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

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Students' attitude towards geometry was relatively correlated with Mathematics if they are comfortable and enjoy it. Attitude is defined as a disposition or position that an individual holds or has towards a specific target, such as geometry and other areas of mathematics like Trigonometry. A student's attitude towards mathematics in everyday life situations, such as measuring and estimating, is a fundamental component 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 maps. In order to represent and solve topics of Mathematics like Trigonometry and in daily life situations, sound geometric 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 scientific and technological development but for all forms of development. Mathematics is one of the core subjects emphasized the importance of geometry in school Mathematics by stating, "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).
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 1 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 1.

Table 1: Distribution of secondary school students’ attitude towards geometry

<table>
<thead>
<tr>
<th>S/NO</th>
<th>Items</th>
<th>SSI Students (n=157)</th>
<th>X</th>
<th>SD</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Geometry is a useful subject</td>
<td>61 45 26 20</td>
<td>2.87</td>
<td>6.17</td>
<td>Agreed</td>
</tr>
<tr>
<td>2</td>
<td>I want to develop geometrical skills</td>
<td>53 51 30 18</td>
<td>2.82</td>
<td>4.90</td>
<td>Agreed</td>
</tr>
<tr>
<td>3</td>
<td>I get satisfaction out of solving geometry problems</td>
<td>49 46 33 22</td>
<td>1.93</td>
<td>5.93</td>
<td>Disagreed</td>
</tr>
<tr>
<td>4</td>
<td>Geometry helps develop the mind</td>
<td>56 40 25 21</td>
<td>2.81</td>
<td>5.67</td>
<td>Agreed</td>
</tr>
<tr>
<td>5</td>
<td>Geometry is important in everyday life</td>
<td>60 50 25 19</td>
<td>3.20</td>
<td>6.25</td>
<td>Agreed</td>
</tr>
<tr>
<td>6</td>
<td>High school geometry is very useful</td>
<td>63 58 19 17</td>
<td>3.11</td>
<td>6.69</td>
<td>Agreed</td>
</tr>
<tr>
<td>7</td>
<td>I usually enjoyed studying geometry</td>
<td>55 58 20 21</td>
<td>2.88</td>
<td>6.47</td>
<td>Agreed</td>
</tr>
<tr>
<td>8</td>
<td>Geometry can be used in many ways outside school</td>
<td>47 60 23 20</td>
<td>2.76</td>
<td>6.15</td>
<td>Agreed</td>
</tr>
<tr>
<td>9</td>
<td>Geometry is dull and boring</td>
<td>23 21 57 49</td>
<td>2.02</td>
<td>6.19</td>
<td>Agreed</td>
</tr>
<tr>
<td>10</td>
<td>Geometry is one of my dreaded subjects</td>
<td>19 24 48 55</td>
<td>1.90</td>
<td>6.04</td>
<td>Disagreed</td>
</tr>
<tr>
<td>11</td>
<td>I like solving geometry</td>
<td>49 53 17 22</td>
<td>2.62</td>
<td>6.72</td>
<td>Agreed</td>
</tr>
<tr>
<td>12</td>
<td>I think I will do well in geometry</td>
<td>46 53 25 20</td>
<td>2.63</td>
<td>5.77</td>
<td>Agreed</td>
</tr>
<tr>
<td>13</td>
<td>Geometry teaches me to be logical in thinking</td>
<td>55 50 23 18</td>
<td>2.76</td>
<td>5.82</td>
<td>Agreed</td>
</tr>
<tr>
<td>14</td>
<td>Geometry will not be important to me in future</td>
<td>22 19 47 51</td>
<td>1.85</td>
<td>5.72</td>
<td>Disagreed</td>
</tr>
<tr>
<td>15</td>
<td>Geometry is a difficult subject</td>
<td>50 51 28 23</td>
<td>2.75</td>
<td>5.97</td>
<td>Agreed</td>
</tr>
<tr>
<td>16</td>
<td>Doing geometry is a waste of time</td>
<td>20 26 45 48</td>
<td>1.88</td>
<td>5.58</td>
<td>Agreed</td>
</tr>
<tr>
<td>17</td>
<td>Geometry is too technical for me to understand</td>
<td>15 24 50 39</td>
<td>1.73</td>
<td>5.29</td>
<td>Disagreed</td>
</tr>
<tr>
<td>18</td>
<td>Geometry is not useful in the society</td>
<td>23 20 49 38</td>
<td>1.83</td>
<td>5.24</td>
<td>Disagreed</td>
</tr>
<tr>
<td>19</td>
<td>Only brilliant students understand geometry</td>
<td>22 24 45 39</td>
<td>1.84</td>
<td>5.13</td>
<td>Disagreed</td>
</tr>
<tr>
<td>20</td>
<td>Geometry is my worst topic in mathematics</td>
<td>20 21 38 39</td>
<td>1.64</td>
<td>4.67</td>
<td>Disagreed</td>
</tr>
</tbody>
</table>
I would like to avoid doing geometry in college 19 22 46 43 1.76 5.27 Disagreed
Knowing geometry will make me improve my mathematics result 56 45 20 18 2.66 5.74 Agreed
Geometry is applicable in solving human and natural problems 61 45 23 10 2.77 5.99 Agreed
Geometry is a worthwhile and reasonable subject 55 47 15 17 2.69 5.67 Disagreed
Geometry makes me to be confused 28 29 46 45 2.14 5.73 Agreed
Aggregate Mean 2.39 Agreed

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean Rank</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>49.81</td>
<td>There is difference</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>21.39</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Df</th>
<th>U-cal</th>
<th>U-crit.</th>
<th>Sig (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>90</td>
<td>49.81</td>
<td>151</td>
<td>0.11</td>
<td>1.87</td>
<td>0.91*</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>21.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not Significant at P≥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≤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), Adebiosu (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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References


