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A STUDY OF MATHEMATICAL REASONING ABILITY OF THE STUDENTS POSSESSING HIGH AND LOW ACHIEVEMENT OF STANDARD IX

DR. SUSHILABEN A. MAKWANA [1]

[1] ASSISTANT PROFESSOR, SHRI M.N. PATEL M.ED. COLLEGE, VIJAYNAGAR.

ABSTRACT:

Children have various abilities like discrimination, numeracy, reasoning, comparison, creativity, imagination, memory etc. Among which reasoning is a special type of aptitude. Reasoning develops thinking power. In the present study, the researcher has tried to know the mathematical reasoning power of the students of class IX considering their high and low academic achievement. The objectives of the study were as follows: 1. To study the mathematical reasoning of students of class IX. 2. To study the mathematical reasoning of class IX students with respect to the caste of the students. 3. To study the mathematical reasoning of the students of class IX in relation to the academic achievement of the students. For data analysis the researcher has calculated mean, standard deviation and statistical technique like t-value. The findings of the study were as follows: 1. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low academic achievement students in class IX. 2. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low academic achievers in class IX. 3. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low achieving girls in class IX. 4. There was no significant difference between the mean scores obtained on the Mathematical Reasoning Test by boys and girls with high academic achievement in class IX. 5. There was no significant difference between the mean scores obtained on the Mathematical Reasoning Test by boys and girls with high or low academic achievement in Class IX.

KEYWORDS:

HIGH AND LOW ACADEMIC ACHIEVEMENT, MATHEMATICAL REASONING.

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1. INTRODUCTION

Each piece of stone has a statue. The statue is carved out of stone by a sculptor with the knowledge to remove the useless part. A child also has latent and special powers. During the educational work of the child, the teacher should know his interests, attitudes, mental strengths etc. and teach him accordingly to move in that direction. Children have various abilities like discrimination, numeracy, reasoning, comparison, creativity, imagination, memory etc. Among which reasoning is a special type of aptitude. Reasoning develops thinking power. It becomes necessary to know the extent of reasoning power in a student so that the personality can be developed properly. Also, there are children with high, medium and low academic achievement in each class. Mathematical reasoning skills of these children should be studied so that proper development of the child could be possible.

2. STATEMENT OF PROBLEM

In the present research paper, the researcher has formulated the problem statement to know the mathematical reasoning ability of the secondary school students keeping in mind the high and low academic achievement of the students as follows:

A Study of Mathematical Reasoning Ability of the Students Possessing High and

Low Achievement of Standard IX

3. OBJECTIVES OF THE STUDY

The objectives of the study were as follows:

1. To study the mathematical reasoning of students of class IX.

2. To study the mathematical reasoning of class IX students with respect to the caste of the students.

3. To study the mathematical reasoning of the students of class IX in relation to the academic achievement of the students.

4. HYPOTHESES OF THE STUDY

HO_1 There is no significant difference between the mean scores obtained on the mathematical reasoning test by high and low academic achievement students.

HO_2 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys with high and low academic achievement.

HO_3 There is no significant difference between the mean scores obtained on the mathematical reasoning test by

girls with high and low academic achievement.

HO_4 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys and girls with higher academic achievement.

HO_5 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys and girls with low academic achievement.

5. VARIABLES OF THE STUDY

The variables included in the study can be stated as follows:

Dependent Variable: Academic Achievement:

High achiever (scored 60 percent or more in first semester examination)

Low achiever (less than 60 percent marks in first semester examination)

Independent variable: mathematical reasoning

Secondary independent variable: Gender: Boys, Girls

Controlled Variable: Students of Class-IX, Area

6. FIELD OF THE STUDY

Since the present study is based on mathematical reasoning, the field of the present study can be called educational psychology.

7. LIMITATIONS OF THE STUDY

The limitations of the present study can be stated as follows:

- The present study was limited to a secondary school in a rural area of Modasa taluka.

- The present study was limited to students studying in a Gujarati medium school during the academic year 2024-2025.

- The study only measured mathematical reasoning. A ready-made standardized device was used.

8. RESEARCH METHODOLOGY

Survey method has been used in the present study.

9. POPULATION AND SAMPLING

All the students studying in Class-IX in Gujarati medium grant-in-aid secondary schools of Modasa city during the academic year 2024-25 were the population of the present study. Shri K.N. Shah High School, Modasa was selected randomly from all the secondary schools in Modasa city by lottery. 96 students of standard IX of this school were selected by using cluster sampling method. They are divided into two groups.

TABLE-1

Group	Academic Achievement	Sample		Total
		Boys	Girls	
1	High	32	28	60
2	Low	19	17	36
		51	45	96

10. TOOL

Based on the literature review, the researcher has designed a mathematical reasoning test consisting of 50 multiple-choice questions, with questions for both verbal and nonverbal reasoning. One mark is assigned for each correct answer.

11. DATA COLLECTION

The school students were provided test paper personally in the classroom after obtaining the prior approval of the school principal for data collection. After the preliminary instruction, 40 minutes time was given to complete the test. Answer sheets and test papers were taken back at the end of the test.

12. DATA ANALYSIS

For data analysis the researcher has calculated mean, standard deviation and statistical technique like t-value.

13. TESTING OF HYPOTHESES

The hypotheses were tested as follows with significance at the 0.05 and 0.01 levels.

HO_1 There is no significant difference between the mean scores obtained on the mathematical reasoning test by high and low academic achievement students.

TABLE-2

TABLE SHOWING MEAN, STANDARD DEVIATION AND T-VALUE OF SCORES OBTAINED BY HIGH AND LOW ACADEMIC ACHIEVEMENT STUDENTS ON MATHEMATICAL REASONING TEST

Achievement	N	Mean	SD	SE_D	r	M.D.	SED	CR	Sig. Level
High	60	38.37	3.53	0.46	0.86	12.03	1.02	11.84	0.01

Low	36	26.33	5.89	0.98					

From the above Table 2, It can be said that there was a significant difference between the mean scores obtained by the high and low academic achievement students on the Mathematical Reasoning Test. So the null hypothesis was rejected.

HO_2 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys with high and low academic achievement.

TABLE-3

TABLE SHOWING MEAN, STANDARD DEVIATION AND T-VALUE OF SCORES OBTAINED ON MATHEMATICAL REASONING TEST BY HIGH AND LOW ACADEMIC ACHIEVEMENT BOYS

Boys	N	Mean	**SD**	SE_D	**r**	M.D.	**SED**	**CR**	**Sig. Level**
High Achievement	32	38.34	3.43	0.61	0.26	13.08	1.31	9.92	0.01
Low Achievement	19	25.26	5.83	1.34					

From the above Table 3, It can be said that there was a significant difference between the mean scores obtained on Mathematical Reasoning Test by high and low academic achievement of boys. So the null hypothesis was rejected.

HO_3 There is no significant difference between the mean scores obtained on the mathematical reasoning test by girls with high and low academic achievement.

TABLE-4

TABLE SHOWING MEAN, STANDARD DEVIATION AND T-VALUE OF SCORES OBTAINED ON MATHEMATICAL REASONING TEST BY HIGH AND LOW ACADEMIC ACHIEVEMENT GIRLS

Girls	N	Mean	**SD**	SE_D	**r**	M.D.	**SED**	**CR**	**Sig. Level**
High Achievement	28	38.39	3.70	0.70	0.21	10.86	1.76	6.17	0.01
Low Achievement	17	27.53	6.08	1.48					

From the above Table 4 It can be said that there was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by girls with high and low academic achievement. So the null hypothesis was rejected.

HO_4 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys and girls with higher academic achievement.

TABLE-5

TABLE SHOWING MEAN, STANDARD DEVIATION AND T-VALUE OF SCORES OBTAINED ON MATHEMATICAL REASONING TEST BY BOYS AND GIRLS WITH HIGH ACADEMIC ACHIEVEMENT

High Achievement	N	Mean	SD	SE_D	r	M.D.	SED	CR	Sig. Level
Boys	32	38.34	3.43	0.61	0.16	0.05	0.85	0.06	NS
Girls	28	38.39	3.70	0.70					

From the above Table 5, It can be said that there was no significant difference between the mean scores obtained on the Mathematical Reasoning Test by boys and girls with high academic achievement. So the null hypothesis was accepted.

HO_5 There is no significant difference between the mean scores obtained on the mathematical reasoning test by boys and girls with low academic achievement.

TABLE-6

TABLE SHOWING MEAN, STANDARD DEVIATION AND T-VALUE OF SCORES OBTAINED ON MATHEMATICAL REASONING TEST BY BOYS AND GIRLS WITH LOW ACADEMIC ACHIEVEMENT

Low Achievement	N	Mean	SD	SE_D	r	M.D.	SED	CR	Sig. Level
Boys	19	25.26	5.83	1.34	0.12	2.27	1.87	1.21	NS
Girls	17	27.53	6.08	1.48					

From the above Table 6, It can be said that there was no significant difference between the mean scores obtained on Mathematical Reasoning Test by boys and girls with low academic achievement. So the null hypothesis was accepted.

14. FINDINGS OF THE STUDY

The findings of the study were as follows:

1. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low achieving students in class IX.

2. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low academic achievers in class IX.

3. There was a significant difference between the mean scores obtained on the Mathematical Reasoning Test by high and low achieving girls in class IX.

4. There was no significant difference between the mean scores obtained on the Mathematical Reasoning Test by boys and girls with higher academic achievement in class IX.

5. There was no significant difference between the mean scores obtained on the Mathematical Reasoning Test by boys and girls with high or low academic achievement in Class IX.

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