

## **Effects of Computer Game-Based Teaching Strategy on Junior Secondary Schools Computer Studies Students' Retention Abilities and Gender in Rivers State.**

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### **Abstract**

The study investigated the effects of computer game-based teaching strategy on Computer Studies students' retention abilities and gender in junior secondary schools. Two research questions guided the study while three null hypotheses were formulated and tested at .05 level of significance. The quasi-experimental research design was adopted for the study. A total of 2,162 students of public junior secondary schools in Ogba Education Zone made up the population of the study. 380 students from 4 intact classes were sampled using the census sampling technique. A structured 30-item validated Computer Studies Retention Test (CSRT) was used for data collection. Three experts validated the instrument and an overall reliability index of .73 was obtained using Kuder-Richardson<sub>20</sub>. Data related to the research questions were analyzed using mean and standard deviation while Analysis of Covariance (ANCOVA) statistics was used to test the null hypotheses. The finding revealed that students taught Computer Studies using game-based teaching strategy have higher retention ability scores than those taught with the expository method. The study also revealed that female students had higher retention ability scores than the male students taught Computer Studies using computer game-based strategy. This implied that the female students benefited from the use of computer game-based strategy than their male counterparts. It was concluded that using game-based teaching strategy is effective in improving students' retention abilities in Computer Studies. It was therefore,

recommended that Computer Studies teachers should adopt and utilize the computer game-based teaching strategy as a teaching pedagogy in junior secondary schools. This is because, the strategy facilitated the attainment of higher retention abilities in students, among others.

**Keywords:** *Computer Studies, Game-Based, Gender, strategy, Retention*

### Introduction

Education in the view of the researcher and in the context of this paper, is the transfer of accumulated knowledge, norms and values of a given society, designed for the acquisition of one's cultural heritage, capable of molding one's behavior to be in tune with the civilized patterns of adulthood. It is in this guise expected that in whatever form of education there is, an educated being should live an acceptable lifestyle within the precepts of the society. These precepts are usually imbibe with the aid certain teaching strategies.

Teaching strategies could be in form of project works, dramatization, drills and practices, games and demonstrations. These strategies aim at transmitting the content of the organized curriculum for the acquisition of basic skills, through the various levels of education. These skills are acquired in formal education settings from primary, secondary and even in the tertiary institutions. Within the context of this research work therefore, the focus was on secondary education.

Secondary education is one aspect of educational institutions in Nigeria that is designed specifically to train and prepare students for middle-level services in both manufacturing and service industries. One of the objectives of secondary education as presented by [Olowe \(2011\)](#) is the acquisition of requisite intellectual and physical skills needed for individuals to be self-reliant therefore, becoming useful members of the society. The broad goal of secondary education as enshrined in the National Policy on Education is to prepare the individual citizen to be useful citizens within their given society and preparation for higher education ([Federal Republic of Nigeria, FRN, 2014](#)). Computer Studies as a school subject, is one among the many educational programmes offered at the secondary school level in the Nigerian educational system.

Computer Studies, according to [Belford \(2018\)](#) is the study of computers, including their design (architecture) and their use for computations, data processing, and systems control. Computer Studies is generally considered in the primary and secondary schools whereas, at the tertiary level, it is known as Computer Science. The significance of

Computer Studies as a subject in the Nigerian system of Education cannot be overemphasized. Specifically, as its focus is to redeem the Nigerian child from the shackles of colonial system of education which merely promoted foreign values and policies and therefore arm him with the requisite abilities. During the 32 Ministerial Council meeting of the National Council on Education in 1987, the Federal government of Nigeria decided to introduce Computer Education into the nation's secondary school system (Ngbarabara, 2021). The teaching and learning of Computer Studies are targeted towards building an egalitarian Nigerian irrespective of socio-political and ethnic diversities. However, despite the numerous advantages derived from introducing Computer Studies into the school curriculum, there seems to be a poor approach in handling the subject in our schools. The evolution of teaching Computer Studies as a subject to address certain abstract topic like system software, is moving toward using computer game-based applications. It provides new ways to represent software concept information and offering more choices about learning content.

Learning is a process for creating knowledge and life experience to use it and apply it in real life situations (Steinkuehler, 2010). In traditional ways of teaching, ideas are presented in theoretical

ways without sufficient opportunities for students to engage in classroom activities such as: problem solving, games playing, and laboratory experiments (Euler, 2011). Students have associated the feelings of success in school with fun because they feel motivated by it. At the same time, having fun in the process of learning varies, depending on the type of classroom activity they are engaged with (Sullivan, 1993 cited in Bragg, 2003). The use of activity method makes students feel skillful in a computer system software class. They are more confident in learning, task involving and motivated to learn (Kloosterman & Gorman, 1990 cited in Bragg, 2003). Nowadays, the use of computer game-based teaching strategy seems to make the teaching of certain abstract concepts like "Software" easier. It could be used in a variety of ways to enhance the learning process.

Computer game-based strategy is introduced and viewed as a strategy to motivate students and as a successful way to introduce the concept of system software (Koc, 2005). The development of computer games is a great gain for youth and adolescents and can lead to retention of abstract concepts like software. In previous times, kids were involved playing with other children, but children of today spends most of their time on computer games as soon as they understand and get acquainted with them (Masoud, 2016). This is

why it is suspected that the game-based teaching strategy will significantly improve students' retention abilities.

According to [Bichi \(2002\)](#), retention is the storage of information over a period of time; this time period is called retention interval. Retention ability therefore, is the ability of one to store, remember and reproduce information learnt after a long period of time. It is the opposite of forgetting or being forgetful. If for any reason, the student or learner is unable to produce the response by the expiration of the retention interval, forgetting has occurred. The increasing prevalence of computer games among young male and female adolescents has raised concern over its effects on gender responsiveness in the teaching and learning of Computer Studies students' towards attaining higher retention abilities.

Gender is a social construct that differentiates a man from a woman in a given society. Gender differences in retention have been examined for some time resulting in a substantial body of literature ([Jack & Johannes, 2001](#)). The importance of examining instructional strategy in relation to gender is based primarily on the socio-cultural differences between girls and boys ([Abra, 2000](#)). Traditionally, girls in our society have been encouraged to conform, whereas boys are

expected to be active and dominant risk-takers. Corroborating this view, [Hassan and Ogunyemi \(2008\)](#) acknowledges that most boys are provided with toys that enhance their visual-spatial abilities such as trucks, Legos (toys consisting of plastic building blocks and other components) and models.

Considering the increasing rate of addiction to computer games among students across the different levels of the Nigerian educational system, the present study investigated the effects of computer games-based teaching strategy on junior secondary schools Computer Studies students' retention abilities in Rivers State.

**Statement of the Problem** Most students face learning problems of different types; which requires instructional attention and various treatment methods. As teachers, one is supposed to adopt methods of teaching that is learner-centered and activity-oriented, to help students develop their computer skills and increase their self-efficacy, thereby creating and instilling in them, a positive perception towards the learning of Computer Studies.

The premium placed on examining pedagogical strategies in relation to students' retention abilities and gender is based primarily on the perceived students' addiction to computer games even on their various mobile phones and other

related devices. This is also in addition to the socio-cultural differences between males and females. Traditionally, the females in our society have been encouraged to conform, whereas males are expected to be active and dominant risk-takers. Conventionally, many modern instructional methods and strategies have been suggested, such as story-telling technique, experimentation, demonstration, field trip, among others. Of all these, the use of computer games-based strategy in the teaching of Computer Studies has not been tried to the best knowledge of the researcher. Although extensive studies have been done on the effects of modern instructional technologies around the world, a wide gap still exist in studies focusing on determining the effects of computer games-based strategy on junior secondary schools Computer Studies students' retention abilities and gender. To this end, the current study was conducted to fill the existing gap.

### **Purpose of the Study**

The general purpose of the study was to determine the effects of computer games-based strategy on junior secondary schools Computer Studies students' retention abilities and gender in Rivers State. Specifically, the study investigated:

1. The mean retention scores and standard deviations of students taught Computer Studies

with computer game-based teaching strategy (Experimental group) and those taught using the expository teaching method (Control group).

2. The mean retention scores and standard deviations of male and female students taught Computer studies with computer game-based teaching strategy (Experimental group).

### **Research Questions**

The following research questions guided the study;

1. What are the mean retention scores and standard deviations of students taught Computer Studies with computer game-based teaching strategy (Experimental group) and those taught using the expository teaching method (Control group) in both pre-test and post-test?

2. What are the mean retention scores and standard deviations of male and female students taught Computer Studies with computer game-based teaching strategy (Experimental group)?

### **Hypotheses**

The following null hypotheses guided the study and was tested at .05 level of significance;

**HO<sub>1</sub>:** There is no significant difference between the mean retention scores of students taught Computer studies with computer game-based

teaching strategy (Experimental group) and those taught using the expository teaching method (Control group).

**HO<sub>2</sub>:** There is no significant difference between the mean retention scores of male and female students taught Computer studies with computer game-based teaching strategy (Experimental group).

**HO<sub>3</sub>:** There is no significant interaction effect of methods (computer game-based teaching strategy) and gender on students' retention abilities in Computer Studies.

### Method

The study adopted the quasi-experimental research design. The population for the study consisted of 2162 JSS2 students drawn from all public junior secondary schools in Ogba education zone of Rivers State. The sample for the study is comprised of 340 students. The census sampling technique was used to draw four (4) schools (2

To establish the internal consistency of the instrument, the Kuder-Richardson<sub>20</sub> formula was used to analyze the data using the Statistical Package for Social Sciences (SPSS) version 21 and obtained a reliability index of .73 Data collected regarding the research questions were analyzed using descriptive statistics (mean and standard

Boys schools and 2 Girls Schools) from the public junior secondary schools in Ogba Education Zone. This is because gender is a variable in the study. In each of the four (4) schools sampled, the intact classes of JSS2 were used based on stratified random sampling. The treatment group total (98 boys and 74 girls = 172) while the control group was (95 boys and 73 girls = 168), making up the total of 340 students used for the study. The instrument for data collection was a researcher self-structured retention test titled "Computer Studies Retention Test" (CSRT). The CSRT is made up of thirty (30) questions drawn from the topics, Software, system software and application Software, all in Computer Studies. In constructing the Retention Test, the researcher prepared the table of specification (Test Blueprint) based on the minimum standards of the junior secondary schools' curriculum for JSS2, to serve as a guide for the test development. Face validity of the instrument was established using the opinion of three experts as they validated the instrument

deviation) for the two research questions. The analysis of covariance (ANCOVA) statistics was used to test the single null hypothesis. The decision rule regarding the research questions was; reject the null (H<sub>0</sub>) if the significance of F-Critical value is less than .05, otherwise, do not reject.

**Results**

**Research Question 1:** What are the mean retention scores and standard deviations of students taught Computer Studies using computer

game-based strategy and those taught using expository teaching method in both pre-test and post-test?

**Table 1: Mean Retention Scores and Standard Deviations of students taught Computer Studies using computer game-based strategy and those taught using expository teaching method in both pre-test and post-test**

Groups	Number	Posttest		Retention	
		Mean ( $\bar{x}$ )	Standard Deviation ( $s$ )	Mean ( $\bar{x}$ )	Standard Deviation ( $s$ )
Control Group	168	32.31	10.97	35.27	11.64
Experimental Group	172	36.33	11.06	38.45	11.53
<b>Total</b>	<b>340</b>				

Data on Table 1 showed that at post-test, the mean score for control group was 32.31 with a corresponding standard deviation of 10.97 respectively. After post-test, it was observed that for the control group, mean retention score was 35.27 with a standard deviation of 11.64. For the experimental group, at post-test, the mean score considering their higher mean retention scores at posttest. As a result of this observed difference in mean retention scores, the null hypothesis was

was 36.33 with a corresponding standard deviation of 11.06 respectively. After post-test, it was observed that for the experimental group, mean retention score was 38.45 with a standard deviation of 11.53 respectively. This signifies that student in the experimental group retained knowledge more than those in the control group tested at .05 level to determine if the observed difference was significant.

**Research Question 2:** What are the mean retention scores and standard deviations of male

and female students taught Computer studies using computer game-based strategy?

**Table 2: Mean Retention Scores and Standard deviations of male and female students taught Computer Studies using computer game-based strategy**

Groups	Number	Post-test		Retention	
		Mean ( $\bar{x}$ )	Standard Deviation ( $s$ )	Mean ( $\bar{x}$ )	Standard Deviation ( $s$ )
Male	193	34.88	10.90	36.91	11.59
Female	147	33.65	11.55	36.84	11.82
<b>Total</b>	<b>340</b>				

Data on Table 2 showed that at posttest, the mean score for male students was 34.88 with a corresponding standard deviation of 10.90 and the female students mean score was 33.65 and a standard deviation of 11.55 respectively. After post-test, it was observed that the male students' mean retention score was 36.91 with a standard deviation of 11.59 respectively. For the female students, the retention mean score was 36.84

**Hypotheses**

**HO<sub>1</sub>:** There is no significant difference between the mean retention scores of students taught

with a corresponding standard deviation of 11.82 respectively.

This implied that the female students retained knowledge more than their male counterparts considering their higher mean retention scores. However, to determine if these observed differences were significant, hypothesis 2 was tested at .05 level of probability.

Computer Studies using computer game-based strategy and those taught using expository teaching method.

**Table 3: Analysis of Covariance (ANCOVA) on the mean retention scores of students in experimental and control groups**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	859.336 <sup>a</sup>	1	859.336	6.406	.012
Intercept	461824.336	1	461824.336	3442.538	.000
GROUP	859.336	1	859.336	6.406	.012
Error	45343.475	338	134.152		
Total	508560.000	340			
Corrected Total	46202.812	339			

a. R Squared = .019 (Adjusted R Squared = .016)

Table 3 showed the one-way ANCOVA on the mean retention scores of students in experimental and control groups. In table 3, the experimental and control groups as main effect, gave an F-value of 6.406 and was significant at 0.012. Since .012 was less than .05, this means that at .05 level of significant, the F-value was significant. Hence, hypothesis 1 was rejected. The findings revealed that there was a significant difference between

the mean retention scores of students taught Computer Studies using computer game-based strategy and those taught using expository teaching method.

**HO<sub>2</sub>:** There is no significant difference between the mean retention scores of male and female students taught Computer studies using computer game-based strategy.

**Table 4: Analysis of Covariance (ANCOVA) on the mean retention scores of male and female students in both control and experimental groups**

	Type III Sum of Squares	df		Mean Square	F	Sig.
Corrected Model	.409 <sup>a</sup>	1		.409	.003	.956
Intercept	453777.409	1		453777.409	3319.671	.000
GENDER	.409	1		.409	.003	.956
Error	46202.403	338		136.693		
Total	508560.000	340				
Corrected Total	46202.812	339				
a. R Squared = .000 (Adjusted R Squared = -.003)						

Table 4 showed the one-way Analysis of Covariance (ANCOVA) on the mean retention scores of male and female students. In table 4, gender as main effect gave an F-value of .003 and was significant at .956. Since .956 is greater than .05, this signifies that at .05 level of significant, the F-value was not significant. With this result, there is no significant difference between the mean

retention scores of male and female students taught Computer Studies using computer game-based strategy.

**H<sub>03</sub>:** There is no significant interaction effect of gender and methods (computer game-based strategy) on students' retention in Computer Studies.

**Table 5: Analysis of Covariance (ANCOVA) on the interaction between gender and computer games on students’ retention scores**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1030.828 <sup>a</sup>	3	343.609	2.556	.055
Intercept	453230.628	1	453230.628	3371.238	.000
GROUP * GENDER	1030.828	3	343.609	2.556	.055
Error	45171.984	336	134.440		
Total	508560.000	340			
Corrected Total	46202.812	339			

a. R Squared = .022 (Adjusted R Squared = .014)

Table 5 showed the interaction effect between gender and method on students’ retention in Computer Studies. The results showed that the main interaction effect gave an F-value of 2.556 and this is significant at .055. Since .055 is greater than .05, this means that at .05 level, the F-value of 2.556 is not significant. Therefore, hypothesis 3 was not rejected as stated, indicating that there was no interaction effect between gender and computer game-based strategy on students’ retention in Computer Studies.

**Summary of Findings**

Results of the analyses of data presented above revealed the following:

1. Students’ retention ability improved, especially those in the experimental group. It therefore, means that, JSS2 students benefited from the teaching of Computer Studies using computer game-based strategy than the expository method because they could retain things they learnt through that process.
2. The male and female students recorded improvement in their retention ability scores. However, the female students recorded slightly higher retention ability more than their male counterparts but was not significant. Hence, there was no significant difference between the mean retention ability scores of male and female students in experimental group.

3. There was no interaction effect between teaching methods (computer game-based strategy & expository method) and gender on students' retention in Computer Studies.

### **Discussion of Findings**

#### **Students' Retention Abilities in Computer Studies When Taught Using Computer Game-Based Strategy**

The finding revealed that students taught Computer Studies using computer game-based strategy have higher retention ability scores than those taught with expository method. This implied that using computer game-based strategy is effective in improving students' retention abilities in Computer Studies. Proving that using computer game-based strategy is an effective pedagogy that can be used to improve students' retention abilities in Computer Studies. This finding, agrees with [Hossein and Seyed \(2014\)](#) who carried out a study on the effect of using educational computer games on recall and retention of spelling in Iranian EFL learners. The study revealed that experimental group (computer games class) outperformed the control group (lecture class) in post-test and delayed post-test.

[Kim and Chang's study \(2010\)](#), agreed with the finding of this study and revealed that computer games improved or increased academic success and retention of students. Also, [FatokunEgya and Uzoечи \(2012\)](#) revealed that students instructed

using computer games had higher scores on the post-test and delayed post-test, compared to those exposed to expository method of teaching. Similarly, [Wee, Sue and Sean \(2008\)](#) study agreed with the finding of this study and stated that computer games help in improving students' retention abilities.

Further analysis revealed that there was a significant difference between the retention ability scores of students taught Computer Studies using computer game-based strategy and those taught with expository method. This implied that using computer game-based strategy is an effective method in improving students' retention abilities than the expository method. This finding tallied with [Wee, Sue and Sean \(2008\)](#) who revealed that a significant difference exist in the retention abilities of students taught with computer games and those taught using expository method. This difference was in favor of the computer game-based strategy. This is a clear proof that computer game-based strategy is very effective in improving students' retention abilities.

#### **Retention Abilities of Male and Female Students Taught Computer Studies Using computer game-based strategy**

The study revealed that female students had higher retention ability scores than the male students taught Computer Studies using computer

game-based strategy. This implied that the female students benefited from the use of computer game-based strategy than their male counterparts. Therefore, computer game-based strategy is effective in improving student's retention abilities.

Further findings revealed that there is a significant difference between the mean retention ability scores of male and female students taught Computer Studies using computer game-based strategy. This finding disagreed with Umeh, Nsofor, Oboh and Idris's (2013) study which revealed there is no significant difference in the retention ability of male and female students. The finding also disagreed with; Adigun, Onihunwa, Irunokhai, Sada and Adesina's (2011) which revealed that male students had slightly better retention ability compared to the female students but there was no significant difference in their retention abilities. This study implied that using computer game-based strategy is a gender responsive pedagogy to enhance learning in secondary schools.

### Conclusion

The study revealed that computer game-based strategy is an effective method in improving students' retention abilities in Computer Studies. The study revealed that students taught with computer game-based strategy have higher

retention ability scores than those taught with the expository method.

Therefore, computer game-based strategy is an effective pedagogy in improving students' retention abilities for male and female students. However, no significant difference existed in the male and female students' retention abilities in Computer Studies. The study therefore, concluded that computer game-based strategy should be introduced in all public junior secondary schools, as it is a gender responsive pedagogy.

### Recommendations

The following recommendations are made based on the findings of the study:

1. Government should provide enough computer games-oriented instructional aids to schools to enable them benefit from the study.
2. Professionally qualified Computer Studies teacher who will handle the use of computer game-based strategy in teaching, should be employed to effectively utilize the strategy in teaching.
3. Male and female students should be exposed equally to computer game-based strategy since the study revealed that their activities are natural to students and is gender responsive.

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