenever there is lack or shortage of specific first hand teaching aids.

Udosan &Ekukinan (2019), defines improvisation as making or inventing a piece of teaching equipment in emergency. The use of improvised instructional materials provides the learners a first-hand experiences during teaching and learning process and minimize the boredom on the path of the learners. Abbot, (2007) sees improvisation as making use of substance from local materials found at home or community, and school compounds when the real or original materials are not available.

Therefore improvisation of instructional materials refers to ability of teachers to source out for local materials resources to enhance instructional process when the ideal ones are not readily available. It creates a clearer picture of the concept taught, makes the lesson interesting and improves the retention ability of learners.

The use of improvised instructional materials and exposure of students to resources available in their immediate environment for instruction at this level brings students to real world of activities and help students gain scientific skills. The environment of the school as well as the home of teachers provide nice sources of materials and resourceful teacher can on his/her own or with the help of the students and members of the society, improvised these materials for teaching/learning purpose.

Students improvised instructional materials ensured the realization of lesson objectives, help in solving the problem of lack of equipment in educational institutions, gives room for the students to demonstrate his creative skills and enable students to make use of cheap local material as alternatives to the expensive foreign ones (Uguche & Usman, 2019).

### **Statement of the Problem**

Within the educational system, success is traditionally gauged by a student's academic achievement, measuring how well they meet the institution's established standards. The

persistent challenge of student failure, particularly in Basic Science and Technology, has become a pressing concern for parents, government authorities, and stakeholders alike. The subpar performance of students in this subject, both in internal and external examinations, has raised significant apprehensions. The ongoing issue of poor achievement in Basic Science and Technology demands immediate attention.

Several research studies have delved into the reasons behind students' suboptimal performance in Basic Science and Technology. Many of these investigations have identified factors such as a dearth of instructional materials, a shortage of qualified teachers in basic science and technology, teachers' inability to effectively engage students in laboratory practical assignments, and insufficient support from school management as potential contributors to the problem. However, it appears that the capacity of teachers to demonstrate creativity and innovation in developing suitable instructional materials for classroom teaching may play a crucial role in enhancing students' academic achievement.

Therefore, this study aims to explore the impact of improvised instructional materials on students' achievement in Basic Science and Technology, recognizing the potential of teachers' creative approaches to positively influence academic outcomes.

### **Purpose of Study**

The primary objective of this research was to investigate the impact of instructional materials improvisation on students' academic achievement in Basic Science and Technology within Ekiti State. Specifically, the study aimed to:

- i. assess the variance in academic achievement between students instructed with improvised instructional materials and those taught using conventional methods in Basic Science and Technology.
- ii. Identify and analyze the disparities in achievement among male and female students when exposed to improvised instructional materials in Basic Science and Technology.

### **Research Questions**

1. Is there a significant difference in the mean achievement scores of students instructed with improvised instructional materials compared to those taught using conventional methods in Basic Science and Technology?
2. Is there a significant difference in the mean achievement scores between male and female students when exposed to improvised instructional materials in Basic Science and Technology?

### **Research Hypotheses**

The study is guided by the following hypotheses:

1. There is no significant difference in the mean achievement scores between students instructed with improvised instructional materials and those taught through conventional methods in Basic Science and Technology.
2. There is no significant difference in the mean achievement scores of male and female students when exposed to improvised instructional materials in Basic Science and Technology.

### **Research Method**

The research utilized a quasi-experimental pre-test, post-test control group design. The study focused on all junior secondary school two (JSS2) students enrolled in Basic Science and Technology in Ekiti-State secondary schools. The sample comprised 120 JSS2 Basic Science and Technology students, chosen through a multi-stage sampling technique.

The initial stage involved selecting four local governments from each of the three senatorial districts in Ekiti-State. The second stage entailed choosing three schools from each selected local government using simple random sampling. Subsequently, 10 students were selected from each school using purposive random sampling, and these samples were assigned randomly to experimental and control groups. The data collection instrument employed was the Basic Science and Technology Achievement Test (BASTAT), consisting of two sections (A and B). Section A gathered respondents' bio-data, including school name, location, student sex, and age. Section B comprised 40 multiple-choice questions on concepts like motion, habitat, and basic tools.

The instrument underwent validation by experts in test and measurement and two seasoned Basic Science and Technology teachers. Reliability, determined through the Test-retest method, yielded a coefficient of 0.75. The experimental group received instruction with improvised materials, while the control group was taught using conventional methods. A pre-test was administered initially to establish the students' baseline knowledge and the academic homogeneity of the experimental and control groups.

After the treatment, a post-test was conducted, and mean and standard deviation were computed for each group to address the research questions. Null hypotheses were tested at a 0.05 significance level using analysis of covariance (ANCOVA).

**Research question 1: Is there a significant difference in the mean achievement scores of students instructed with improvised instructional materials compared to those taught using conventional methods in Basic Science and Technology?.**

**Table 2: mean achievement scores of students instructed with improvised instructional materials and those taught using the conventional method in Basic Science and Technology.**

Variable	N	PRE TEST		POST TEST		Mean Differences
		Mean	S.D.	Mean	SD	
Improvised instructional materials	60	13.53	2.27	27.80	1.88	14.27
Convectional method	60	14.05	2.45	12.40	1.75	-1.65
Total	120	13.79	2.37	20.10	7.94	6.81

Table 2 displays the average achievement scores of students who were instructed using improvised teaching materials versus the conventional method in the field of basic science and technology. The findings reveal that students exposed to improvised instructional materials achieved a mean score of 13.53, whereas those in the conventional group scored 14.05 before the intervention. Following the treatment, students taught with improvised instructional materials demonstrated a higher mean achievement score of 27.80 compared to

their counterparts in the conventional group, who scored 12.40. This suggests a notable difference in the mean achievement scores between students instructed with improvised instructional materials and those using the conventional method in basic science and technology.

**Research question 2: Is there a significant difference in the mean achievement scores between male and female students when exposed to improvised instructional materials in Basic Science and Technology?**

**Table 3: presents the mean achievement scores of students instructed with improvised instructional materials, categorized by gender**

Gender	N	PRE TEST		POST TEST		Mean Differences
		Mean	S.D.	Mean	SD	
Male	19	12.79	2.82	25.84	2.36	13.05
Female	41	14.34	2.48	25.71	1.29	11.37
Total	60	13.85	2.67	25.75	1.68	11.90

Table 3 displays the mean achievement scores of male and female students instructed with an improvised instructional strategy in basic science and technology. The findings reveal that prior to treatment, male students exposed to improvised instructional materials had a mean achievement score of 12.79, while their female counterparts scored 14.34. After the treatment, male students taught with improvised materials achieved a mean score of 25.84, and female students had a mean score of 25.71 under the same treatment conditions. This suggests that there is no significant difference in the mean achievement scores between male and female students taught with improvised instructional materials in basic science and technology.

**Hypothesis 1: There is no significant difference in the mean achievement scores between students instructed with improvised instructional materials and those taught through conventional methods in Basic Science and Technology.**

**Table 4: ANCOVA of Students' Achievement Taught With Improvised Instructional Materials & Conventional Groups.**

Source	SS1	Df	Ms	F	Sig.	Partial Eta <sup>2</sup>
Corrected model	5348.494	2	2674.202	904.490	.000	.939



Intercept	1303.041	1	1303.041	404.725	.000	.790
Covariate (Pretest)	1.729	1	1.729	.585	.446	.005
Group	5345.953	1	5345.953	1808.150	.000	.939
Error	345.921	117	2.957			
Total	49351.00	120				
Corrected Total	5694.325	119				

P < 0.05

Table 4 outlines the contrast in mean achievement scores between students instructed with improvised instructional materials and those taught using the conventional method in Basic Science and Technology. The outcome indicates that the computed f-value (1808.150) with degrees of freedom 1 & 117 reached statistical significance at the P<0.05 level for the groups. Consequently, the null hypothesis was rejected, indicating a significant difference in the mean achievement scores of students taught with improvised instructional materials and the conventional method in basic science and technology.

**Hypothesis 2: There is no significant difference in the mean achievement scores of male and female students when exposed to improvised instructional materials in Basic Science and Technology.**

**Table 5: Table 5: summary of the paired sample t-test, illustrating the difference between male and female students' mean achievement scores in basic science and technology when taught with improvised instructional materials.**

Source	N	Mean	Df	f-cal	t-table
Male	24	67.791	38	1.41	1.96
Female	16	64.875			

P > 0.05

Table 5 displays the contrast in mean achievement scores between male and female students taught with improvised instructional materials in Basic Science and Technology. The outcome indicates that the computed f-value (1.41) with a degree of freedom of 38 was not statistically significant at the p>0.05 level of significance for the group. Consequently, the null hypothesis was not rejected. This implies that there is no significant difference in the mean achievement scores of male and female students when taught with improvised instructional materials in basic science and technology.

## **Discussion**

The outcomes presented in Table 2 indicate a significant performance difference between students taught with improvised instructional materials and those instructed through the conventional method. The study found that students exposed to improvised instructional materials achieved a mean score of 27.80, surpassing their counterparts in the conventional group with a mean achievement score of 12.40.

Furthermore, Hypothesis 1, as illustrated in Table 3, supports the notion of a substantial difference in mean achievement scores between students taught with improvised instructional materials and the conventional method in basic science and technology. The computed f-value (1808.150) with degrees of freedom 1 and 117 reached statistical significance at  $p < 0.05$  for the groups.

This aligns with the discoveries of Eriba et al. (2015), who observed improved performance in chemistry among students taught with improvised instructional materials compared to those instructed using conventional methods.

Lastly, as presented in Table 4, the investigation found no significant difference in the mean achievement scores between male and female students taught with improvised instructional materials in basic science and technology. The result, with an f-value of 1.41 (which is less than the table value of 1.96) and a degree of freedom of 38, was not statistically significant at  $p > 0.05$  for the group.

While this finding supports Adegbite's (2017) assertion that there is no significant difference in the mean achievement scores of male and female students in basic technology, it contrasts with Bukoye's (2019) claim that male students outperform their female counterparts when using instructional materials. This suggests a nuanced relationship between gender, instructional materials, and academic performance, warranting further exploration and consideration in educational practices.

In light of the study's findings, it is affirmed that students taught with improvised instructional materials in Basic Science and Technology demonstrated significantly superior achievement compared to their counterparts instructed using the conventional method. This underscores the substantial role of improvised instructional materials in enhancing

instructional effectiveness in the sciences. Utilizing locally available materials from the immediate environment is identified as a practical means to address the gaps resulting from the absence of standard instructional materials, thereby positively impacting students' achievement.

### **Conclusion**

Based on the findings of this study, it was concluded that students taught with improvised instructional materials in Basic science and technology performed significantly better than their counterpart using conventional method. Hence the place of improvised instructional materials towards instructional effectiveness in sciences is established. The use of locally available materials from our immediate environment will help to bridge the gap created by lack of standard instructional material and students' achievement.

### **Recommendations**

Based on the findings of the study the following recommendations were made:

1. Teachers are encouraged to diversify their use of improvised instructional materials, ensuring relevance to lesson content. Creativity in leveraging resources within the immediate environment is crucial for effective teaching and learning in Basic Science and Technology.
2. Government and relevant professional bodies, such as the Science Teachers Association of Nigeria (STAN), should organize workshops, seminars, and conferences for science teachers. These initiatives aim to update their knowledge and enhance their skills in identifying, producing, and improvising instructional materials.
3. Authors of Basic Science textbooks should integrate worked examples utilizing improvised instructional materials where feasible. This approach contributes to better comprehension by learners.
4. Government agencies and professional bodies like the National Educational Research and Development Council (NERDC) and STAN should sponsor further research to explore the efficacy of instructional material improvisation in promoting students' achievement in Basic Science.

5. Policymakers in educational institutions should allocate funds to facilitate the sourcing of materials necessary for improvisation in schools and colleges. This strategic support ensures sustained access to resources that enhance the teaching and learning experience.

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