



Influence of Attitude towards Geometry on Achievement in Geometry among the IX Class Pupil - A Study

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Abstract: Mathematics can be considered as the back-bone for the development of Science and Technology. Mathematics plays a very important role in the life of all human beings and development of the country. The present study is aimed to find out the influence of Attitude towards Geometry on achievement in Geometry among IX class Students and to suggest the appropriate methods to improve the achievement in Geometry. It is found that the overall attitude towards geometry of the students had a significant influence on their Achievement in Geometry. All the four areas of ATG and the total score of Attitude towards Geometry have a significant influence on the Difficulties in Learning Geometry of IX class students.

Key words: Mathematics, Geometry, Achievement, Attitude towards geometry.

Introduction

Education is found to be an effective tool to bring the required changes in the society. The National Education Commission (1964-66) has emphasized that education is the one and only instrument that can be used to bring about a change towards the social and economic betterment of India. Further the education commission quoted 'India is now being shaped in her class rooms'. It is not only a saying but also a reality. In the world, based on Science and Technology, it is the education that determines the level of prosperity, welfare and security of the people.

Mathematics plays a very important role in the life of all human beings. Everybody needs the knowledge of mathematics in one way or other. Importance of mathematics is very clear, from its wide applications ranging from daily uses of even a common man, to its applications for the development of

science, Engineering and Technology and even social sciences including languages. Former president of India A.P.J. Abdul Kalam called upon the Universities to turnout a global cadre of skilled professionals in Science and Technology to make India to realize its dreams of a developed nation by 2020. Mathematics plays a key role for the development of Science and Technology. National education commission observed 'proper foundation in the knowledge of the subject should be laid down at the school level itself'.

Geometry is an important branch of mathematics, which dominates the learning of mathematics in high school classes. Geometry helps in creating interest of the students in the learning of the subject mathematics due to its practical and direct experiences. Thus learning of Geometry is necessary at high school stage for developing logical reasoning. Introduction of Geometry at lower secondary stage should be based on



practical work. The poor performance of students in mathematics and Geometry in particular has been a thing of concern to mathematics educators, parents and government.

Need and importance of the Study

The present day modern world is witnessed with unprecedented growth of Science and Technology and the life style of the people has been constantly changing accordingly. Mathematics can be considered as the back-bone for the development of Science and Technology. Mathematics plays a very important role in the development of the country. In view of the important role that Mathematics plays in the modern world, it has been imperative for any nation or the world to promote mathematics education, in their respective countries. It is not possible for us to expect improved mathematics education, in the higher education, unless, we succeed in providing a sound mathematics education at the school level.

Scope of Study: The main intention of the study is to find the influence of Attitude towards Geometry with Achievement in Geometry of IX class students. The marks obtained in an objective test, in Geometry are taken as Achievement in Geometry which is regarded as dependent variable in the present study. The objective test is developed and standardized by the investigator. Attitude towards Geometry, are measured by using the relevant instruments with four dimensions i.e., Basic Concepts, Motivation, Methodology followed by the teacher, Learning process of the students. The study is confined to only 60 schools of Nellore District, under

the Managements of Government and private.

General Statement of the Problem: The present study is designed to study the influence of Attitude towards Geometry and its dimensions i.e., Basic Concepts, Motivation, Teaching Methodology and Learning Process on the Achievement of Geometry among the IX class students.

Objectives of the Study: To study the influence of Attitude towards Geometry on the Achievement in Geometry of IX class students.

Hypotheses of the Study: There would not be any significant influence of Attitude towards Geometry on the Achievement in Geometry of IX class students.

Variables Included: The following variables were taken into consideration in this study. Achievement test Score in Geometry – Total

- Area – 1: Achievement score in Lines and Angles
- Area -2: Achievement score in Triangles
- Area – 3: Achievement score in Quadrilaterals
- Area – 4: Achievement score in Areas
- Area – 5: Achievement score in Circles
- 2. Attitude towards Geometry

Dimension1: Basic Concepts
Dimension 2: Motivation
Dimension 3: Methodology followed by teachers

Dimension 4: Learning Process of the Students

Thus the total number of variables used in the present investigation was presented in the following table-1.



Table-1: Total number of variables used

S.No.	Variable	Total
1.	Learning Difficulties in Geometry Scale	01(+ 05 areas) =06
2.	Attitude towards Geometry Scale	01 (+4 areas) = 05
Total		11

Research Tools used

1. Achievement Test in Geometry – developed and standardized by the investigator
2. Attitude towards Geometry questionnaire (ATG) – which was developed and standardized by the investigator.

Tools Description

(i) Attitude towards Geometry Scale:

Regarding the reasons for low achievement of IX class students in geometry, opinions of experienced teachers and teacher educators on the subject of the study difficulties faced by the IX class students in learning geometrical concepts were taken into consideration. The attitude towards geometry questionnaire was prepared and standardized by the investigator which consists of 36 statements with four dimensions viz., Basic concepts, Motivation, Methodology and Learning process. The questionnaire includes favorable and unfavorable statements. Each statement has three responses namely Always(A), sometimes(S), and Never(N). The respondent has to identify and select which is appropriate as per his/her will to express their opinions. The reliability of the index ascertained by split half method is 0.91. Hence the questionnaire is considered to be reliable.

(ii) Achievement Test in Geometry :

To measure achievement in geometrical concepts of the IX class students, Achievement in Geometry scale was

developed by the investigator mainly on the five areas viz., (i) Lines & Angles, (ii) Triangles, (iii) Quadrilaterals, (iv)Areas and (v) Circle. A total of 100 statements (from each aspect 20 statements) were prepared and a pilot study was conducted on a sample of 200 students studying IX class in different secondary schools of Nellore District. Item analysis was carried out as suggested by Kelly (1939). Items for which the 't' value was significant at or above 0.01 level was selected to include in the final form. Out of 100 statements 69 items were selected for final study. In the tool four alternatives are given for each item. The student has to choose only one alternative which he feels appropriate for him. The validity and reliability of the scale was found that the intrinsic validity is 0.927 and the reliability is 0.915.

Research Method: The Research methodology is concerned, the present study comes under the scope of the descriptive research. Besides descriptive field of study, the present investigation includes composite characteristics of causal comparative and correlation research.

Sample Selected: The sample selected consists of 600 boys and 600 girls (N=1200). The sample design of the study is taken as 2 x 2 x 3 factorial design. For the present study, the sample consisting of 60 high schools under different Managements namely



Zillaparishad, Government, Municipalities and Private Management have been selected randomly.

Collection of data: The investigator personally visited all the schools selected for the study and explained the heads of the institutions, the purpose of collecting the data with the help of the data gathering instruments and teachers of the concerned schools.

Scoring and Analyses: The Objective Test for Achievement in Geometry was scored on a multiple choice type test by giving the weights 1 in the case of correct answer and zero for the wrong answer. The total score is taken for the study. As there are 69 items in the test, the theoretical range of the score is from 0 to 69. The Attitude towards Geometry questionnaire had 36 statements with 4 dimensions Viz., Basic concepts, Motivation, Methodology followed by teachers, and Learning Process. Each statement was accompanied by three responses. As it is a three point scale – 3, 2 and 1 was given to always, sometimes

and never respectively for favourable attitude and reverse is given in the unfavourable item. The score range in this scale is from 36 to 108. The higher score indicates more the attitude toward Geometry.

Influence of Attitude towards Geometry on Achievement Geometry: Does the overall attitude towards geometry of the students affect the level of their Achievement Geometry? To probe into this, the sample of students was classified into three group's viz., Less Attitude Group, Moderate Attitude and High Attitude Group. (The Mean and SD of attitude towards geometry Score are 70.73 and 8.64 respectively). Those who scored $M - 1SD$ were treated as Less Attitude group (those whose score < 62), while those who scored above $M + 1SD$ were treated as High Attitude group (those whose score > 79). Others were treated as Moderate group (whose score lies between 63 and 78). The mean Achievement Geometry scores and SDs of the three groups of students were presented in the table -2

Table -2 Means and SDs of different areas and overall Achievement Geometry Scores of Students classified according to their overall attitude towards Geometry

Areas of difficulties in learning geometry	Less Attitude (N=423)		Moderate Attitude (N=396)		High Attitude (N=381)	
	M	SD	M	SD	M	SD
1. Lines & Angles	5.69	1.31	7.13	1.49	8.66	1.52
2. Triangles	4.17	1.26	4.99	1.32	5.71	1.26
3. Quadrilaterals	4.65	1.28	5.60	1.43	6.44	1.58
4. Areas	5.76	1.33	6.34	1.45	6.77	1.61
5. Circles	5.82	1.29	6.25	1.25	6.55	1.43
6. Overall Difficulties	26.09	4.48	30.31	5.07	34.13	5.44



Table -3 Results of ANOVA of the Achievement Geometry Scores of the Students classified according to their Attitude towards Geometry

Areas of difficulties in learning geometry	Sum of Squares		Mean Squares		"F' value (df 2,1197)
	Between	Within	Between	Within	
1. Lines & Angles	1763.484	2486.075	881.742	2.077	424.543**
2. Triangles	482.667	1963.169	241.334	1.640	147.148**
3. Quadrilaterals	643.819	2444.978	321.910	2.043	157.599**
4. Areas	207.459	2568.240	103.729	2.146	48.346**
5. Circles	108.802	2106.345	54.401	1.760	30.915**
Overall Difficulties	13013.743	29874.787	6506.871	24.958	260.712**

** Significant at or above 0.01 level

The 'F' ratio (260.712) was significant at or above 0.01 level for the overall Achievement Geometry. This reveals that overall attitude towards geometry of the students had a significant influence on their Achievement Geometry. It is also seen that as the level of attitude towards

geometry increased, the level of difficulties also found decreased. To find out which of these three groups of the students differed significantly from the others in their Achievement Geometry, the mean scores of the three groups of students were further analyzed by employing 't' test.

Table-4: Mean Achievement in Geometry Scores of different Subgroups of Students classified according to their Attitude towards Geometry and the results of 't' test

Source	Less Attitude	Moderate Attitude	High Attitude
Lines and angles	5.69	7.13	8.66
Triangles	4.17	4.99	5.71
Quadrangles	4.65	5.60	6.44
Areas	5.76	6.34	6.77
Circles	5.82	6.25	6.55
Overall	26.09	30.31	34.13

Note:

1. The means are arranged in ascending order from left to right.
2. Any two means not underscored by the same line are significantly different at or above 0.05 levels.
3. Any two means underscored by the same line are not significantly different at 0.05 levels.

The results of the 't' test presented in the table-4, show that the

mean Achievement Geometry scores of each group differed significantly from the others. The less attitude group of students exhibited lower difficulties in the dimension – lines and angles and high group exhibited higher difficulties. The moderate attitude groups expressed average level of difficulties on all of the dimensions and overall Achievement Geometry also.



Hence, the hypothesis, "*There would not be any significant influence of attitude towards geometry of the students on the Achievement in Geometry*" was rejected on the overall and on all the areas. Therefore, it is concluded that attitude towards geometry of the students is one of the significant influence on their level of Achievement Geometry.

Major Findings

- The overall attitude towards geometry of the students had a significant influence on their Achievement in Geometry.
- All the four areas of ATG and the total score of Attitude towards Geometry have a significant influence on the Difficulties in Learning Geometry of IX class students.
- The students who had less Attitude towards Geometry had Low Achievement (29.09) in Geometry compared to the students who had moderate attitude (30.31) and High attitude (34.13) towards Geometry. Similar trend was found in all the dimensions of Achievement in Geometry.
- The less attitude group of students exhibited lower difficulties in the dimension – lines and angles and high group exhibited higher difficulties. The moderate attitude groups expressed average level of difficulties on all of the dimensions and overall Achievement in Geometry also.
- Better the attitude, is associated with lower the Difficulties in Learning Geometry of IX class students.

Educational Implication: To improve the achievement in Geometry at secondary level, efficient, dedicated, honest and committed teachers of mathematics are to be recruited. Plans are to be made to design more para-mathematical activities, as curricular inputs, to eliminate the fear of mathematics in children and get through some interest toward Geometry.

- More importance is given to Basic Concepts of Geometry in the teaching
- The appropriate method of teaching should be applied in order to improve the attitude and achievement of students in Geometry. That are question & answer, individual project, peer and group discussion, time on-task activities, presentation, cooperative learning, individual learning and guided discovery methods of teaching should be applied. In addition Geometry should be presented by a combination of deductive & inductive method, analytic & synthetic method, heuristic method, demonstration method, laboratory method in the appropriate topic. Tutorial should be given to supplement the class every week.
- Special programmes such as providing additional information, encouragement to participate in competitive tests and providing suitable study material etc may be taken to safeguard the interests of those students, who want to specialize, in the area of mathematics and related Geometry branch.
- Proper positive Attitude towards the Geometry must be laid down by the concerned teachers. Without positive attitude, it is rather difficult to raise the standards.
- Pupils must be encouraged to solve at least fifty percent of the



problems in each area and in each exercise.

standard, Indian Educational Review, Vol.27(3).

References:

Agarwal, Archana. (2002). Some correlates of Academic Achievement, *Indian Journal of Educational Research*, Vol.21, No. 2, pp. 75-76.

Aggarwal, J.C. (1999). *Principles, Methods and Techniques of Teaching*. Vikas Publishing House, Masjid Road, Jangpura, New Delhi, pp.16-17, 42, 55, 245.

B.S.P.Raju : "A study, teaching problem solving in Mathematics", -*Edutracks* Feb 2004

Balasubramanian, T. and Feroze, M. (1966). A Comparative Study of the Academic Achievement in Mathematics of Urban and Rural Students of Standard X in the High Schools of Coimbatore, *Journal of Educational Research and Extension*, VOL. 3, No.1, pp. 25.

Beaton, A.E. et.al. (1996). Mathematics Achievement in the Middle - School Years. IEA's Third International Mathematics and Science Study. Boston College, Chestnell Hill, (Abstract through Internet).

Burger, W. F. & Shaughnessy, M. (1986). Characterizing the van Hiele levels of development in geometry. *Journal for Research in Mathematics Education*, 17 (1), 31-48.

Chitrigimath, G.M. (2000). Construction and Standardization of an achievement test in general mathematics of X

Dash, P.C. (1989). A Study of achievement and connective preference styles in Mathematics of Class X students. Ph.D. Dissertation in Edu, University of Rajasthan.

Dede, Y. (2012). Students' attitudes towards geometry: a cross-sectional study. *International Journal for Studies in Mathematics Education*, 5(1), 85-113.

Golden and will, B. (1978). A profile of high and low achievers in Mathematics among 6th grade students, District. Abst. Int. Vol. 38, No.8, pp. 46-39.

Government of Andhra Pradesh (1996). Mathematics Text Book, VIII Class, Hyderabad.

Government of Andhra Pradesh (1997). Mathematics Text Book, IX Class, Hyderabad.

Groves Douglas, A, and Cebullakristin, J. (2000). Improving students achievement in Mathematics, *Part I: Research findings*, ERIC Digest, ERIC Identifier No: ED 463952, - From Internet.

Head, John (1981). Personality and learning of Mathematics, *Educational Studies in Mathematics*, pp. 339-350.

Kulbir Sidhu (1995). Teaching of Mathematics, text Book, Sterling Publishers Pvt. Ltd., L-10-GreenPark extension, NewDelhi-110016, pp. 12-14.

Lalithamma, K.N. (1975). Some factors affecting achievement of secondary



school pupils in mathematics, *second survey of educational Research*, No.2, pp.349.

Panchalingappa and Shahpur Nagappa (1995). An Investigation into the causes of under achievement in secondary school Mathematics, *Educational Abstracts*. Vol. 2, No.1, pp. 37.

Pavani . G. (1995). : An investigation into common errors and the level of achievement of VIII grade students in geometry.

Ponnuswamy and Sudharsan, S.(2001). Students Achievement and Cooperative Learning Method in Mathematics at Upper primary Level, *Educational Abstracts*: VoL.5, No.1 and 2, pp. 36-37.

Rajendra Mistra. (1980). A study of attitude towards mathematics of secondary school students, *Indian Educational Review*, *Ph.D. Thesis* submitted to Patna University, pp. 91-94.

Sheba.K . (2004). : The difficulties of IX Class pupils in learning geometry.

Sridhar Sarma P.S. (2004).: An investigation into the reasons of low achievement of VIII class students in geometry.