

# Investigation into Secondary School Students' Attitude towards Learning of Geometry in Zamfara State, Nigeria

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### ABSTRACT

*Research findings in secondary schools have consistently indicated that geometry is one of the most difficult areas of Mathematics at basic level and students' attitude towards it has been a factor that is known to influence students' achievement in mathematics. The purpose of this study is to investigate the level of students' attitude towards geometry and to find out whether gender difference influences such attitude. Some selected secondary schools in Zamfara state were used for the study. The study adopted a descriptive survey design using a questionnaire tagged Geometric Attitude Questionnaire. The population of the study consisted of SS I students in Zamfara state. A sample of 157 students was drawn using simple random sampling technique. Descriptive statistics of means and standard deviations were used to answer the research questions while Inferential Statistics of the Mann-Whitney test was used to test the formulated hypothesis. The study revealed that students' attitude towards geometry was relatively high generally, with male students having much higher positive attitude to geometry than their female counterparts and that difference between them was not statistically significant at  $\alpha = 0.05$  level of significance. It is recommended that teachers should be resourceful in encouraging and helping students in order to build positive attitude by trying to relate geometry to real life situations and also be gender sensitive.*

**Keywords:** Geometry, Attitude, Secondary School Students

### Introduction

Mathematics, in general, is linked with the development of any nation in the world, Mathematics as a discipline opens and shuts doors for men and women than any other content area we have got. Whether it is in Science, Engineering or Technology, it is tremendously important that a person be well armed with Mathematics if they are to have options in their lives (Thompson, 2013). Mathematics deals with patterns and relationships among quantities, numbers, and shapes (Isma'il et al., 2019) and it is intimately involved in every moment of everyone's life. Right from human existence on this earth, it has been a faithful companion. The role played by Mathematics in the day to day activities of human endeavors is suggestive of the fact that Mathematics is needed by all, not only for scientific and technological development but for all forms of development. Mathematics is one of the core subjects to be offered by all students up to the tertiary levels of education. This compulsory nature of Mathematics carries with it the assumption that the knowledge of the subject is essential for all members of society.

Attitude is any strong belief, feeling, approval or disapproval towards people and situations. It is possible to have favourable or unfavorable attitudes towards people, things and academic subjects. Psychologists define attitude as a leaned tendency to evaluate things in a certain way. This can include evaluation of people, issues, objects or events. Such evaluations are often positive or negative, but they can be uncertain at times (Kendra, 2013). Attitude is a central part of human identity, everyday people love, hate, like, dislike, favor, oppose, agree, disagree, argue, persuade etc. The everyday notion of attitude refers to someone's basic liking or disliking of a familiar target. A general overview of the development of attitude throughout school years is documented through surveys and meta-analyses. These studies have shown that, for example, girls tend to have more negative attitude towards mathematics than boys (McLeod, 2014). The general attitude of the class towards mathematics is related to the quality of the teaching and the social-psychological climate of the class (Kendra, 2013).

Geometry is an important area in school Mathematics curriculum throughout history; it has had great importance in people's lives, originating with the need of human beings to specify quantities, to measure figures, and to make maps. In order to represent and solve topics of Mathematics like Trigonometry and in daily life situations, sound Geometry knowledge is necessary. The National Council of Teachers' of Mathematics (NCTM) in the year 2000 has emphasized the importance of geometry in school Mathematics by stating, "Geometry and spatial sense are fundamental components of Mathematics learning. They offer ways to interpret and reflect on our physical environment." The usefulness of Geometry in everyday life is obvious in areas like measuring and estimating to both male and female students (Aiken, 1976).

### Statement of the Problem

The consistent poor performance in Mathematics has been of concern to Mathematics Educators, Mathematicians and the general public. Despite the importance of Mathematics and most especially Geometry to national and

individual development, student's performance in Geometry has not been encouraging. Summary of the West African Examinations Council (WAEC) chief examiner's report (2009-2013) indicated that students' fail to attempt questions relating to Geometry, and those who attempt, do so haphazardly. Also, Ogunleye (2010) reported that out of all the topics at the senior secondary school curriculum, Geometry has the highest percentage of students' failure. The consistent poor performance and avoidance of questions in Geometry by senior secondary school students in public examinations motivated the choice of Geometry for this study. This poor performance has been attributed to many factors among which are; inadequate teachers' content knowledge of geometry, poor teaching methods, lack of instructional materials, students misconception and misinterpretation of questions and none use of information and communication technology (ICT). Many studies have been undertaken with the hope of finding solutions to the above problems, but proved abortive. In light of the above, this study intends to adopt a different approach which is students' centered as against previous researches that are teacher-centered.

### **Objectives of the Study**

The main objective of this study is to investigate secondary school students' attitudes towards learning of geometry in Zamfara state.

The specific objectives of the study are as follows;

1. To investigate secondary school students' attitude towards the learning of geometry;
2. To investigate the difference in attitude between male and female students in geometry?

### **Research Questions**

The study sought answers to the following research questions;

1. What is the general attitude of secondary school students towards geometry?
2. Is there any difference in attitude between male and female students towards geometry?

### **Research Hypothesis**

1. There is no significant difference in the attitude of male and female students towards geometry.

### **Methodology**

The design of the study was a descriptive survey design. The population of the study consisted of SS I students in Zamfara state. Students at this level form the foundation class for senior secondary school education, therefore the most appropriate for the study. The sample for the study consisted of one hundred and fifty-seven (157) SSI students drawn from two intact classes selected by balloting system using simple random sampling technique.

The instrument for data collection was a Geometry Attitude Questionnaire (GAQ). The GAQ was adopted from Tapia and Marsh (2004), Attitude towards Mathematics Inventory. The questionnaire consisted of twenty five (25) multiple choice questions on students' attitude towards geometry drawn on four point Likert scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). The responses are SA= 4, A= 3, D= 2, SD =1. A mean of 2.0 was set as a benchmark for either agreeing or disagreeing with all the 25 items of the questionnaire.

The GAQ was validated by two Senior Lecturers with Ph.D. qualification and well experienced in test construction in the Science Education Department, Federal University Gusau. This was to determine the appropriateness of the test items, language used and content validity. The GAQ was pilot tested and the reliability of the instrument was determined using test-re-test method; the coefficient for reliability was found to be 0.78. Research questions were answered descriptively using mean and standard deviation while the formulated hypothesis was tested with Mann-Whitney test statistics.

**Results and Discussion**

**Research Question 1:** What is the general attitude of secondary school students towards geometry?

The results are presented in table one.

**Table 1:** Distribution of secondary school students' attitude towards geometry

S/NO	Items	SSI Students (n=157)				X	SD	Decision
		SA	A	D	SD			
1	Geometry is a useful subject	61	45	26	20	2.87	6.17	Agreed
2	I want to develop geometrical skills	53	51	30	18	2.82	4.90	Agreed
3	I get satisfaction out of solving geometry problems	49	46	33	22	1.93	5.93	Disagreed
4	Geometry helps develop the mind	56	40	25	21	2.81	5.67	Agreed
5	Geometry is important in everyday life	60	50	25	19	3.20	6.25	Agreed
6	High school geometry is very useful	63	58	19	17	3.11	6.69	Agreed
7	I usually enjoyed studying geometry	55	58	20	21	2.88	6.47	Agreed
8	Geometry can be used in many ways outside school	47	60	23	20	2.76	6.15	Agreed
9	Geometry is dull and boring	23	21	57	49	2.02	6.19	Agreed
10	Geometry is one of my dreaded subjects	19	24	48	55	1.90	6.04	Disagreed
11	I like solving geometry	49	53	17	22	2.62	6.72	Agreed
12	I think I will do well in geometry	46	53	25	20	2.63	5.77	Agreed
13	Geometry teaches me to be logical in thinking	55	50	23	18	2.76	5.82	Agreed
14	Geometry will not be important to me in future	22	19	47	51	1.85	5.72	Disagreed
15	Geometry is a difficult subject	50	51	28	23	2.75	5.97	Agreed
16	Doing geometry is a waste of time	20	26	45	48	1.88	5.58	Agreed
17	Geometry is too technical for me to understand	15	24	50	39	1.73	5.29	Disagreed
18	Geometry is not useful in the society	23	20	49	38	1.83	5.24	Disagreed
19	Only brilliant students understand geometry	22	24	45	39	1.84	5.13	Disagreed
20	Geometry is my worst topic in mathematics	20	21	38	39	1.64	4.67	Disagreed

21	I would like to avoid doing geometry in college	19	22	46	43	1.76	5.27	Disagreed
22	Knowing geometry will make me improve my mathematics result	56	45	20	18	2.66	5.74	Agreed
23	Geometry is applicable in solving human and natural problems	61	45	23	10	2.77	5.99	Agreed
24	Geometry is a worthwhile and reasonable subject	55	47	15	17	2.69	5.67	Disagreed
25	Geometry makes me to be confused	28	29	46	45	2.14	5.73	Agreed
<b>Aggregate Mean</b>						<b>2.39</b>		<b>Agreed</b>

Table 1 above analyzed the mean and standard deviation of secondary school students' attitude towards geometry. The table revealed students had relatively high level of attitude to geometry with an aggregate mean of 2.39. This implies that majority of students have an interest in solving geometry and appreciate its applicability in solving human and natural problems. Although many of the students (61 strongly agreed, 54 agreed) admitted that geometry is a useful subject and important in everyday life (60 strongly agreed, 50 agreed), conversely, they still considered it as a difficult subject.

### Research Question 2

Is there any difference in attitude between male and female students in geometry?

**Table 2:** Descriptive statistics (Mean Rank) result of the difference in attitude to geometry between male and female students

Variables	N	Mean Rank	Remark
Male	90	49.81	There is difference
Female	53	21.39	

The result in table 2 above revealed that male students have a mean rank of 49.81 as against their female counterparts with 21.39. This indicates that differences exist between the attitudes of male and female students towards geometry. The positive attitude towards geometry was found to be higher in males.

**Hypothesis 1:** There is no significant difference in the attitude of male and female students towards geometry.

To find out if the difference in attitude between the male and female students is significant or not, a Mann-Whitney test statistic was conducted.

**Table 3:** Summary of u-test analysis on difference in attitude to geometry between male and female students

Variables	N	Mean	Df	U-cal	U-crit.	Sig (p)
Male	90	49.81	151	0.11	1.87	0.91*
Female	53	21.39				

\*Not Significant at  $P \geq 0.05$

Table 3 showed that the difference in the attitude of male and female students towards geometry is not statistically significant because the calculated P-value of 0.91 is greater than  $P \leq 0.05$  level of significance with the U-critical (1.87) greater than U-cal (0.11) at degrees of freedom of 151. Therefore, the formulated hypothesis is hereby accepted. In other words, there is no significant difference in the attitude of male and female students towards geometry.

The findings in this research is in line with that of Akinsola and Olowojaiye (2010) that gender has no significant influence on the attitude of secondary school students towards learning geometry. This corroborates the empirical findings of Suleiman and Sodangi (2016) and Umar (2008) who reported no significant difference in the performance of male and female students in geometry. However, the findings contradicted the findings of McLeod, (2014), Ifemuyiwa (2008), John et al. (2005), Ogunkola (2008), Alebiosu (2005) and Amoo (2002) that males and females have differential abilities in science and mathematics in particular. They found that males are superior in numerical aptitude, science, reasoning and spatial relationships while females are superior in verbal fluency, perceptual speed, memory and manual dexterity. The outcome of Adekosan (2002) study also supported these studies that the attitude of female students towards mathematics is generally low when compared with their male counterparts.

### Conclusion and Recommendations

Generally, the attitude of SSI students towards geometry was relatively high. Although the majority of the students indicated that they do not like solving geometric problems, on the other hand, many of them agreed that geometry will be useful to them in the future. The findings also revealed that male students have a higher attitude than females though not statistically significant. It is recommended that students should be encouraged to develop a positive attitude towards geometry and also discard all the misconceptions held about mathematics. This can be achieved by ensuring a conducive learning environment and taking the students step by step through a concept and also relate all geometric concepts to real life situations.

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