

Capturing Secondary School Students' Interest via the Utilization of the Tablet Teaching Strategy in Geometry in Osun State, Nigeria

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Abstract: The purpose of this study was to use Tablet Teaching Strategy (TTS) to ascertain students' geometry interest at senior secondary school one. The research was carried out in Osun west education district of Osun State with a population of 12,431 senior secondary one students. 168 students were sampled from four schools out of 68 government owned senior secondary schools. Quasi-experimental design of non-randomized pre-test post-test control group design was utilized. The research instrument was Geometry Interest Inventory (GII). The reliability of the instrument was 0.72. Three research questions were asked and answered with means and standard deviations while the three hypotheses formulated were tested using Analysis of Covariance at 0.05 level of significance. The study found among others that students taught via the utilization of tablet teaching strategy improved in their interest in geometry more than those taught without tablet teaching strategy. Recommendation such as incorporating tablet teaching strategy into mathematics curriculum was made among others.

Keywords: Tablet Teaching Strategy, Students' Interest, Geometry, Secondary School, Mathematics Education

I. INTRODUCTION

The development of any nation is dependent on its improved mathematics education programme which establishes basis for the technological advancement. Also, science is the bedrock that provides the spring board for the growth of technology, which Mathematics is the gate and key to science (Patrick, 2016). Importance and contributions of Mathematics to the modern culture of science and technology was further acknowledged, and then asserted that without Mathematics there is no science, without science there is no modern technology and without modern technology there is no modern society (Imoko & Isa, 2015).

From the National Curriculum for senior secondary schools, mathematics is divided into five sections which include: Number and Numeration; Algebraic processes; geometry, statistics and probability. The focus of this study is on geometry. This is because the West African Examination Council (WAEC, 2016) Chief Examiner reported that candidates were observed to be generally weak in geometry. Geometry is a branch of mathematics of Egyptian origin (Euclid, 300BC). Geometry is a science of space, involving, describing and measuring figures, theory of ideas and methods by which one can construct and study idealized model of the physical world as well as other real world phenomenon (Iji, Ogbale & Uka, 2014). Geometry is an aspect of school Mathematics that has everyday application in the life of the child. It helps the child in the development of aestheticism around his/her environment as well as inductive reasoning skills. Geometry is one of the important fields of mathematics. Most of the goods and structures in our physical environment are geometric shapes and objects. Geometry can be used in solving problems not only in other areas of mathematics but also in sciences, arts and daily life (Aktaç & Cansız-Aktaç, 2012).

Geometry is one aspect of mathematics that is mostly dreaded by the students (Osman, Erhan, Ramazan & Adem, 2015). According to WAEC Chief Examiner's report (2016), Geometry is among the areas students avoid attempting questions on while those who dare it perform poorly. Anyamene, Nwokolo, Anyachebelu and Anemelu (2012), observed that students have problems on how to study mathematics. These problems emanate as a result of problems facing the effective teaching and learning of mathematics at all levels of Nigerian educational institutions. Azuka (2013), identified poor teaching methods and lack of knowledge of technological innovations by the mathematics teachers, as the major factors contributing to the low achievement of students in Mathematics. Onah (2015), also observed that poor study habits contribute to students low achievement in mathematics. There is an ample evidence of continued low interest and achievement in the subject by Nigerian students (Iji, Ogbale & Uka, 2014).

According to Giginna (2013), interest is the degree of likeness an individual has for something such as activity, person or situation. It concerns the individual's preference for a particular type of ability. Bulunuz and Jarret (2009) state that, there is connection between interest and effort. In other words, the more a person is interested in a subject, the more effort he will put into it. He further described an interested person as being

engaged, engrossed or entirely taken up by an activity because of its recognized worth. Bulunuz and Jarret concluded that in many learning tasks in school the process and outcome are separated which results in “divided interest” and the students cannot connect executing a task with its outcome. Interest facilitates learning, improves understanding and stimulates effort and personal involvement. Interest is a strong factor in the teaching and learning of mathematics (Iji, Omenka & Akpan, 2017). If a child is interested in a subject, he would continue to study the subject even when he is hungry and other children are inviting him to play. The degree and the direction of attitude towards mathematics are largely determined by the kind of interest developed by students for Mathematics. Available studies have shown that students generally have weak interest toward mathematics (Ogochukwu, 2010). Hence, this study equally aims at finding out if the interest of the students can be captured via the utilization of Tablet Teaching Strategy.

Tablet can be defined as small, wireless, mobile personal computers which have finger-driven touch screens and are backed-up by diverse applications in a well-provisioned application marketplace (Falloon, 2013). Tablet Teaching Strategy is a teaching process in which an instructor uses a tablet as a medium of disseminating and receiving information from his/her students. Tablets have fantastic applications that can be used for drawing, writing, and animation during a presentation. Students can circle, highlight, or write in points as they present their latest research or findings. When they are done, the presentation is saved and can be emailed to the teacher for grading. Textbooks are expensive, they are also hard on the environment and inefficient when the information is outdated, an entire new version must be released. Tablet e-book solves this problem. Students can highlight and bookmark easily the major points on their e-book, they can even be inspired to create their own e-book through Tablet. If Games in the Tablet are used by the students with moderation, this can boost creativity and imagination of the students (Julie, 2017).

According to Clarke and Svanaes (2012), tablets appear to facilitate more collaborative learning, especially through its role in improving communication. Applications such as Face time allow pupils to ask each other for help or discuss their school work at home, and through emails they can keep a running dialogue with their teachers out of school. This allows the learning teachers facilitated at school to continue at home, breaking down barriers between school and home, and making communication more seamless. The fact that the device is both personal and portable, meaning that it could easily be transported in the classroom to a friend’s house which, when combine with the tablet’s communication options, enables greater collaboration without consideration for gender”.

Gender of learners is one of the factors that affect students’ academic achievement. Over some decades there has been evidence of growing gender gap in educational achievement in many countries. Gender bias in education is responsible for the inequality in opportunity, access, enrollment, curriculum, subject disciplines and several others (Gibb, Fergusson & Horwood, 2012). Franden (2003), in his research on gender differences, found out that there are some gender differences in mathematical processing and that boys achieved better than girls. Review of studies show inconsistency on results of male and female students’ achievement in mathematics public examination and in Mathematics achievement tests. Reports from studies of Anyamene, Nwokolo, Anyachebelu and Anemelu (2012), Gambari, Falode and Adegbenro (2014), Malik and Salman (2016), all show no significant differences among male and female students in Mathematics achievement tests. However, Ogbonna (2007), Iji, Omenka and Akpan (2017) indicates that there is significant difference among male and female students in mathematics achievement tests. Specifically, most of the studies did not examine the achievement of male and female students in geometry achievement tests but rather, Mathematics in general. This evidence shows that something needs to change. Since the Tablet has been recognized as a machine that does not recognize gender, but only keeps to instruction, it was necessary to find out if Tablet Teaching Strategy when used in teaching geometry would lead to bridging of gap between boys and girls in their interest in Geometry.

II. PURPOSE OF THE STUDY

The purpose of this study was to capture students’ interest via the utilization of Tablet Teaching Strategy (TTS) in mathematics classroom. Specifically it will determine whether the use of Tablet Teaching Strategy (TTS);

1. enhanced secondary school students’ interest in geometry.
2. resolved the controversy of the inconsistency in researchers’ report in interest in geometry of secondary school students.
3. Had interaction effect of TTS and male and female on secondary school students’ interest in geometry.

III. RESEARCH QUESTIONS

The following research questions were asked to provide guide for the study.

1. What are the mean interest ratings of SS1 students taught geometry via (TTS) and those taught without Tablet Teaching Strategy?

2. What are the mean interest ratings of male and female SS1 students taught geometry via Tablet Teaching Strategy?
3. What is the interaction effect of TTS and male and female on SS1 students' interest in geometry?.

IV. RESEARCH HYPOTHESES

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

1. There is no significant difference between the mean interest ratings of SS1 students taught geometry via (TTS) and those taught without Tablet Teaching Strategy.
2. There is no significant difference between the mean interest ratings of male and female SS1 students taught geometry via Tablet Teaching Strategy.
3. There is no significant interaction effect of TTS and male and female on SS1 students' interest in geometry.

V. METHODOLOGY

The research design for this study was quasi-experimental. Precisely, the study used a non-randomized pre-test post-test control group design. The subjects of the study were not randomized into experimental and control groups but were left as intact classes. This was to avoid the disruption of the school programmes. However, the study was conducted in Osun West Education District of Osun State, Nigeria. Osun State is in south west geo-political zone of Nigeria. The population of this study was 12,431 Senior Secondary School one (SS 1) students from sixty eight government Secondary Schools in the study area. Simple random sampling was used to select four schools from 68 senior secondary schools. The choice of senior secondary one was purposive. This was basically because it is at this level that vigorous academic work begins in preparation for both internal and public mathematics examinations. The sample size for this study was 164 students. This was made of 84 students for the experimental group and 80 students for the control group. The choice of which schools and classes to be used as experimental and control was done through simple random sampling (flip of a coin). The Instrument of the study was Geometry Interest Inventory (GII). The geometry interest inventory was a researcher structured 24 item questionnaire that was constructed by the researcher to determine the interest and feeling of students about geometry. The items were designed on the basis of a four-point scale. The four-point scale ranges from strongly agree, agree, disagree and strongly disagree. These items contained both positive and negative statements of feelings and interest from the students' point of view. It was validated by two mathematics teachers, two mathematics educators and one measurement and evaluation experts. It has a reliability index of 0.72, established using Cronbach Alpha reliability coefficient. The study lasted for four weeks. Data collected and collated were analyzed using mean, standard deviations and Analysis of Covariance.

VI. RESULTS

The results from analysis of data for this study are presented according to the research questions asked and hypotheses formulated.

Research Question 1

What are the mean interest ratings of SS1 students taught geometry with Tablet Teaching Strategy (TTS) and those taught without Tablet Teaching Strategy? Answer to this research question is presented in Table 1.

TABLE 1: MEAN AND STANDARD DEVIATION OF INTEREST RATINGS OF SS1 STUDENTS TAUGHT GEOMETRY WITH TTS AND THOSE TAUGHT WITHOUT TTS

Group	N	Pre-GII		Post-GII	
		Mean	SD	Mean	SD
With TTS	84	2.67	1.02	3.29	0.90
Without TTS	80	2.76	0.99	2.90	1.07
Mean difference		0.09		0.39	
Total	164				

Table 1 shows that for pre-test, the TTS had a mean interest ratings of 2.67 while the control had a mean rating of 2.76. Their mean difference is 0.09. For post-test scores, the TTS has a mean interest rating of 3.29 while the control group had a mean rating of 2.90. Their mean difference is 0.39.

Research Question 2

What are the mean interest ratings of male and female SS1 students taught geometry with Tablet Teaching Strategy? Answer to this research question is presented in Table 2.

TABLE 2: MEAN AND STANDARD DEVIATION OF INTEREST RATINGS OF MALE AND FEMALE SS1 STUDENTS TAUGHT GEOMETRY USING TTS

Gender	N	Pre-GII Mean	SD	Post-GII Mean	SD
Male	43	2.67	1.04	3.29	0.97
Female	41	2.68	1.0	3.32	0.93
Mean difference		0.01		0.03	
Total	84				

Table 2 shows that for pre-test, the male had a mean interest rating of 2.67 while the female had a mean rating of 2.68. Their mean difference is 0.01. For post-test rating, the male has a mean rating of 3.29 while the female group had a mean rating of 3.32. Their mean difference is 0.03.

Research Question 3

What is the interaction effect of TTS and male and female on SS1 students' mean interest rating in geometry? Answer to this research question is presented in Table 3.

TABLE 3: THE INTERACTION EFFECT OF TTS AND MALE AND FEMALE ON SS1 STUDENTS' INTEREST IN GEOMETRY

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3240.308 ^a	2	1620.154	28.368	.000	.412
Intercept	134.628	1	134.628	2.357	.129	.028
PreInterest	3154.584	1	3154.584	55.235	.000	.405
Groups	5174.489	1	5174.489	129.363	.000	.446
Groups*Gender	78.948	1	78.948	1.382	.243	.017
Error	4626.109	81	57.112			
Total	531005.000	84				
Corrected Total	7866.417	83				

a. R Squared = .412 (Adjusted R Squared = .397)

The interaction effect of TTS and male and female on SS1 students' mean interest rating is read from Table 7 across the row heading **Groups*Gender** and column heading **Partial Eta Square** (Groups*Gender: Partial Eta Square = .017). $F = 1.382$, $df = 1$ and Partial Eta = .017. The calculated percentage of interaction effect of TTS and male and female on SS1 students' mean interest rating ($.017 \times 100 = 1.7\%$) is 1.7%.

Research Hypothesis 1

There is no significant difference between the mean interest rating of SS1 students taught geometry with (TTS) and those taught without Tablet Teaching Strategy. The test result of this hypothesis is presented in Table 4.

TABLE 4: TWO-WAY ANCOVA RESULT OF MEAN INTEREST RATINGS OF SS1 STUDENTS TAUGHT GEOMETRY WITH TTS AND THOSE TAUGHT WITHOUT TABLET TEACHING STRATEGY

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9559.819 ^a	2	4779.909	119.499	.000	.597
Intercept	57.560	1	57.560	1.439	.232	.009
PreInterest	5984.011	1	5984.011	149.601	.000	.482
Groups	5174.489	1	5174.489	129.363	.000	.446
Error	6439.956	161	40.000			
Total	922817.000	164				
Corrected Total	15999.774	163				

a. R Squared = .597 (Adjusted R Squared = .592)

Table 4 shows that P- value of 0.00 was less than the significance level of 0.05. Since the p-value of 0.00 is less than the significance level of 0.05, the null hypothesis of no significant difference was rejected.

Research Hypothesis 2

There is no significant difference between the mean interest ratings of male and female SS1 students taught geometry with Tablet Teaching Strategy. The result of this hypothesis is presented in Table 5.

TABLE 5: TWO-WAY ANCOVA RESULT OF MEAN INTEREST RATINGS OF MALE AND FEMALE SS1 STUDENTS TAUGHT GEOMETRY WITH TABLET TEACHING STRATEGY

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3240.308 ^a	2	1620.154	28.368	.000	.412
Intercept	134.628	1	134.628	2.357	.129	.028
PreInterest	3154.584	1	3154.584	55.235	.000	.405
Groups	5174.489	1	5174.489	129.363	.000	.446
Groups*Gender	78.948	1	78.948	1.382	.243	.017
Error	4626.109	81	57.112			
Total	531005.000	84				
Corrected Total	7866.417	83				

a. R Squared = .412 (Adjusted R Squared = .397)

Table 5 reveals that the P-value of 0.243 was greater than the significance level of 0.05. Since the p-value of 0.243 is greater than the significance level of 0.05, the null hypothesis of no significant difference was not rejected.

Research Hypothesis 3

There is no significant interaction effect of TTS and male and female on SS1 students' mean interest ratings in geometry. The result of this hypothesis is presented in Table 6.

TABLE 6: TWO-WAY ANCOVA RESULT OF INTERACTION EFFECT OF TTS AND MALE AND FEMALE ON SS1 STUDENTS' MEAN INTEREST RATINGS IN GEOMETRY

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3240.308 ^a	2	1620.154	28.368	.000	.412
Intercept	134.628	1	134.628	2.357	.129	.028
PreInterest	3154.584	1	3154.584	55.235	.000	.405
Groups	5174.489	1	5174.489	129.363	.000	.446
Groups*Gender	78.948	1	78.948	1.382	.243	.017
Error	4626.109	81	57.112			
Total	531005.000	84				
Corrected Total	7866.417	83				

a. R Squared = .412 (Adjusted R Squared = .397)

Table 6 reveals that the P-value of 0.243 was greater than the significance level of 0.05. Since the p-value of 0.243 is greater than the significance level of 0.05, the null hypothesis of no significant difference was not rejected.

VII. SUMMARY OF FINDINGS

The following major findings were based on the data presented in this study:

1. Students taught geometry using Tablet Teaching Strategy (TTS) improved in their interest during the period of this study.
2. The adoption of TTS in the Mathematics classroom enhanced male and female SS1 students' interest in the geometry taught during the period of this study.
3. There was no significant statistical interaction effect with the use of TTS in the Mathematics classroom on male and female SS1 students' mean interest ratings in geometry.

VIII. DISCUSSION OF FINDINGS

The Students taught geometry using Tablet Teaching Strategy (TTS) improved in their interest during the period of this study. This means that the tablet teaching strategy enhanced students' interest in geometry. This finding is in agreement with that of Onah (2015) and Iji, Honmane and Omenka (2016), who earlier found that students' interest in mathematics could be improved through the use of captivating teaching strategy using multimedia projection and GSM teaching strategy. Tablet teaching strategy is expected to be highly stimulating by transforming difficult and boring activities into easy and pleasurable experiences thereby increasing students' interest in geometry. The students in this group must have experienced these possibilities and thus had their interest in geometry increased more than those taught without tablet teaching strategy. As earlier pointed out in literature (Ramzi, 2014) had posited that today's students are growing with and also getting their information via visual tools like television, mobile device, computers and internet. Getting their interest by traditional teaching methods where a lot of channels compete for their attention is becoming difficult, therefore study materials that are related to what students are used to such as mobile device, video games, television which compel the students' attention and cooperation makes learning a pleasurable experience.

Another finding of the study is that the adoption of TTS in the Mathematics classroom enhanced male and female SS1 students' interest in the geometry taught during the period of this study. Also the findings found that both sexes improved in their geometry interest with tablet teaching strategy, though the female improved more than their male counterparts. However, this difference was not statistically significant. This finding is in line with Anyamene, Nwokolo, Anyachebelu and Anemelu (2012), who found that the teaching of mathematics could be made interesting irrespective of gender differences using computer assisted instruction. Similarly, the finding agrees with Ramzi (2014) who found that the usage of mobile device helped students to overcome problems and challenges encountered in learning mathematics irrespective of gender. Students' interest in geometry may have been an outcome of motivated behaviour because it develops and deepens as participants continue to re-engage in geometry. The tablet teaching strategy offers students opportunity to engage themselves in learning geometry at anytime and anywhere.

The findings also showed that there was no significant statistical interaction effect via the utilization of TTS in the Mathematics classroom on male and female SS1 students' mean interest ratings in geometry. This result agrees with Onah (2015) whose result indicated that there was no significant difference between male and female students' interest in Set. This is so because both male and female students have equal feeling toward geometrical concept without stereotype.

IX. RECOMMENDATIONS

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

1. Tablet teaching strategy should be incorporated in the curriculum as a teaching strategy in teaching mathematics in the Mathematics classroom.
2. Teacher training institutions should be encouraged to include tablet teaching strategy as a strategy in the mathematical methodology course content.

X. CONCLUSION

It could be concluded in this study that tablet teaching strategy enhanced students' interest in Geometry irrespective of gender. This implies that if mathematics teachers use innovative teaching strategies such as the tablet teaching strategy which is found to have enhanced students' interest, the issue of low achievement in mathematics at the senior secondary school level could improve. Similarly, the gender gap created by continued use of unfavourable teaching strategy in geometry could also be bridged with tablet teaching strategy.

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