

**ASSESSMENT OF SCAFFOLDING LEARNING STRATEGY ON STUDENTS' INTEREST IN GEOMETRY AMONG SENIOR SECONDARY SCHOOLS IN ZARIA METROPOLIS, KADUNA STATE, NIGERIA**

**By**

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**Abstract**

*The study Assessed Scaffolding Learning Strategy on Students' Interest in Geometry among Senior Secondary Schools in Zaria Metropolis, Kaduna State, Nigeria. A pre-test post-test quasi experimental design was adopted for the study. Simple Random Sampling Technique was used to select two co-educational schools from the population as the sample. The sample of the study consisted of 122 students (60 males and 62 females) from two different schools in the Zone. The instrument used for data collection was Students Geometry Interest Inventory (SGII). The SGII had a reliability of 0.88 using Cronbach Alpha reliability coefficient. The research questions were answered using mean and standard deviation while the null-hypotheses were tested at 0.05 level of significance using t-test statistic. The results revealed that students taught geometry using scaffolding learning strategy showed greater interest in learning geometry than those taught using the lecture method. The study also revealed that both male and female students in experimental group have about the same interest ratings. Based on the findings, it was recommended that teachers should be trained and seminars should be organised for Mathematics teachers to be able to use Scaffolding Learning Strategy for teaching mathematics among others.*

**Keywords:** Mathematics, geometry, Scaffolding learning strategy, gender and interest

**Introduction**

Mathematics is a functional tool needed in every aspect of life and work. According to Ajani, Areelu and Odeyemi (2011), Mathematics has been discovered to be of great importance to man in his daily activities. In spite of its importance, Mathematics is a subject that is considered challenging and boring by many students (Nwafor, Ibrahim & Ambrose, 2018). However, it is disheartening that research and data from National Examination Bodies like West African Examination Council (WAEC) and National Examination Council (NECO) have shown a consistent poor performance in Mathematics (Nwafor et al. 2018). Meanwhile, Ahmad (2016), enumerated that the concepts of Mathematics taught at secondary school level in Nigeria are in seven major areas namely: Number and Numeration, Algebra, Mensuration, Geometry, Trigonometry, Statistics and Probability. Amoo (2007), observes that one of the areas of Mathematics that many students usually encounter problems is geometry. The poor understanding of students in this area has contributed to low achievement in Mathematics (Salami & Popoola, 2016). This could be blamed on the fact that many mathematics teachers at the basic level lack the essential rudiments of teaching geometry at the lower level. Ebesine

(2013), stated that the instructional approach adopted by teachers could make learners to develop negative or positive interest towards the learning of geometry. The report of the West African Examination Council (WAEC, 2017) Chief Examiner on students' areas of deficiency in Senior Secondary Certificate Examinations (SSCE) showed that students least understood geometry concepts (Hamza & Timayi, 2018).

Geometry is a branch of Mathematics that deals with the learning of shape, size and the property of space. Ugwuanyi (2000), stated that geometry is one aspect of Mathematics that is mostly dreaded by students. The concept of geometry is taught in schools right from primary to tertiary level. However, most students find geometry boring therefore absent themselves in geometry lessons. These perceptions among other factors compel the students to be afraid and finally lose interest in geometry which has a negative effect on their performances. However, one of the prerequisites for understanding Mathematics is interest and the desire of students to learn Mathematics (Khayati & Payan, 2014). Interest is a stimulus that increases the activity power (Shabani, 2006). Therefore, it is necessary to further examine the factors involved in making students interested in geometry.

Scaffolding is a learning process designed to promote a deeper level of learning. Hartman (2002) identified a number of important scaffolds like giving approval, probing learner's ideas, structuring task activities and providing general hints or specific suggestions that will help the learner throughout the task. Scaffolding can be seen as a learning method where teachers provide temporary guidance or support when introducing new content or explaining assignments through procedural steps (Cooper & Robinson, 2014). Scaffolding has the ability to enable communication between participants more active, constructive, adjusts to need, and tends toward common understanding. These characteristics have led some to suggest that scaffolding is a derivative of one-to-one tutoring. David (2014) noted that one common characteristic for defining and describing scaffolding includes contingency, fading and transfer of responsibility.

Contingency is used to describe the way the expert adjusts or supports the learner. Selecting and deploying effective contingencies depends on knowing the learner's current level of ability. Acquiring an understanding of the learner's current level of ability is accomplished through assessment. Fading is the gradual withdrawal of contingencies, or supports. Fading occurs as the expert observes that the learner is becoming competent as well as having interest in the subject area. Transfer of responsibility refers to the learner's internalization of new knowledge or skill so that there is a change in cognitions or affect. Transfer of responsibility is also directly related to the learner's control over subject matter and perceptions of self-efficacy. Scaffolding may be done in the context of classrooms in many ways, commonly referenced categories include feedback, hints, instruction, explaining, modeling, and questioning (David, 2014). Based on the ideas of Vygotsky (1978), scaffolding operates on the premise that the support of the teacher leads the students to become independent learners, once that support is removed. Scaffolding strategy encourages dialogue between teacher and student which will provide the students with enough guidance and support to accomplish goals that are impossible without it.

Meanwhile, gender differences in Mathematics performance has been a great controversial issue in educational domain and research documents show great discrepancies among girls and boys performance in Mathematics (Sprigler & Alsup, 2003). O'Connor-Petruso, Schiering, Hayes and Serrano (2004) have shown that gender differences in Mathematics (geometry) achievement become apparent at the secondary level when female students begin to exhibit low interest in their Mathematics activities and perform lower than

males on problem solving and higher level Mathematics tasks. In spite of research evidences for male's superiority in Mathematics performance, some research findings do not support the difference between two genders in Mathematics achievement.

Mass failure of students in Mathematics at all levels of education in Nigeria is a big challenge to the nation, this could be linked to many reasons such as truancies, teachers competency, abstractness of the subject and many more but students' interest played a prominent role. Therefore this write up focussed on lack of interest and fear of Mathematics as great hindrance to students' passing examination. Despite the relative importance of Mathematics in science and information based courses as well as in medicine and social science, students' performance in the subject both in internal and external examinations has remained consistently poor. Mathematics educators are trying to identify the major causes of problems associated with the teaching and learning of Mathematics in schools. This study therefore, Assessed Scaffolding Learning Strategy on Students' Interest in Geometry among Senior Secondary Schools in Zaria Metropolis, Kaduna State, Nigeria

### **Purpose of the study**

The study has the following objectives:

1. Find out the effect of scaffolding learning strategy on level of interest of secondary school students in geometry.
2. Ascertain whether the use of scaffolding learning strategy has effect on interest of male and female students in geometry.

### **Research questions**

This study was guided by the following research questions:

1. What is the mean interest rating of students exposed to scaffolding learning strategy and those with lecture method?
2. What is the difference in the level of interest rating between male and female students taught geometry using scaffolding learning strategy?

### **Research Hypotheses**

The following research hypotheses were tested at 0.05 level of significance:

**H<sub>01</sub>:** There is no significant difference in the mean interest rating of students exposed to scaffolding learning strategy and those exposed to lecture method in geometry.

**H<sub>02</sub>:** There is no significant difference between the mean interest ratings of male and female students taught geometry using scaffolding learning strategy.

### **Methodology**

The study adopted a quasi-experimental control group design employing control and experimental group which was recommended by Shittu, (2013). Quasi-experimental design was adopted because the researcher has no total control over the study subjects. The study involved two groups; experimental and control group which was drawn from the population of senior secondary class two (SSII) in Zaria metropolis, Kaduna State. The experimental group was taught geometry using SLS while the control group was taught geometry using lecture method. The population of the study consists of 8,556 senior secondary school year two students in 19 public schools in the study area. The schools are located in an urban and rural areas which were made up of both single and co-educational. The sample of the study was made up of one hundred and twenty two (122) SS 2 students comprising 60 males and 62 females. Simple random sampling technique was used to select the sample for the study. Two schools were selected out of 19 schools for the study. Therefore, one intact class was selected from each of these schools. The two schools with their intact class were sorted and randomly

assigned to two groups that is experimental and control groups respectively. The experimental group was exposed to Scaffolding Learning Strategy while the control group was exposed to Lecture Method.

The instrument used for the study was Students Geometry Interest Inventory (SGII). It consists of two sections: Section A and B, Section A was for students' bio data information while Section B consisted of thirty (30) items interest scale. Each item was rated on a five-point scale with the positive statements response as Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly Disagree (SD) and were coded as 5, 4, 3, 2 and 1 respectively. It was validated by two experts in Mathematics Education Ahmadu Bello University, Zaria. The reliability coefficient of Students Geometry Interest Inventory was computed with SPSS using Cronbach Alpha and the reliability index of 0.88 was obtained. The data collected were subjected to both descriptive and inferential statistics. The research questions were answered with the use of mean and standard deviation while the research hypotheses were tested using independent sample t-test statistic.

## Results

The results of the study were obtained from the research questions answered and hypotheses formulated for the study;

**Research Question One:** What is the mean interest rating of students' exposed to scaffolding learning strategy and those with lecture method? Summary of the mean and standard deviation is presented in Table 1.

**Table 1**

*Mean and Standard Deviation of Students' Interest in Geometry of both the Experimental Group and Control Group after Exposure to Treatment.*

Groups	N	Mean	Std. Deviation	Mean Difference
Experimental	63	110.63	9.21	39.48
Control	59	71.15	18.15	

The result in Table 1 shows the mean and standard deviation of the Students' Interest level in geometry of the Experimental group and the control group. The results revealed that the experimental group had the highest mean score of (110.63) while the control group had the lowest mean score of (71.15). The mean difference between SLS and LM is 39.48.

Hypothesis One: There is no significant difference in the mean interest rating of students exposed to Scaffolding Learning Strategy and those exposed to Lecture Method in geometry. Independent Sample t-test was used to test this hypothesis at  $\alpha \leq 0.05$  level of significant. The summary of the analysis is presented in Table 2.

**Table 2**

*Independent Sample t-test of Students' Interest Level in Scaffolding and Lecture Method*

Groups	N	Mean	Std. Deviation	df	t-value	p-value	Decision
Experimental	63	110.63	9.21	120	15.295	.000	Reject H <sub>0</sub>
Control	59	71.15	18.15				

\*significant ( $p - value \leq \alpha - value 0.05$ )

The result in Table 2 showed that the calculated t-value was 15.295 with P-value 0.00. The P-value of 0.00 is less than alpha value of 0.05. Based on this result, the null hypothesis was rejected, this implies that there is significant difference between the interest rating level of the students exposed to Scaffolding Learning Strategy and those exposed to Lecture Method in geometry.

Research Question Two: Which gender will have higher mean interest rating among students taught geometry using scaffolding learning strategy? Summary of the mean and standard deviation of the students' interest level is presented in Table 3.

**Table 3**

*Mean and Standard Deviation of the Students' Interest in Geometry between Male and Female in the Experimental Group after Exposure to Treatment.*

Gender	N	Mean	Std. Deviation	Mean Difference
Male	33	110.70	10.400	0.1303
Female	30	110.57	7.87	

The result in Table 3 shows the mean and standard deviation of the Students' Interest level in geometry of the male and female student in the experimental group. The results revealed that male students had the mean score of (110.6970) while the female students had the mean score of (110.5667). The mean difference between male and female students is 0.1303.

**Hypothesis Two:** There is no significant difference between the mean interest ratings of male and female secondary school students taught geometry using scaffolding learning strategy. Mann-Whitney U-test was used to test this hypothesis at  $\alpha \leq 0.05$  level of significant. The summary of the analysis is presented in Table 4

**Table 4**

*Independent Sample t-test of Students' Interest Level of both Male and Female Students in Experimental Group.*

Gender	N	Mean	Std. Deviation	Df	t-value	p-value	Decision
Male	33	110.6970	10.40	61	0.056	0.119	Retain H <sub>0</sub>
Female	30	110.5667	7.87				

\*\*Not significant ( $p - value > \alpha - value 0.05$ )

The result in Table 4 showed that the calculated t-value was 0.056 with P-value 0.119. The P-value of 0.119 is greater than alpha value of 0.05. Based on this result, the null hypothesis was retained, this implies that there is no significant difference between the mean interest rating of both male and female students taught geometry using scaffolding learning strategy.

### **Discussion**

The study assessed Scaffolding Learning Strategy on Students' Interest in Geometry among Senior Secondary Schools in Zaria Metropolis, Kaduna State, Nigeria. Two hypotheses were stated and tested based on the scores obtained in Students Geometry Interest Inventory (SGII). The analyses of the data obtained were presented in tables 2 and 4 in accordance with the stated hypotheses. The findings are discussed as follows:

The result presented in Table 2 shows that significant difference exists between the interest rating level of the students exposed to Scaffolding Learning Strategy and those exposed to Lecture Method in geometry. The result of the current study agreed with the findings of Obioma (2011), who identified a significant difference between the interests of students in geometry when taught with Scaffolding instructional as a rebranded strategy and those taught with lecture method. More so, the current study is in conformity with the study of Michelle, Scott and Joanne (2014), who discovered that Students showed an increase interest in mathematical problem solving skills over time with the use of scaffolding strategy as they engaged in tasks designed to support their development of conceptual understandings in geometry. Meanwhile, the result disagreed with the findings of Tran (2014) who find out that there is no significant difference in the mean achievement score of students in the experimental group with those in the lecture group. The findings of Twan, (2022) differed with the result of the present study by concluding that there is no significant in the students' interest levels in ecology concepts between the experimental and the control group.

The result in Table 4 showed that there is no significant difference between the mean interest rating of both male and female students taught geometry using scaffolding learning strategy. The finding is in line with that of Azih and Nwosu (2011), who investigated the effects of instructional scaffolding strategy on the performance of male and female students in financial accounting in Abakaliki Urban of Ebonyi State. Their study revealed that scaffolding strategy was superior to the lecture method in improving the performance and interest of male and female students in financial accounting. The result showed that gender has no significant difference when taught with scaffolding learning strategy on students' interest. Summary of the result reveals that Scaffolding Instructional Strategy was superior to the lecture method in improving the performance of male and female students in financial accounting. This means that for students to perform greatly in their academy, their interest level must be high and the

use of scaffolding learning strategy has proven to be effective in this regards. The study of Ricarda, Kleinert and Wilde (2021) hypothesized that gender differences with regard to learning strategy use would be less pronounced for students with a high degree of interest in biology than for those with a low degree of interest. Their results showed a reduction of the gender gap in terms of the learning strategies transformation and effort with respect to male students without any disadvantage for the female students. Furthermore, Ramalyn (2013), noted in his work that Scaffolding teaching strategy improves students' performance as well as create room for students to desire the learning of mathematics due to the fact that it enhances personal connection with the teacher and peers in a the classroom. From the empirical evidence related to this study, scaffolding learning strategy appears to play a very important role in increasing the interest and academic performance of students.

## **Conclusion**

Based on the findings from the study, it was concluded that Scaffolding Learning Strategy enhanced students' interest in geometry more than lecture method. The students that were taught with Scaffolding Learning Strategy (SLS) had positive interest towards learning geometry than those taught with lecture method. SLS encourages sharing of ideas among students, fostered cordiality and friendliness in the classroom and this made the lesson interesting for the students. The use of SLS was found to be effective in increasing the interest of male and female students towards the learning of geometry. Therefore, using SLS for the improvement and increment of students' interest in geometry is a welcome idea and the strategy has the potential of enhancing the academic performance of students in geometry.

## **Recommendations**

Based on the findings of the study, the following recommendations are made;

1. The implementation of Scaffolding Learning Strategy (SLS) in teaching of geometry has shown that it is gender friendly thereby increases both male and female interest in learning geometry.
2. Curriculum developers and planners should adapt the Scaffolding Learning Strategy (SLS) and introduce it into the mathematics curriculum especially in teaching geometry.
3. In view of the population explosion in schools as well as inadequate learning atmosphere, schools should provide conducive learning atmosphere that could accommodate Scaffolding Learning Strategy activities.
4. Training and re-training of teachers should be encouraged on the use Scaffolding Learning Strategy in Mathematics classes.

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