

# Influence of Geometrical Ability and Study Habit on the Achievement in Mathematics at Secondary Stage

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## Abstract

The present study aims at studying the influence of areas in relation to the geometrical ability and study habit on the achievement in mathematics to the pupils' at secondary stage. A sample of 500 students of standard IX from secondary school of south kamrup district, Assam, participated in the present study, in which the relationship among the achievement in mathematics was most closely related with geometrical ability and study habit. Analysis of data indicated that there was no significant difference on the achievement in mathematics of the students in case of medium and sex for different sub categories. The regression equation thus obtained shows that geometrical ability and study habit contributes 20.33% and 35.91% respectively to the Achievement in mathematics.

**Key words:** Geometrical Ability, Study Habit, Achievement in Mathematics, Sex, Medium

## 1. Introduction

Education is the manifestation of knowledge and Mathematics is the oldest of all sciences that have developed through the ages having a direct impact on the quality of human life on our planet. In elementary stage the base on mathematics should be imposed to develop for mental observation and creativity or innovativeness. The education commission (1964-1966) popularly known as "Kothari commission" recommended that mathematics should be taught on a compulsory subject to all pupils as a part of general education. The national policy of education (1986)[1] has also considered the importance of mathematics in general education and suggests that 'mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically. In the secondary schools, there are three groups of pupils, on the basis of their option in mathematics education. Among them, the first group of pupils wants to continue their higher classes with the subject mathematics. The second group of pupils wants to continue their studies in the subject other than mathematics. But there are still third group of pupils who will end their formal education with the secondary school stage. Mathematics education gives training to individuals with the help of geometry; to the masses as it enable them to take part in the creation of society. National councils of supervisors of mathematics endorsed that geometry was one of the ten proposed basic skill areas (NCSM, 1776) and is indeed a basic skill that should be taught to students of all ability levels (Sherard). Study habit is a well planned and deliberate pattern of study which has attained a form of consistency on the part of the student towards understanding academic subject and s and passing at examination (Pauk, 1962; Deese, 1959; Akinboye, 1974) [2, 3]

## 2. Review of Related literature

For instance (Wotriak, 1977), found intelligence and reasoning ability to be related to mathematical achievement. On the other hand, (Reed, 1978) [4] found logical thinking to have a low positive correlation ( $r = 0.29$  depends on) with performance in algebra. It appears that the students would need a minimum level of intelligence after which other intervening variables such as pre-requisite knowledge, perseverance and motivation become very important variables and could thus account for the difference among students. A number of affective variables influencing the learning of mathematics were examined by Reyes (1984) [5]. These variables include self concept, mathematics anxiety, attribution, and perceived usefulness of mathematics The Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989) and other important literature in the area of reform in mathematics education (Mathematical Sciences Education Board, 1990; National Research Council, 1989) call for change in emphasis and content in geometry at all levels.[6] Learning of geometry is formally introduced in the Malaysian primary mathematics curriculum. The emphasis in geometry increases as students progress to secondary education, where about forty percent of the sixty topics in the five-year secondary mathematics curriculum comprises geometry content (Malaysian Ministry of Education, 1998). Geometry is a unifying theme to the entire mathematics curriculum and as such is a rich source of visualization for arithmetical, algebraic, and statistical concepts

Learning geometry may not be easy, and a large number of the students fail to develop an adequate understanding of geometry concepts, geometry reasoning, and geometry problem solving skills (Elchuck, 1992; Noraini, 1999) [7]. The lack of understanding in learning geometry often causes discouragement among the students, which invariably will lead to poor performance in geometry. Numerous research have been undertaken to investigate trends in mathematics achievement and the factors influencing mathematics learning and performance (Ma and Klinger, 2000; Papanastasiou, 2000; Al Khateeb, 2001; Tsao, 2004; Mullis, Martin, Gonzalez and Chrostowski, 2004; House and Telese, 2008). [8,9,10,11] According to Olayinka (1996) and Yahaya (2003), [12,13] passing examination to secure certificates either for admission into higher institution or secure good jobs is the main goal of education to many people and not the acquisition of knowledge and skills through studying. Hence the present study entitled “Influence of geometrical ability and study habit on the achievement in mathematics at secondary stage”

### **3. Objective of the study:**

The present study was taken up with the following objectives:

- 1) To find out the relationship between achievement in mathematics and geometrical ability and study habit of IX standards students
- 2) To study the significant difference of achievement in mathematics, geometrical ability and study habit of IX standards students when they are classified according to their sex.
- 3) To study the significant difference of achievement in mathematics, geometrical ability and study habit of IX standards students when they are classified according to the medium of instruction.
- 4) To study the significant difference of achievement in mathematics with different geometrical ability and study habit group of IX standards students when they are classified according to the sex.
- 5) To study the significant difference of achievement in mathematics with different geometrical ability and study habit group of IX standards students when they are classified according to the medium of instruction.
- 6) To determine the relative contribution of the geometrical ability and study habit to the prediction of achievement in mathematics.

### **4. Samples**

The normative survey method on stratified random technique was used for the present study. For this purpose 250 boys and 250 girls of standard IX from secondary school of south kamrup district were selected at random.

### **5. Tools Used**

Following tools were used to collect the data for the study-

- (a) **Mathematics achievement test:** This has its content based on senior secondary mathematics syllabus and contains multiple choice items and validated with the assistance some senior secondary school teachers
- (b) **Geometrical ability questionnaire:** This was constructed and validated with the assistance some senior secondary school teachers.
- (c) **Study habit Inventory:** This was constructed and validated by the investigator.

### **6. Data collection**

The investigator collected data by visiting the schools. Three tools were used for analysis of data.

### **7. Data analysis**

Correlation, t-test and multiple regressions were used to study the variables in the present study.

### **Hypothesis testing**

- H1) There is no significant relationship between geometrical ability and study habit and achievement in mathematics of IX standards students
- H2) There is no significant difference in the mean achievement in mathematics, geometrical ability and study habit of boys and girls student studying in IX standards.
- H3) There is no significant difference in the mean achievement in mathematics, geometrical ability and study habit of English and Assamese medium students studying in IX standards.

- H4) There is no significant difference in the mean achievement in mathematics with different geometrical ability and study habit group of IX standards students when they are classified according to sex.
- H5) There is no significant difference in the mean achievement in mathematics with different geometrical ability and study habit group of IX standards students when they are classified according to the medium of instruction.

**Table-1**  
**r-value for Achievement in mathematics and Geometrical ability, study habit**

Sl.No.	Variable	N	df	r	p
1.	Achievement in Mathematics	500	498	0.524	<0.05
2.	Geometrical Ability				
3.	Achievement in Mathematics	500	498	0.696	<0.05
4.	Study habit				

**Table-2**  
**Data and Results of test of significance of Difference between mean scores of Achievement in Mathematics for different Sub Samples**

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	43.00	26.43	5.09
	Girls	250	33.06	15.96	
Medium	English	250	39.48	23.01	2.65
	Assamese	250	36.58	21.65	

**Table-3**  
**Data and Results of test of significance of Difference between mean scores of Geometrical Ability for different Sub Samples**

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	13.28	9.03	3.89
	Girls	250	10.39	7.54	
Medium	English	250	12.43	8.66	1.57
	Assamese	250	11.24	8.18	

**Table-4**  
**Data and Results of test of significance of Difference between mean scores of Study Habit for different Sub Samples**

Sub Samples		N	Mean	S.D	t value
Sex	Boys	250	63.20	21.62	1.29
	Girls	250	60.71	21.31	
Medium	English	250	62.78	20.70	.855
	Assamese	250	61.13	22.24	

**Table-5**  
**Significance Differences between the Means of Achievement in mathematics Scores with different sub categories of Geometrical ability**

Sl. No.	Sub category	N	Mean	SD	SE(Means)
1	High	28	75.18	11.86	2.24
2	Average	82	41.99	17.07	1.89
3	Low	140	22.08	9.54	.81

Group	t value	D.F.	Level of Significance
High/Ave	11.33	108	At 0.5 and 0.1
Ave/Low	9.71	220	At 0.5 and 0.1
High/Low	22.30	166	At 0.5 and 0.1

**Table-6**  
**Significance Differences between the Means of Achievement in mathematics Scores with different sub categories of Study Habit**

Sl. No.	Sub category	N	Mean	SD	SE(Means)
1	Regular	34	55.41	28.85	4.95
2	Moderately Regular	141	34.21	19.19	1.62
3	Irregular	75	25.76	13.22	1.53

Group	t value	D.F.	Level of Significance
Reg/Modreg	5.19	173	At 0.5 and 0.1
Modreg/Irrreg	3.4	214	At 0.5 and 0.1
Reg/Irrg	7.38	107	At 0.5 and 0.1

### Multiple Regression Analysis

In pursuance of the objective (6) of the study, i.e. to determine the relative contribution of the geometrical ability and study habit to the prediction of achievement in mathematics of IX standard students, data were subjected to statistical treatment of multiple regression technique.

**Table-7**  
**The relative contribution of Geometrical ability and study habits in to the prediction of achievement in mathematics.**

Variables	Constant	Regression Coefficient	B-Coefficient	r value	% of contribution
Geometrical Ability	-7.461	1.030	.388	.524	20.33
Study habit		.538	.516	.696	35.91
					R <sup>2</sup> =56.24

- From table-I it may be observed that the r-value of geometrical ability and study habit on achievement in mathematics are 0.524, 0.696 respectively. All these values are much closed to one. So geometrical ability and study habit to the achievement in mathematics are significantly related. So it may be concluded that the student who has the high geometrical ability and better study habit imply the high achievement in mathematics.
- From table-2 we observed that with regard to achievement there is significant difference between boys and girls (t=5.09, significant at 0.05 level) and between English medium and Assamese medium students (t=2.65, significant at 0.01 level). It is seen that the mean achievement score for boys (M=43) is higher than that of girls (M=33.06) and the mean achievement score for English medium students is higher than that of Assamese medium students. So it may be concluded that the null hypothesis is rejected for achievement in mathematics for different sub samples of sex and medium. This implies that Boys are high on achievement in mathematics when compared with girl's students and English medium students are high on achievement in mathematics than Assamese medium students.

- 3) From table-3 we observed that with regard to geometrical ability there is significant difference between boys and girls ( $t=3.89$ , significant at 0.05 level) and between English medium and Assamese medium students ( $t=1.57$ , not significant). It is seen that the mean geometrical ability score for boys ( $M=13.23$ ) is higher than that of girls ( $M=10.39$ ). So it may be concluded that the null hypothesis is rejected for geometrical ability for different sub samples sex and medium. This implies that Boys are high on geometrical ability when compared with girl's students and geometrical ability is independent for the sub-categories of medium.
- 4) From table-4 we observed that with regard to study habit there is no significant difference between boys and girls ( $t=1.29$  not significant) and between English medium and Assamese medium students ( $t=.855$ , not significant). So it can be inferred that study habit is independent for sub-categories of sex and medium.
- 5) From table-5 we observed that with regard to achievement in mathematics, there is significant difference between sub-categories of Geometrical ability between high and Average ( $t= 11.33$ ), average and low ( $t=9.71$ ) and high and low ( $t=22.30$ ).
- 6) From table-6 we observed that with regard to achievement in mathematics, there is significant difference between sub-categories of study habit between regular and moderately regular ( $t= 5.19$ ), moderately regular and irregular ( $t=3.4$ ) and regular and irregular ( $t=7.38$ ).
- 7) From table- 7 it is observed that-
  - (a) The achievement in mathematics by the independent variable geometrical ability of IX standard students to the extent of 20.33%.
  - (b) The achievement in mathematics by the independent variable study habit of IX standard students to the extent of 35.91%.
  - (c) The regression equation obtained for total sample of 500 to predict achievement in mathematics of IX standard students with the help of the prediction variable geometrical ability and study habit is :

$$AIM = -7.461 + 1.030 * GA + .538 * SH$$

Where AIM= Achievement in mathematics, GA= Geometrical ability, SH= study habit

## Findings of the study

### I. Findings of coefficient of analysis

- . Geometrical ability and achievement in mathematics are significantly related.
- . Study habit and achievement in mathematics are significantly related.

### II. Findings of t-test analysis

- . Boys have better achievement in mathematics than girls.
- . English medium students are high on achievement in mathematics than Assamese medium students.
- . Boys are high on geometrical ability compared with girls.
- . High geometrical ability group have the better achievement in mathematics than lower and high group of pupils.
- . Regular study habit group have the better achievement in mathematics than irregular and moderately regular group of pupils

### III. Findings of Multiple Regression analysis

- . Geometrical ability as an independent variable depends on the achievement in mathematics of IX standard students to the extent of 20.33%.
- (d) . Study habit of mathematics as an independent variable depends on achievement in mathematics of IX standard students to the extent of 35.91%.

## Conclusion

From the above study we may conclude that the geometrical ability influence the achievement in mathematics and recommended the inclusion of geometrical curricular programmes and workshops to improve the geometrical thinking. Moreover the achievement in the subject mathematics mostly depends on pupils study habit. The teacher needs to improve their relationship with the students to encourage good study habits on the part of the student. So it is beyond imagination for most of the parents and teacher's that study habit influence pupil's achievement in mathematics and to guide the students proper study habit to improve problem solving in mathematics.

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