

Impact of Reasoning Ability on Mathematics Achievement

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Abstract: Achievement implies the academic status of the students in different subjects. It helps to assess the learning status of an individual. Among various factors, reasoning ability is one of them, which, I influences the achievement in mathematics. The present study aims at studying the influence of reasoning ability on the achievement to the pupil's at secondary stage. A sample of 600 students of class VIII of the districts Purba Medinipur, Paschim Medinipur and Howrah were selected. Stratified random sampling is used for this purpose.

Key word: Mathematics, Academic achievement, reasoning ability.

I. INTRODUCTION

Today's world is world of science; the credit of all technical progress in science goes to the progress of mathematics. "Mathematics is the queen of sciences and arithmetic is the queen of all mathematics" –quoted by Gauss. So it is known to all the arithmetic in the basic branch of mathematics. Mathematics is not only the science of calculation, measurement and magnitudes. But it helps to thinking and reasoning logically. Reasoning is typical thinking. It is Different from thinking because it involves a sequence of symbolic activities directed towards the solution of problem. According to Garrett (1986) reasoning is stepwise thinking with a purpose or goal in mind. Mathematics is the only subject in which there is a great influence of reasoning rather than memory.

Many research work has been incorporated in this aspect – Rastogi (1983) revealed that one of the main factor or cause of backwardness in achievement in mathematics is reasoning ability. Kauss (1985) also revealed that reasoning ability and spatial ability are significantly correlated to the achievement in mathematics; Sumangala (1995) studied the effect of mathematical ability to achievement in mathematics. He found that they are significantly correlated Subhasis Mukherjee (2012) studied on the relationship of academic achievement of the 10th grade students with their study habit, personality and scholastics aptitude. From his study it was revealed that eight various type of measures along with numerical ability and reasoning ability were the best predictors and that all contributed statistically to the variance of academic achievement of urban and rural students in mathematics. Cain W. Ralph (1966), studied the relationship of verbal reasoning and numerical ability to achievement and also its effects on traditional and modern mathematics programmed. It revealed that both reasoning and numerical ability is an important

factor of the two programmed. Muthumanichan, R. (1992) also investigated that there exists positive correlation between the reasoning ability and achievement in commerce. The researcher wants to highlight the relation between achievement in mathematics and reasoning ability. Hence the present study entitled "Impact of mathematics reasoning on achievement in mathematics at secondary stage",

II. OBJECTIVES OF THE STUDY

The following objectives are framed for the study

- 1) To construct and standardize a reasoning ability test for the students of Class VIII.
- 2) To determine the significance of differences between the achievement in mathematics and reasoning ability of the student sex wise.
- 3) To study the relationship of academic achievement in mathematics of student with reasoning ability.

III. SAMPLES

The researcher intended to develop and standardize the achievement in mathematics reasoning ability test. The researcher used stratified random technique for this study. For these purpose 300 boys and 300 girls of class VIII from secondary school of Purba Medinipur, Paschim Medinipur and Howrah districts were selected.

IV. TOOLS USED

Following tools were used to collect the data for the study_

- 1) Self constructed reasoning ability test.
- 2) Self constructed achievement test in mathematics.

V. DATA COLLECTION

The researcher collected data by visiting the schools from dip above mentioned districts. Two tools were used for analysis of data.

VI. DATA ANALYSIS

Description statistics, correlational test and multiple regressions were according to the need of research situation.

VII. HYPOTHESES

- 1) There would be no significant difference in achievement in mathematics and reasoning ability of the students between boys and girls.
- 2) There would be no significant difference in reasoning ability and achievement in mathematics between the students of urban and rural areas.
- 3) There would be no significant relationship among achievement in mathematics of the secondary school students and reasoning ability.
- 4) There would be no significant impact of reasoning ability on academic achievement in mathematics of the students.

Table – 1

Statement of the significance of difference in mean scores of the gender wise students in achievement test in mathematics.

Variable	Groups compared	Number	Mean	St. Div	df	Mean Difference	t
Achievement in Mathematics	Boys	300	32.13	14.058	598	0.173	0.161
	Girls	300	61.96	12.230			

It was revealed from table-1 that the t-value for the achievement test in mathematics test scores of the boys (M-62.13) and girls (M-61.96) was found to be 0.161 (P>0.05). So it may be concluded that the null hypothesis is accepted for achievement test in mathematics for boys and girls. This implies that there is no significant mean difference between boys and girls in achievement in mathematics.

Table-2

Statement of the significance of difference in mean scores of the students strata wise in Achievement Test in Mathematics.

Variable	Groups compared	Number	Mean	St. Div	df	Mean Difference	t
Achievement in Mathematics	Students of Rural area	300	60.93	12.27	598	2.233	2.083
	Students of Urban area.	300	63.16	13.973			

It was revealed from table-2 that the t-value for the achievement in mathematics test scores of the students of rural area (M-60.93) and the students of urban area (M-63.16) was found to be 2.083 (p< 0.05). So it may be concluded that the null hypothesis is rejected for the achievement test in mathematics for the students of urban and rural areas. Thus it can be said that there is a significant mean difference between the students of urban area and rural area.

Table -3

Determination of the significance of difference in mean scores (Gender) for Reasoning Ability.

Variable	Groups compared	Number	Mean	St. Div	df	Mean Difference	t
Reasoning Ability	Boys	300	31.02	7.845	598	0.827	1.314
	Girls	300	30.19	7.567			

It was revealed from table-3 that the t-value for the reasoning ability test scores of the boys (M-31.02) and the girls (M-30.19) was found to be 1.314 (P> 0.05). Then it can be said that there is no significant mean difference between boys and girls in reasoning ability.

Table – 4

Determination of the significance of difference in mean scores (Strata wise) for Reasoning Ability.

Variable	Groups compared	Number	Mean	St. Div	df	Mean Difference	t
Reasoning Ability	Students of Rural area	300	32.09	5.771	598	2.973	4.808
	Students of Urban area.	300	29.12	9.023			

It was revealed from table-3 that the t-value for the Reasoning Ability Test scores of the rural area (M-32.09) and urban area (M-29.12) was found to be 4.808 (P<0.01). So it may be concluded that the null hypothesis is rejected for reasoning ability test of the students belong to rural and urban area. Thus it can be said that there is a significant mean difference between the students of rural and urban area.

Table – 5

r-value for the Achievement test in Mathematics and Reasoning Ability.

Sl. No.	Variable	Number	df	r	p
1	Achievement in Mathematics	600	598	0.635	<0.01
2	Reasoning Ability				

From table – 5 it was revealed that the r-value of reasoning ability and achievement in mathematics is 0.635(P<0.01). So it can be concluded that reasoning ability and achievement in mathematics is significantly related. It can also be concluded that student with high reasoning ability must do better in their achievement.

Table – 6

The relation contribution of reasoning ability to be Prediction of achievement in mathematics.

Model	B	R	Adjusted R square	t	Sig
Constant	28.878	0.635	0.402	16.964	.000
Reasoning Ability	1.084				

It was revealed from table-6 that reasoning ability was the best predictor to the model. The adjusted R squares show that the reasoning ability only 40.2% of the variance of the dependent variable was accounted for. The B-coefficients are calculated from the regression model- $Y = 28.878 + 1.084X$.

$$Y = \text{Achievement in mathematic.}$$

$$X = \text{Reasoning ability.}$$

VIII. FINDINGS OF THE STUDY

- Findings of t-test analysis
 - There is no significant difference between boys and girls in the achievement in mathematics.
 - There is a significant difference between rural and urban students in achievement in mathematics.
 - There is no significant difference between boys and girls in their reasoning ability test.
 - There is a significant difference between rural and urban students in reasoning ability test.
- Findings of Correlation - Achievement in mathematics are significantly correlated with reasoning ability.
- Findings of multiple regression - Achievement in mathematics is the dependent variable is predicted by the independent variable reasoning ability to the extent 40.3%.

IX. CONCLUSION

From the data analysis it can be concluded that achievement of mathematics is not only to achieve the subject matter and secure only the number. Individual difference in school learning is the most important phenomenon which is assessed mainly by achievement and it can be predicted by many independent variables. Among those reasoning ability is the important mathematical ability which is correlated with achievement in mathematics, so there should be a change in the teaching method for fulfillment of the aims and objectives of teaching this subject. In order to make the challenge successful the teachers should encourage the student to think logically and critically by presenting brain storming problems. His role will be that of a participant in an interaction with the students, controlling the situation to make the student efficient.

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