

# Effects Of Drill-and-practice Instructional Strategy on Senior Secondary Schools Students' Retention of Electricity Formulae in Ekiti State, Nigeria

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## Abstract

This study was carried out to examine the effects of drill and practice instructional strategy on students' retention of electricity formulae in senior secondary schools in Ekiti state, Nigeria. Pretest post-test control group quasi experimental research design was adopted. Multistage random sampling technique was used to select one hundred students from four senior secondary schools in of Ekiti State. Physics Retention Test (PRT) was used to collect the data and analyzed using ANCOVA statistics at 0.05 level of significance. The findings revealed that there were no significant effects of drill and practice instructional strategy on students' retention of electricity formulae. Sequel to the findings, recommendations were therefore made that that the policy makers and curriculum planners should not only elucidate on effective conventional teaching method but also incorporate drill and practice instructional strategy due its versatilities among others.

**Keywords:** *Formulae, Electricity, Retention Strategy, Drill and Practice*

## Introduction

The achievements and exploit of 20th-century, physics have empowered all the sciences and caused a new dispensation of inventions (Canter, 2015). The level of inventions in physics has

increased sporadically in the past years (Aydoğdu, 2018, Kennedy, 2016). Physics as a subject is being connected to the beginning and future of the world itself (Cuhls, Blind & Grupp, (2012).

With the subject now linked greatly to the other sciences and playing vital roles in the area of contribution to national goals, education in this area of specialization is very germane. Physics situated at the centrality of the technology driving our economy, and general scientific literacy must be a major goal of physics education in various levels (Graham, 2018). This Physics is described as the study of energy and matter in space and time and how they are related to each other (Aladejana & Ukoh, 2022). The challenges that physics can solve are global challenges, and physics itself has become a more world enterprise (Hazari, Sonnert, Sadler & Shanahan, 2010; Petroski, 2011).

In recognition of importance of Physics in the global society, Federal Ministry of Education (FME, 2009) developed a Physics curriculum for senior secondary schools' students with the general objectives of providing basic literacy in Physics education for functional living in the society and acquiring basic concepts and principles of Physics as a preparation for further studies amongst others. To achieve the above, secondary school Physics curriculum should stress on unifying principles and concepts with a better and modified teaching methods. The Physics curriculum emphasizes that students must be well trained and developed at the right from lowest level of cognitive domain to acquire the basic knowledge needed to comprehend the physics

concepts and principles as a functional tool for societal development.

However, West African Examination Council (WAEC) chief examiners' reports (2019, 2020) on performances of students in Physics in senior secondary school certificate examinations (SSCE) revealed that most students had difficulty in solving problems set on electricity. Suggesting remedies, WAEC's chief examiners' reports (2019, 2020) stated that teachers should explain theories and principles well for students to understand and also apply them. Most theories, principles, laws and other aspects of electricity are expressed in equations and formulae. These equations and formulae played crucial in solving problems in electricity. The understanding, mastery, applications and retention of these equations and formulae play significant role in the accomplishment of educational and societal goals (Koskei, Itegi & Muchanje, 2020) and which require several repetitions and practices. The systematic repetition of equations and formulae is known as drill and practice strategy (Aladejana & Fatoba, 2022). This strategy is a routined and repetitious exercise used as a way of learning skills or procedures and perfect them. According to Rusman (2011) learning drills are a means of learning to develop learners on the lesson material that has been given and it has been

proven to be effective instructional strategy that improves students' retention (Mohan, Arumugam, Haniffa, Mariandaram & Haron, 2018; Eze, Onwusa & Nwaosa, 2020).

Similarly, findings revealed that gender differences exist in students' retention (Alaniz-Alvarez, Cruz-Alaniz & Nieto-Samaniego, 2018; Eze, Obidile & Otokutu, 2020). Alaniz-Alvarez, Cruz-Alaniz & Nieto-Samaniego (2018) reported that girls outperformed boys in short term retention in 7<sup>th</sup> grade but the same with boys in 9<sup>th</sup> grade exams. Also, Eze, Obidile & Otokutu (2020) found that there exists significant gender difference in the mean scores of male and female students' retentions. This gender according to Myers (2002) in Fatoba & Aladejana (2014) is described as characteristic through which male or female as defined by people.

### **Statement of the Problem**

Students in all parts of the globe, most especially in Nigeria have been found to have a lot of challenges with memorization, mastery, applications of formulae in solving problems in electricity. Many studies have been carried in order to address the problem but the problem still persists. Therefore, the study investigated the effects of drill-and-practice instructional strategy

on senior secondary students' retention of electricity formulae.

### **Research Hypotheses**

Three research hypotheses were formulated and tested:

**H<sub>01</sub>:** There is no significant effect of treatment on students' retention of electricity formulae in senior secondary school.

**H<sub>02</sub>:** There is no significant effect of gender on students' retention electricity formulae in senior secondary school.

**H<sub>03</sub>:** There is no significant interaction effect of drill and practice strategy in students' retention electricity formulae.

### **Significance of the Study**

This study is of great significance to curriculum developers, ministry of education, students, teachers and parents

### **Research Design**

This study adopted 2 X 2 control group pre-test, post-test quasi-experimental research design

### **Population of the Study**

The targeted population for this study consisted of senior secondary school Physics students in Ikole local government of Ekiti State.

### **Sample and Sampling Technique**

Multistage random sampling technique was used to select one hundred students from four senior secondary schools in Ikole local government area of Ekiti State, Nigeria.

### Instruments for Data Collection

The only instrument used for data collection was Electricity Formulae Retention Test (EFRT) which contained twenty multiple choice objective items developed by the researcher.

### Method of Data Analysis

Analysis of covariance (ANCOVA) was used to analyses the data collected.

### Testing of Hypotheses

**Hypothesis 1:** There was no significant effect of drill and practice instructional strategy on students' retention in senior secondary school in Ekiti State, Nigeria.

**Table 1: A two-way Analysis of Covariance (ANCOVA) summary of drill and practice instructional strategy on students' retention.**

Dependent Variable: Post test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
Corrected Model	4069.697 <sup>a</sup>	4	1017.424	3.045	.021	.125	12.178	.784
Intercept	12620.070	1	12620.070	37.765	.000	.308	37.765	1.000
Pretest	1880.580	1	1880.580	5.628	.020	.062	5.628	.650
Group	1000.407	1	1000.407	2.994	.087	.034	2.994	.402
Drill	784.706	1	784.706	2.348	.129	.027	2.348	.328
Group * Practice	171.403	1	171.403	.513	.476	.006	.513	.109
Error	28405.025	95	334.177					
Total	413375.000	100						
Corrected Total	32474.722	99						

a. R Squared = .125 (Adjusted R Squared = .084)

b. Computed using alpha = .05

Table 1 showed a two-way Analysis of Covariance (ANCOVA) summary of drill and practice instructional strategy on students’ retention. A Levene test was used to analyze the homogeneity of the variances. As a result of the analysis, it was found that the variances for the drill and practice instructional strategy on students’ retention are homogeneous ( $F=0.087, p>0.05$ ). Based on the two-way ANCOVA conducted, it was found that there was no significant effect of drill and practice

instructional strategy on students’ retention after treatment  $F(1, 95) = 0.513, p = 0.476, \text{partial } \eta^2 = 0.006$ . Since 0.476 is greater than 0.05 (at the 95% level of confidence) obtained for both public and private school students involved in the study was not significant at 0.05 level of significance. This indicated that there was no significant effect of drill and practice instructional strategy on students’ retention. Based on this, the null hypothesis was accepted.

**Hypothesis 2:** There is no significant effect of gender on students’ retention of electricity formulae in senior secondary schools in Ekiti state

**Table 2: A two-way Analysis of Covariance (ANCOVA) summary of gender effect on students’ retention.**

**Tests of Between-Subjects Effects**

Dependent Variable: Post-test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
Corrected Model	3138.066 <sup>a</sup>	3	1046.022	3.066	.032	.097	9.199	.700
Intercept	12059.927	1	12059.927	35.354	.000	.291	35.354	1.000
Pretest	1537.401	1	1737.401	5.093	.027	.056	5.093	.607
Group	230.889	1	230.889	.677	.413	.008	.677	.129
Gender	29.477	1	29.477	.086	.769	.001	.086	.060
Group * Gender	.816	0	.816	.035	.364	.002	.035	.
Error	29336.656	96	341.124					
Total	413375.000	100						
Corrected Total	32474.722	99						

a. R Squared = .097 (Adjusted R Squared = .065)

b. Computed using alpha = .05

Table 2 showed a two-way Analysis of Covariance (ANCOVA) summary of gender effect on students' retention. A Levene test was used to analyze the homogeneity of the variances. As a result of the analysis, it was found that the variances for the genders' effect on students' retention are homogeneous ( $F=0.086$ ,  $p>0.05$ ). Based on the two-way ANCOVA conducted, it was found that there was no effect on students' retention after treatment  $F(0, 96) = 0.035$ ,  $p = 0.364$ , partial  $\eta^2 =$

$0.002$ . Since  $0.364$  is greater than  $0.05$  (at the 95% level of confidence) obtained for both male and female students involved in the study was not significant at  $0.05$  level of significance. This indicated that there was no significant effect of gender on students' retention. Hence, the null hypothesis was accepted.

**Hypothesis 3:** There is no significant interaction effects of drill and practice instructional strategy and gender on students' retention.

**Table 3: Interaction effects of drill and practice strategy and gender on students' retention.**

**Tests of Between-Subjects Effects**

Dependent Variable: Post-test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
Corrected Model	3238.086 <sup>a</sup>	3	1036.032	3.066	.032	.097	9.199	.700
Intercept	13069.917	1	13059.917	34.34	.000	.291	34.354	1.000
Pretest	1537.401	1	1737.401	5.093	.027	.056	5.093	.607
Group	230.889	1	230.889	.677	.413	.008	.677	.129
Drill	29.477	1	29.477	.086	.769	.001	.086	.060
Group * Practice	.816	0	.816	.039	.374	.002	.035	.
Error	29336.656	96	341.124					
Total	413375.000	100						
Corrected Total	32474.722	99						

a. R Squared = .097 (Adjusted R Squared = .065)

b. Computed using alpha = .05

Table 3 showed a two-way Analysis of Covariance (ANCOVA) summary of interaction effect of drill and practice strategy in students' retention. A Levene test was used to analyze the homogeneity of the variances. As a result of the analysis, it was found that the variances for the drill and practice strategy and gender on students' retention are homogeneous ( $F=0.076$ ,  $p>0.05$ ). Based on the two-way ANCOVA conducted, it was found that there was no effect on students' retention after treatment  $F(0, 96) = 0.039$ ,  $p = 0.374$ , partial  $\eta^2 = 0.002$ . Since 0.374 is greater than 0.05 (at the 96% level of confidence) obtained. This indicated that there was no significant effect of drill and practice strategy and gender on students' retention. Therefore, the null hypothesis was accepted.

### Discussion of the Findings

The study x-rays the effects of drill and practice instructional strategy on the senior secondary students' retention of electricity formulae. The finding of this study reveals that there was no significant effects of drill and practice instructional strategy on students' retention of electricity formulae. This is in line with the finding of Aladejana & Fatoba (2022) that students exposed to conventional method outperformed the students taught using drill and practice instructional strategy. However, the finding contracts earlier findings of Mohan, et.al (2018) and Eze, Onwusa & Nwaosa (2020) that drill and

practice instructional strategy improves students' learning outcomes.

Also, the finding of this study revealed that there was no significant effect of gender on students' retention of electricity formulae.

Similarly, the finding of this study revealed that there was no significant interaction effects of drill and practice instructional strategy and gender on students' retention of electricity formulae. This is in agreement with the finding of Aladejana & Fatoba (2022) that the strategy and gender do not have significant interaction effects.

### Conclusion

Sequel to the results of this study on the effects of drill and practice instructional strategy in students' retention of electricity formula, it was found that drill and practice instructional strategy has no significant effects on students' retention of electricity formulae. Similarly, gender has no significant effects on students' retention of electricity formulae. Finally, drill and practice instructional strategy and gender have no significant interaction effects on students' retention of electricity formulae.

### Recommendations

In line with the findings of this study, the following recommendations are made:

(a) Though drill and practice instructional strategy has no effects on students' retention of electricity formulae, nevertheless, the teaching of physics in secondary school should be carried out in a way that learners will effectively comprehend and learn the concept taught. It should be done in such a way that combination of conventional method and drill and practice instructional strategy will be used to enhance retention of electricity formulae due to the fact that it has capacity of playing greater role in students' retention.

At the various level of government, workshops should be organized regularly and frequently for physics teachers on drill and practice instructional strategy.

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