



CAUSES OF ANXIETY IN GEOMETRY AMONG THE STUDENTS OF SECONDARY SCHOOLS AND ITS REMEDIES

Pooja Podmaja Priyadarshini
Researcher

Dr. Ajay Kumar Swain
Assistant Professor

NKC CTE, Angul

Abstract

The study was conducted with the objectives as to find out the causes of anxiety in geometry among the students of secondary schools, to estimate the relationship between anxiety and achievements in geometry of students in secondary schools, to compare the degrees of anxiety in geometry between boys and girls of secondary schools, to study the differences of anxiety in geometry of the students belong to rural and urban secondary schools and to estimate the effects of strategies for minimizing the anxiety in Geometry of students in secondary schools. The hypotheses where there is no significant relationship between anxiety and achievements in geometry of students in secondary schools, there is no significant difference between boys and girls in relation to the degrees of anxiety in geometry, there is no significant difference between rural and urban students in relation to the degrees of anxiety in geometry and there is no significant effect of strategies on minimising anxiety of students in geometry. The study revealed that a large number of pupils of secondary schools have anxiety in geometry. The degree of anxiety in geometry between boys and girls differ significantly. The degrees of anxiety in geometry between rural and urban students differ significantly.

Key Words: Anxiety, Geometry, Secondary Schools, Remedies

1. Introduction:

Education is the only way for the development of both individual and nation. Mathematics is one of the most important subjects in school education and it is the backbone of all sciences and technology. Our daily life depends on modern technology that means our progress depend highly on mathematics. Since mathematics is abstract in nature, therefore it is more difficult to learn and understand than compare to other subject in school level. Geometry is a branch of mathematics which is more abstract and harder than compare to other branches of mathematics. Therefore, most of the students face anxiety at the time of solving problems in geometry. This type of anxiety caused for negative attitude due to bad experience and lack of knowledge on the content. Anxiety creates nervousness in the mind and destroys the concentration over the problem. Anxiety and phobia demoralise the students mind and it affects the achievement badly. The relationship between mathematics anxiety and achievement indicates that if anxiety increases, then performance decreases. That means anxiety and achievement are inversely proportion to each other. Different factors are responsible for

anxiety in geometry such as teachers' attitude and inappropriate teaching techniques, unhealthy teacher-student relationship, misbehaviour of the teacher, lack of practice, lack of patience, lack of motivation, avoidance of the subject, social position, gender variation, negative attitude of the students about geometry, lack of self-belief, lower confidence, environmental influence, lack of preparation, low self-esteem, wrong process of learning style etc.

To reduce anxiety in geometry, different measures are to be followed such as cooperative learning, teachers' friendly behaviour, mood therapy, supportive and encouraging classroom environment, adopting appropriate teaching techniques with the suitable teaching learning materials, students positive attitude about geometry, practice geometrical problems more and more with patience, give more attention in the geometric class to understand geometry correctly and easily, improve creating frame of mind by deep thoughts etc.

To achieve the goal of geometry education and to improve the achievement of the students in the examination there is an urgent need to find out the causes of anxiety in geometry. The study will be also carried out for developing effective strategies for minimising anxiety in geometry among the students of secondary schools.

2. Review of Related Literature:

The researchers have gone through the following studies.

Naseek P (2021) conducted the study on "Mathematics Anxiety among Students: Causes and Remedies" IJARIE, Vol-7, Issue-3. The study revealed that Mathematics anxiety is a feeling of tension, apprehension, or fear that interferes with the performance of students while learning mathematics. **Bhat, I. A & Arumugam, G (2020)** studied on Mathematics Anxiety among Students: An Overview. Gedrag & Organisatie Review, Vol. 33, Issue-02. The study revealed that symptoms through which we can easily identify the children that have fear of mathematics and finally study suggest some preventive measures with the help of which anxiety can be reduced. **Sharma (2016)** conducted a study on alleviating mathematics anxiety of elementary school students: A situated perspective. The main purpose of this study was to investigate the effects of situated learning effortful control on mathematics anxiety of school students. 99 seventh grade students were selected from two senior English medium schools. Mathematics anxiety scale was administered for collection of data which was developed by Sharma and Sansanwal and also Effortful Control scale (Lonigan and Philips) was also used. This study was experimental type. The results of this study indicate that students who were exposed to the situated learning model had significantly less mathematics anxiety than their counter parts. **Kaur (2017)** examined math-phobia: Causes and remedies. This study examined the causes of poor mathematics teaching and learning in primary and post-primary schools and recommends remedial measures to overcome them. There are many causes of mathematics phobia in schools which are poor Causes of Anxiety in Geometry, examination system, introduction of modern mathematics, shortage of qualified mathematics teachers, inherent fear of mathematics, lack of effective teaching aids etc. The study revealed that math-phobia exists among the students in accordance with feverish feelings in math class, difficulty in understanding math problem among others. Remarkable causes include poor student-teacher relationship, non-conducive environment for math class among others. There should be effective effort in solving problem to improve students' mathematics achievement. **Khemka & Rathod (2016)** conducted a study on academic anxiety of secondary school students.

In this study, purposive sampling technique was used to selection of school and stratified random sampling technique was used for selection of students. Survey method was used for the study. 400 students were selected for conducting the research. After using statistical technique results showed that 18.5% of students had low academic anxiety, 75% of students had average academic anxiety and about 6.5% of students had high academic anxiety. It is revealed that female students were more academic anxious than male students; boys of government schools had more academic anxiety than boys of private schools; girls of private schools had more academic anxiety than girls of government schools. **Bhowmik & Banerjee (2015)** conducted a co-relational study on anxiety achievement in mathematics and of secondary school students' in Jangal-Mahal of West Bengal, India. The main purpose of this study was to investigate Jangal Mahals' (West Bengal, India) high school students' anxiety towards Causes of Anxiety in Geometry and relationship between anxiety in mathematics and achievement in mathematics. The design of this study was descriptive type. Findings showed that in gender difference there is no significant difference on the students' anxiety towards mathematics, though there is not so significant difference in achievement in mathematics. Also, there is a significant negative correlation between anxiety towards mathematics and achievement in mathematics.

3. Rationale of the Study:

Geometry at the secondary stage is a compulsory part of mathematics. Generally, the concept of geometry starts at the very beginning of school education. In the initial stage, it contains some common drawings such as line, triangle, circle, figure etc. Although the primary students have the scope to learn basic drawings of geometry. In most of the occasion, they learn the basic geometric concepts mechanically. In the syllabus of mathematics, geometry starts from class VI. Although the students are aware about the nature of figure, line, circle, triangle, rectangle etc. It has been observed that in mathematics, less weightage has been given on geometry. Accordingly, the students are not so serious about the concept of geometry. If the nature of geometry is analysed, then it is revealed that most of the concepts of geometry at the school level are not so typical. But due to improper ideas on geometry, most of the students feel anxious about geometry. The nature of geometry in many occasions hampers proper conceptual development on the theorems, constructions, and axioms and so on. As a result, they obtain poor marks in geometry which develops the anxiety among the students at secondary level. It has also been observed that many students use the technique of rote memorization to work out geometry problems without understanding the concept. Hence, they are unable to solve the problem in geometry in a proper manner. The anxiety originates from the nature of geometry and its classroom instruction. A large number of students obtain poor marks in geometry part.

4. Statement of the Problem:

The researcher is a teacher and has experience of teaching mathematics as well as geometry at secondary level. She has also gone through some related studies and the following questions came to the mind of the researcher.

- What are the reasons behind the poor achievements of students in geometry?
- Why does anxiety originate about geometry among the students?
- What are the causes of anxiety of students in geometry?

- What would be the strategy for remedies of anxiety among the students of the secondary schools in geometry?

The researchers felt that a systematic study is needed to find out the answers of the questions. Hence, it is decided to conducted the study entitled as “**Causes of Anxiety in Geometry among the Students of Secondary Schools and its Remedies**”.

5. Objectives of the Study:

The present study was conducted with the following objectives.

1. To find out the causes of anxiety in geometry among the students of secondary schools.
2. To estimate the relationship between anxiety and achievements in geometry of students in secondary schools.
3. To compare the degrees of anxiety in geometry between boys and girls of secondary schools.
4. To study the differences of anxiety in geometry of the students belong to rural and urban secondary schools.
5. To estimate the effects of strategies for minimizing the anxiety in Geometry of students in secondary schools.

6. Hypotheses of the Study:

The following hypotheses were taken in the study.

- There is no significant relationship between anxiety and achievements in geometry of students in secondary schools.
- There is no significant difference between boys and girls in relation to the degrees of anxiety in geometry.
- There is no significant difference between rural and urban students in relation to the degrees of anxiety in geometry.
- There is no significant effect of strategies on minimising anxiety of students in geometry.

7. Delimitation of the Study:

- The present study was delimited to the class IX students of Chilika Block in Khordha District.
- The study was delimited to the class IX Geometry part of Mathematics subject.

8. Method of the Study:

Here, the experimental method was adopted to conduct the study.

9. Population of the Study:

All the class IX students of Govt. Secondary Schools in Chilika Block are the population of the study.

10. Sample of the Study:

120 students (60 boys and 60 girls) of class IX from six rural and urban Govt. Secondary Schools in Chilika Block were selected as sample of the study.

11. Tools Used:

The following tools were used for collection of data.

1. An Opinionnaire: It was used to find out the causes of anxiety in geometry.

2. An Anxiety Scale: It was used to measure the anxiety in geometry among the students in secondary schools.
3. Achievement Test: It was used to measure the achievements of students in geometry.
4. Pre-Test questions
5. Learning Materials for Different Strategies: Selected contents / units based on selected strategies used for experimentation.
6. Post-Test questions

12. Procedure of Data Collection:

In this study, the causes of anxiety in geometry were identified from students' responses. The opinionnaire on anxiety in geometry was distributed to the students and after students' response the opinionnaires were collected. After that students' responses were used to estimate the degree of intensity of identified causes of anxiety in geometry. Anxiety test and achievement test were administered on the students of class IX of six schools. These tools were administered to know the relationship between anxiety and achievement of the students in geometry. After experimentation post-test was conducted to find out the effect of strategies.

13. Result and Discussion:

Category of Causes for Anxiety:

A. Causes related to nature of pupils

- Poor intelligence of pupils in geometry
- Practicing time of geometry problem is very low
- Attitude of students in geometry
- Assume lesser ability than the original one
- Lack of logical thought of students
- Lack of knowledge about geometry
- Lack of thinking as whole of the problem in geometry
- Lack of logical thinking during solving problem in geometry

B. Causes related to family, friends and parents

- Parents weakness in geometry
- Parents fearless in geometry
- Parents negative attitude in geometry
- Unhygienic relationship between family and society
- Parents unexpected expectation from children
- Negative mentality of elders to students
- Negative remarks of friends about the subject and ability of an individual

C. Causes related to examination and evaluation system

- Time bound in case of examination
- Lack of adequate planning in evaluation

- Pattern of given marks in the evaluation of answer sheet
- Fear of failure in examination

D.Causes related to curriculum

- Curriculum is not related to balance mental development of students

E.Causes related to learning problem

- Incompleteness of acquiring knowledge in geometry in the lower classes of the school
- Concepts and laws of geometry are taken into memory without understanding it properly.

F.Causes related to the teacher and classroom instruction

- Lack of proper guidance/teaching by the teacher
- Lack of application of teaching aids and modern technology in the classroom
- Show punishment and fear to students by the teacher in the classroom
- Lack of responsibility of teacher
- Students are obliged to solve geometrical problems in specific process according to teacher instruction
- Learning matter is not presented attractively
- Lack of self-belief and lack of efficiency in geometry of teacher
- In efficiency of joining geometry to the real life at the time of teaching
- Difference between pattern of student's realization and pattern of teaching technique
- Lack of patience of teacher
- Inefficiency of selection of right procedure in case of teaching geometry

G.Causes related to general perception

- In general concept, to solve geometrical problem huge intelligence is required
- Geometry is not an interesting and memory-based subject

Table: 2

Showing Anxiety Score range as per Experts Opinion

Nature of Anxiety	Range of scores
Extremely Anxious Group	More than 90
Highly Anxious Group	81 – 90
Moderately Anxious Group	71 – 80
Low Anxious Group	61 – 70
Non-anxious Group	Below 61

Table: 3**Showing Distribution of Pupils Based on Anxiety Score**

School	Anxious		Non - Anxious		Total
	No. of Boys	No. of Girls	No. of Boys	No. of Girls	
S ₁	7	8	3	2	20
S ₂	7	7	3	3	20
S ₃	6	7	4	3	20
S ₄	7	8	3	2	20
S ₅	7	7	3	3	20
S ₆	6	7	4	3	20
Total	40	44	20	16	120
	84		36		

Table-4**Showing Distribution and Percentage of Boys and Girls**

Category	Boys		Girls	
	N	%	N	%
Extremely Anxious Group	6	8.6	3	5.67
Highly Anxious Group	9	15.75	9	14.68
Moderately Anxious Group	2	26.62	3	27.91
Low Anxious Group	1	17.05	3	27.32
Non-Anxious Group	2	31.98	2	24.42
Total Students	20	100	20	100

Hypothesis: 1

The relationship between anxiety and achievement of students in geometry is not significant.

Table-5**Showing Distribution of Students on Anxiety**

	Total Students	Number of Anxious Students	Number of Non-Anxious Students
Students Number	120	84	36
Average Anxiety Score	68.74	76.15	49.68

Interpretation:

The trend reveals that a large number of pupils of secondary schools are having anxiety in geometry. Also, Table 5 indicates that average anxiety score of anxious students is high than that of non-anxious and total students.

Table-6**Showing Distribution of Students Based on Anxiety Score**

Score Range	Above 90	81 - 90	71 – 80	61 – 70	Below 61
Category	Extremely Anxious	Highly Anxious	Moderately Anxious	Low Anxious	Non-Anxious
No of Pupils	9	18	5	4	4
Percentage	7.06%	15.18%	27.3%	22.47%	27.99%

Interpretation:

Above Table-6 indicate the distribution of students based on anxiety in geometry. Distribution reveals that nearly 72% students are anxious in geometry and approximately 28% students belong to non-anxious group.

Hypothesis: 2:

The degree of anxiety in geometry between boys and girls do not differ significantly.

Table- 7**Showing Distribution of Boys & Girls according to their Anxiety Nature**

Gender	Extremely A G	Highly A G	Moderately AG	Low A G	Non-A G	x^2	Sig.
Boys	6	9	2	1	2	26.34	0.01
Girls	3	9	3	3	2		

Interpretation:

The degree of anxiety in geometry between boys and girls differ significantly

Hypothesis: 3

The degree of anxiety in geometry between urban and rural does not differ significantly.

Table-8**Showing distribution of Urban & Rural students based on their nature of anxiety**

Location	Extremel y A G	Highly A G	Moderatel y AG	Low A G	Non-A G	x^2	Sig.
Urban	5	8	3	3	1	18.16	0.05
Rural	4	10	2	1	3		

Interpretation:

Therefore, the degrees of anxiety in geometry between rural and urban students differ significantly.

Hypothesis: 4

The effects of strategies on learning and anxiety of students in geometry do not differ significantly.

Table-9

Showing t-value between pre and post achievement scores of students in geometry

Strategies	N	Test	Mean	SD	SED	't' value	Sign.
ST1	120	Pre	14.11	2.82	0.23	17.87	0.01
	120	Post	18.22	2.28			
ST2	120	Pre	14.09	2.48	0.42	22.24	0.01
	120	Post	23.43	2.57			

Interpretation:

It has been observed from the results that the achievements of pupils instructed through Strategy-1 differ significantly at 0.01 levels between pre and post conditions. Similar result has been found in case of Strategy-2. Hence, the effects of learning and anxiety of students in geometry differ significantly.

14. Findings of the Study:

(1) Major causes of anxiety in geometry identified by experts:

- Lack of practicing in geometry
- Attitude of students in geometry
- Lack of proper guidance/teaching
- Lack of responsibility of teacher
- Assume lesser ability than the original one
- Students are generally panic regarding geometry
- Concept and laws of geometry are taken into memory without understand it properly
- Incompleteness of acquiring knowledge in geometry in the lower classes of school
- Inefficiency of joining geometry to the real life at the time of teaching

(2) Findings Pertaining to H_{01}

Results indicate that a large number of pupils of secondary schools have anxiety in geometry. The average anxiety score of anxious students is higher than that of non-anxious students. Distribution of students on anxiety reveals that nearly 72% students are anxious in geometry and approximately 28% students belong to non-anxious group. The coefficient of correlations between anxiety and achievements indicates that there is a negative significant relation between anxiety and achievements of pupils in geometry. So H_{01} is rejected.

(3) Findings Pertaining to H_{02}

The degree of anxiety in geometry between boys and girls differ significantly. The results show that boys and girls having different degrees of anxiety in geometry. The trend of results indicates that the girls are more anxious than that of boys in solving geometry problems. So H_{02} is rejected.

(4) Findings Pertaining to H₀₃

The degrees of anxiety in geometry between rural and urban students differ significantly. The results conclude that rural and urban students having different degrees of anxiety. The trend indicates that the rural students are more anxious than urban students in geometry. So H₀₃ is rejected.

(5) Findings Pertaining to H₀₄

The effects of strategies on learning and anxiety of students in geometry differ significantly.

15. Conclusion:

- Most of the students of secondary school face anxiety in geometry.
- The relation between anxiety and achievements are inversely proportion to each other.
- Girls are more anxious than boys in solving geometrical problems.
- Effective teaching strategies with proper teaching aids help students to reduce anxiety and phobia in doing geometry.
- Self-confidence, hardworking and practice geometry again and again help student to get clear knowledge about geometry and that leads to higher achievement in geometry in the examination.
- Guided discovery approach has been established its superiority for minimizing anxiety among the pupils of secondary schools in geometry.
- Healthy student-teacher relationship helps students to clear their problems regarding the matter and therefore anxiety regarding the subject is automatically reduced.

References:

- Agarwal, S. M. (2000). Teaching of modern mathematics. New Delhi: Dhanpat Rai Publishing Co.
- Agarwal, J. C. (2010). Principles, methods & techniques of teaching. Delhi: Vikas Publication House Pvt. Ltd., Bookman.
- Banerjee, S. (2005). Ganit shikshan paddhati. Kolkata: Rita Book Agency.
- Bloom, B. S. (1956). Taxonomy of educational objectives. New York, David McKay Company.
- Das, N. G. (1989). Statistical method. Calcutta: M. Das and Co.
- Edwards, A. L. (1960). Experimental design in psychological research. Rinehart, New York.
- Garrett, H. E. (1981). Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd.
- National Council of Teachers of Mathematics (2000). Principles and standards for school mathematics. Reston, VA: National Council of Teachers of Mathematics.
- Özerem, A. (2012). Misconceptions in geometry and suggested solutions for seventh grade students. International Journal of New Trends in Arts, Sports & Science Education, 1(4), 23-35.
- Salinas, T. (2004). Effects of reflective notebooks on perceptions of learning and mathematics anxiety. PRIMUS, 14(4), 315-327.