



A Study of Errors Committed by the VIII Class Students in Geometrical Concepts

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ABSTRACT

Mathematics is one subject which has extensive application in our day to day life situations. A fundamental knowledge of basic mathematical concept is valuable even for a layman. For an intellectual understanding of contemporary literature and to lead a successful life in society, knowledge of mathematical language, symbols and their manipulations are essential. Knowledge of elementary mathematical concepts is very essential for any person to lead a fruitful life in the society. The world of today which learn more and more heavily on science and technology, demands more and more mathematical knowledge. It has been said that mathematics is the only branch of learning in which theories of two thousand years old are still valid. Mathematics has been defined as the science of quality, measurement and special relations. It is a systematized, organized and exact branch of science. Bertrand Russell (1901) defined mathematics as "The subject in which we never know what we are talking about, nor whether what we are saying is true", in fundamentally significant.

KEYWORDS : Geometrical concepts, Gender, Management, Annual income and Father Education.

INTRODUCTION

Bell discussing the merits of this definition in his "Queen of sciences" says that

- It Emphasizes the entirely abstract character of mathematics
- It reduces all mathematics to postulation forms and
- It opposes the traditional definition of mathematics as the science of number, quantity and measurement.

Mathematics is an art which expresses beauty through a system of definition, axioms and theorems. Mathematics was originally discovered for the purpose of investigation, understanding and formulating the properties of natural phenomena both physical and social.

Bacon said "Mathematics is the gateway and key to all sciences". Mathematics is having correlation with all other sciences, with language and literature and also with art and architecture.

Many problems can be broken down by analyzing them into inter-related constituent problems, which can be explored by well known mathematical techniques. Whenever there is structure, relationship, regularity, systematic variation, there is mathematics.

The national policy on education (NPF) (1986), Stated "Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically"

History of geometry

The word geometry originally meant for measurement of earth.

It is a Greek word goes meaning earth and matron meaning measure. Geometry was extremely important to ancient societies and was used for surveying, astronomy, navigation, and building geometry in actually known as Euclidean geometry which was written well over 2000 years ago in ancient Greece by Euclid, Pythagoras, Thales, Plato and Aristotle just to mention a few.

The most fascinating and accurate geometry text was written by Euclid and was called elements. There are two types in geometry (i) informal geometry and, 2) formal or demonstrative geometry.

In Egypt, the need for the study of geometry grew up due to annual Divesting Floods of the Nile. After the river Nile receded farms owned by farmers had to be earned again. Thus, interest in the study of shapes and size of geometrical figures grew.

Geometry thus began as the study of special properties of material bodies, properties having to do with the form, shape and size of things. Later the science of geometry was sought to be established on the basis of notation of points, line etc.

Importance of Geometry

Geometry became an important part in mathematical curriculum

Geometry has a double value, first as knowledge and second as a method of logical thinking. Geometry is recognized on a study important for cultural development. It is the key to mathematical thinking.

Geometry provides ideal field observing and exercising the process of deductive logic. Technical advances have placed an increasing importance on the geometry of form, size and position.

No branch of mathematics perhaps appeals to the layman more than does geometry.

Diagnostic tests

The tests which have been devised to provide information about the specific nature of pupil's difficulties in given subject areas are called diagnostic tests.

The term diagnosis has been borrowed from the medical profession where it implies "Identification of disease by means of patient's symptoms."

The word diagnosis is used more or less in the same sense in education. We may say that educational diagnosis is "The determination of the nature of learning difficulties and deficiencies"

According to Atkinson Mark M. (1969) "Educational diagnosis is required for pupils to enable education to discover individual strengths and weaknesses as a basis for planning their educational guidance"

Surgen Pau, V. laid down the following essential steps in educational diagnosis.

- Identifying the pupils who are having difficulties.
- The errors or learning difficulties of pupils.
- Discovering the casual factors.

Educational diagnosis implies all activities in measurement and interpretation that helps to identify growth at large and their casual factors for individuals or for class groups.

Purpose of diagnostic tests

Diagnostic tests measure some what narrower aspects of achievement than survey tests.

Diagnostic tests yield measures of highly related abilities underlying achievement in a subject. They are designed to identify particular strengths and weaknesses on the part of the individual child and within reasonable limits to reveal the underlying causes.

The immediate aim is to locate areas in which additional instruction or remedial education is required or in which teaching methods have to be improved. No rigid time limit need be specified in the case of diagnostic tests. Diagnosis should be individualized as much as possible and every student should be allowed as much time as he needs reasonably.

It may be noted that the preparation of blue print may altogether be avoided in a diagnostic test.

Edward and Stanley have stressed that the factors such as teaching methods and the teaching-learning process, social and emotional problem, physical factors, intellectual and mental factors. Factors associated with learning difficulties will have significant influence on learning.

To determine the degree and nature of their influence educational diagnosis is often necessary.

Review of Literature

Dutta, A., Learning Disabilities in the Reasoning Power of the Students in Geometry-Diagnosis and Prevention, Ph.D. Edu., Kai. U. 1986. The main purposes of the study were (i) to diagnose the major patterns of disabilities in a specific area of geometry with the help of tools specially developed for the purpose, and (ii) to try out experimentally teaching methods which would prevent development of learning disabilities in the area under study. Three hypothesis were examined. The study had two dimensions. The first was diagnosis of patterns of disabilities of students in the concepts of 'congruency of triangles' in geometry. The second part consisted of preventive measures adopted by the experimenter to check development of learning disabilities in this area with the help of audio-visual methods and techniques. A diagnostic test in 'congruency of triangles' was constructed to identify patterns of disabilities, and was administered on 286 slow learners in geometry. Structured individual interviews were conducted with 20 per cent students selected randomly from the original sample. In the second phase, the experiment was conducted in four secondary schools with controlled and experimental groups. The initial measures by the verbal creativity test and criterion measures by the diagnostic test in geometry were subjected to analysis of covariance. Some of the findings were: 1. Thirty-three major patterns of disabilities were identified. 2. The experimental groups taught by audio-visual materials and techniques achieved significantly more than the controlled groups taught by conventional methods.

Bharjwaj, R. P., Standardization of a Comprehensive Diagnostic Test and Preparation of Remedial Material in Mathematics for Middle Standard Students of Haryana, Ph.D. Edu., Kur. U., 1987. The objectives of the study were (i) to construct and standardize a diagnostic test in mathematics for middle standard students of Haryana, (ii) to find out the types of errors committed by the pupils in the context of the nature of teaching units, and (iii) to construct and try out remedial material. The main features of the test and remedial material were: 1. The test consisted of three parts, that is, arithmetic, algebra and geometry.

Bala Guraiah (2008) found that there is significant difference between errors committed in geometrical concepts by Telugu and English medium students. Sex has no significant influence on the frequency of errors committed by pupils of VIII class in Geometrical concepts. Locality has no significant influence on the errors committed by VIII class students in geometrical concepts. Management of the Schools has significant influence. There is no significant impact of religion on the errors committed by the pupils. There is significant influence of father's educational status on the errors committed by the pupils. There is significant influence of mother's educational status on the errors committed by the pupils. There is significant influence of fa-

ther's occupation on the errors committed by the pupils. There is significant influence of mother's occupation on the errors committed by the pupils. There is significant influence of birth order on the errors committed by the pupils.

Scope of the Study

The main intention of the present study is to find the relation of errors committed by the VIII class students in geometrical concepts with Gender, Management, Annual income and Father education.

Objective of the Study

To study the impact of Gender, Management, Annual income and Father education on the errors committed by the VIII class students in geometrical concepts.

Hypotheses of the study

- There would be no significant impact of 'gender' on the errors committed by the VIII class students in geometrical concepts.
- There would be no significant impact of 'management' on the errors committed by the VIII class students in geometrical concepts.
- There would be no significant impact of 'annual income' on the errors committed by the VIII class students in geometrical concepts.
- There would be no significant impact of 'father education' on the errors committed by the VIII class students in geometrical concepts.

Tools for the Study

- The geometrical concepts inventory prepared by the investigator, the tool was highly reliable for the investigation. The total question items in the present diagnostic test are forty. Each question item carries one mark. The number of errors committed by each pupil is expressed for statistical computations.
- Personal data regarding the student – 1. Name, 2. Gender, 3. Management, 4. Annual income and 5. Father education.

Data Collection

The sample for the investigation consisted of 300 VIII class students in Chittoor district. The stratified random sampling was applied in three stages. The first stage is management i.e. Government, Private and aided the second stage is locality i.e. rural and urban and third stage is gender i.e. male and female. It is a 3X2X2 factorial design with 300 sample subjects. The investigator personally visited schools with the permission of the head masters of the schools. The investigator personally visited secondary schools with the permission of the head masters of the schools. The students who attended to the school on the day of collection of data are considered for the purpose of the investigation. It was provided to the concerned students of the school. The students were given necessary instructions about the instruments and motivated to respond genuinely to all the items. The geometrical concept test and personal data sheet were administered. The data on each variable in the investigation is properly coded to suit for computer analysis. The analysis was carried out on the basis of objectives of the investigation and hypotheses formulated by employing appropriate statistical techniques. The inferential statistical technique 'F' and 't' – tests was employed to test hypothesis.

RESULTS AND DISCUSSION

1. Gender

The relationship of errors committed by the VIII class students in geometrical concepts with their gender is studied in the present investigation. On the basis of gender, the VIII class students divided into two groups. The boys form with the Group – I and Group – II forms with the girls. The errors committed by the VIII class students in geometrical concepts of the two groups were analyzed accordingly. The errors committed by the VIII class students in geometrical concepts for the two groups were tested for significance by employing 't' - test. The following hypothesis is framed.

Hypothesis – 1

There would be no significant impact of 'gender' on the errors committed by the VIII class students in geometrical concepts.

The above hypothesis is tested by employing 't' - test. The results are presented in **Table – 1**.

Table – 1
Influence of gender on the errors committed by the VIII class students in geometrical concepts

S. No.	Gender	N	Mean	S.D.	't' - Test
1.	Boys	150	24.39	5.68	5.886**
2.	Girls	150	28.11	5.28	

** Indicates significant at 0.01 level

It is found from the Table – 1 that the computed value of 't' (5.886) is greater than the critical value of 't' (2.59) for 1 and 298 df at 0.01 level of significance. Hence the Hypothesis – 1 is rejected at 0.01 level. Therefore it is concluded that the gender has significant influence on the errors committed by the VIII class students in geometrical concepts.

2. Management

The relationship of errors committed by the VIII class students in geometrical concepts with their management is studied in the present investigation. On the basis of management, the VIII class students are divided into three groups. The Government school students form with the Group – I, Group – II forms with the Private school students and Group – III forms with Aided students. The corresponding errors committed by the VIII class students in geometrical concepts of the three groups were analyzed accordingly. The mean values of errors committed by the VIII class students in geometrical concepts for the three groups were tested for significance by employing 'F' - test. The following hypothesis is framed.

Hypothesis – 2

There would be no significant impact of 'management' on the errors committed by the VIII class students in geometrical concepts.

The above hypothesis is tested by employing 'F' - test. The results are presented in **Table – 2**.

Table – 2
Influence of management on the errors committed by the VIII class students in geometrical concepts

S. No.	Management	N	Mean	S.D.	'F' – Test
1.	Government	100	24.84	5.47	17.251**
2.	Private	100	28.89	5.49	
3.	Aided	100	25.02	5.48	

** Indicates significant at 0.01 level

It is found from the Table – 2 that the computed value of 'F' (17.251) is greater than the critical value of 'F' (4.68) for 2 and 297 df at 0.01 level of significance. Hence the Hypothesis – 2 is rejected at 0.01 level. Therefore it is concluded that the management has significant influence on the errors committed by the VIII class students in geometrical concepts.

3. Annual income

The relationship of errors committed by the VIII class students in geometrical concepts with their annual income is studied in the present investigation. On the basis of annual income, the students are divided into three groups. The annual income is up to rupees fifty thousand form the Group – I, Group – II forms with annual income is above rupees fifty thousand one to one lakh and Group – III forms with annual income is above rupees one lakh. The corresponding errors committed by the VIII class students in geometrical concepts of the three groups were analyzed accordingly. The mean values of errors committed by the VIII class students in geometrical concepts for the three groups were tested for significance by employing 'F' - test. The following hypothesis is framed.

Hypothesis – 3

There would be no significant impact of 'annual income' on the errors committed by the VIII class students in geometrical concepts.

The above hypothesis is tested by employing 'F' - test. The results are presented in **Table – 3**.

Table – 3
Influence of annual income on the errors committed by the VIII class students in geometrical concepts

S. No.	Annual income	N	Mean	S.D.	'F' - Test
1.	Group – I	130	25.86	5.63	4.991**
2.	Group – II	79	25.14	5.82	
3.	Group – III	91	27.77	5.69	

** Indicates significant at 0.01 level

It is found from the Table – 3 that the computed value of 'F' (4.991) is greater than the critical value of 'F' (4.68) for 2 and 297 df at 0.01 level of significance. Hence the Hypothesis – 3 is rejected at 0.01 level. Therefore it is concluded that the annual income has significant influence on the errors committed by the VIII class students in geometrical concepts.

4. Father education

The relationship of errors committed by the VIII class students in geometrical concepts with their father education is studied in the present investigation. On the basis of father education, the students are divided into three groups. The father education is 10th class and below form the Group – I, Group – II forms with father education is intermediate and graduation and Group – III forms with father education is above graduation. The corresponding errors committed by the VIII class students in geometrical concepts of the three groups were analyzed accordingly. The mean values of errors committed by the VIII class students in geometrical concepts for the three groups were tested for significance by employing 'F' - test. The following hypothesis is framed.

Hypothesis – 4

There would be no significant impact of 'father education' on the errors committed by the VIII class students in geometrical concepts.

The above hypothesis is tested by employing 'F' - test. The results are presented in **Table – 4**.

Table – 4
Influence of father education on the errors committed by the VIII class students in geometrical concepts

S. No.	Father education	N	Mean	S.D.	'F' - Test
1.	Group – I	94	27.47	5.75	5.472**
2.	Group – II	141	25.11	5.75	
3.	Group – III	65	26.97	5.46	

** Indicates significant at 0.01 level

It is found from the Table – 4 that the computed value of 'F' (5.472) is greater than the critical value of 'F' (4.68) for 2 and 297 df at 0.01 level of significance. Hence the Hypothesis – 4 is rejected at 0.01 level. Therefore it is concluded that the father education has significant influence on the errors committed by the VIII class students in geometrical concepts.

Findings

There is significant influence of gender, management, annual income and father education at 0.01 level on the errors committed by the VIII class students in geometrical concepts.

Conclusions

In the light of the findings, the following conclusions are drawn. Gender, Management, annual income and father education have significant influence on the errors committed by the VIII class students in geometrical concepts.

EDUCATIONAL IMPLICATIONS

- The findings of the present research have raised some important questions related to the educational needs of the students with special reference to their geometrical concepts
- Gender is highly influence on the errors committed by the VIII class pupils in geometrical concepts. Girls have less error committed by the VIII class pupils in geometrical concepts than the boys. The administrators to provide physical facilities for boys.

- Management is highly influence on the errors committed by the VIII class pupils in geometrical concepts. Private students have less error committed by the VIII class pupils in geometrical concepts than the government students. The administrators to provide physical facilities for various types of managements.
- Annual income is highly influence on the errors committed by the VIII class pupils in geometrical concepts. High income group students less error committed by the VIII class pupils in geometrical concepts than the low income group students. The administrators to provide economic facilities for various annual income groups.
- Father education is highly influence on the errors committed by the VIII class pupils in geometrical concepts. Low education fathers' students have less error committed by the VIII class pupils in geometrical concepts than the high education fathers' students. The administrators to provide facilities for various rural and urban students.
- The basic concepts are to be given properly so that the pupils can proceed further geometrical learning.
- A considerable amount of time must be allowed in the time table for teaching of geometry.
- Emphasis should be placed on real understanding and not on mechanical performance and manipulations.
- Previous knowledge must be thoroughly tested before giving new knowledge in geometry.
- Adequate practice should be given in measuring angles in parallel line.
- Teacher must employ suitable methods of teaching for those pupils who are lacking basic knowledge in geometrical concepts.
- Teacher should employ multiple approaches in dealing a concept. Each approach should supplement the other.
- Place should be given to drill work in teaching geometrical concepts and skills.
- **Motivating the Study of Geometry** the use of different mathematical instruments must include interest in the students. The teacher must tell the pupils to prepare different models in Geometry with papers, wood etc.,
 - a) Arousing interest by means of daily use of Geometry:** The daily use to geometrical principles such as in laying roads, in constructing buildings etc., may be quite rewarding. The pupil may appreciate the wide use of the subject and develops interest with himself.
 - b) Mathematical recreations:** Pupils find much pleasure in constructing figures with wood and papers. Most of the Audio Visual aids must be prepared by the students. Such materials should be made valuable aids to teaching.
 - c) Mathematical Games:** With the application of the Pythagoras principle many games like finding the height of hill, ladder on the wall can be explained to the pupils and they are also asked to find out such heights. These games may be pleasant and successful.
 - d) Mathematical Work Shops:** Every school must have at least a small mathematical work shop to utilize the pupils leisure time properly. There the students may be asked to prepare the models of cubes, spheres, squares, and different geometrical figures.
 - e) Role of Mathematics Clubs:** Mathematics clubs provide an

excellent means of stimulating and fostering interest in the study of Mathematics. It is aimed at the improvement of the quality of the routine class work. The clubs provides opportunity of better co-operation among pupils and between teacher and pupils. Some of the useful activities that could be carried out by the club are given below:

- Useful cuttings of the recent mathematical innovations can be displaced.
- Mathematical magazines and journals can be displaced in the club.
- Talks by the experts in specific fields can be given by the members of the club themselves.
- Time should be given to the members in preparing teaching aids.
- Studies of the contributions of great mathematicians; and birthday celebrations of great Mathematicians must be celebrated.
- Conducting symposia on selected topics of every day importance.

f) Use of Multi-Sensory Aids: Appropriate aids such as charts, models, devices, slides, film-strips, films, flannel graphs, radio and television lessons should be used where ever they are necessary. Uses of programmed learning materials are important in learning geometrical concepts.

g) Mathematics Libraries: In the general library in Mathematics departments, Mathematics libraries can be exhibited for use by the pupils. It must consist of text books, specialized books in the fields of Mathematics.

- When ever pupil fails to understand in the ordinary class room teaching, the teacher must supplement his teaching with Audio Visual aids.
- Carefully selected problems are important aids to teaching these should make pupils think and some times even think hard.
- The teacher must conduct action researches to solve his problems which he comes across in the class room teaching.
- The teaching of Mathematics should be integrated with the teaching of other subjects as far as possible, especially in schools.
- When ever pupils feel difficulty in learning certain concepts the teacher must think of proper remedial measures.
- The teacher should aim at the optimum intellectual development of each child and should direct his efforts at good pupils only.
- The teacher should encourage questions both inside and outside the class room and he should not appear annoyed even if the question is not relevant.
- Special care should be taken for gifted children as well as backward children.
- Examinations are real evaluators of the teacher as well as his students. A carefully planned examination tells the teacher how much his pupils have understood and the teacher knows the level of ability of his students and he can further change his methods of teaching to be suitable to his students.
- Mathematics is a growing dynamic subject, it should be taught by teachers who read new books, recent innovations and gain up-to knowledge.

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