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Relationship between Achievement in Mathematics and Problem Solving Ability of High School Students

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Abstract

The home environment refers to the physical, emotional, and psychological atmosphere in which a child grows up. The home environment plays a vital role in shaping a student's performance in mathematics. National Policy on Education (NPE, 1986) has envisaged that, "Mathematics should be visualized as the vehicle of communication to train a child to think, to reason, to articulate and to analyses logically. It should be treated as a concomitant to any subject involving analysis and synthesis. Different types of problem solving are critical to the discussion of problem solving and student achievement because of the potentially different impact on student achievement. The present study aimed to find out the relationship between achievement in mathematics and problem solving ability of high school students. A sample of 434 high school students was selected for data collection. Achievement Test in Mathematics constructed and validated by the investigators and Home Environment Scale constructed and validated by the investigators. Descriptive and differential analysis for further analysis and interpretation. Findings of the study revealed that High School students' level of Achievement in Mathematics is average. High School students' level of Problem Solving Ability is average. There is no significance difference between male and female High school students in their Achievement in Mathematics and Home environment. There is a significance difference between rural and urban High school students in their Achievement in Mathematics. There exist a positive and significant relationship between achievement in mathematics and Home Environment among high school students.

Keywords: *Achievement in Mathematics, Home Environment, Gender.*

1. INTRODUCTION

Present age is the age of science and information. Whatever technological and physical progress being made, shall be corresponding to the role of mathematics. Kothari commission has explained about placing mathematics as a compulsory subject up to high school or ninth standard and has said "Mathematics should be made a compulsory subject for the standards of I to IX, as part of general education". One's proficiency in these skills and abilities from his data base enables him to solve variety of problems and it varies in degree and intensity as he moves up from higher secondary to graduate level and then to post graduate level. The home environment plays a crucial role in shaping a

school student's academic success, emotional well-being, and overall development. A supportive home environment, where parents or guardians are involved in the student's education, greatly influences academic performance. Parents who show interest in their child's studies, monitor their progress, and encourage learning help students stay motivated and perform better in school.

A supportive, structured, and nurturing home environment is vital for a student's academic achievement, emotional development, and overall well-being. It provides the foundation for building confidence, developing good study habits, managing stress, and cultivating the values needed for lifelong success. A positive home environment complements school efforts, making it a significant factor in a child's education.

2. NEED FOR THE STUDY

Mathematics is a part of science which has four fundamental operations of addition, subtraction, multiplication and division. Understanding mathematics is important because it can help measure the effectiveness of lessons and understand student performance in mathematics. Mathematics provides a great way to develop mental discipline and improve critical thinking and critical reasoning. Mathematics knowledge also plays a key role in understanding concepts in other school subjects, such as science, social studies, and even music and art. For high school student it is one among the other school subjects that every student must learn without option. Therefore, the investigator was used to find out the ground realities entitled as "Relationship between achievement in Mathematics and Problem solving ability of High School Students".

3. STATEMENT OF THE PROBLEM

Mathematics is a handmaid of all sciences. It is a well-known fact that a mere possession of knowledge is no guarantee for its wise use. Though the assumption "Knowledge is power", by itself is valid, becomes meaningless when the individual possessing it fails to the maximum benefit of mankind. The primary goal of mathematics teaching and learning is to develop the ability to solve a wide variety of complex mathematics problems. Achievement refers to the successful reaching of a goal.

4. RESEARCH METHODOLOGY

- **Method:** Normative survey method was used to collect data.
- **Sample:** The sample of the study consist high school students studying in Puducherry region.
- **Sampling Technique:** Random sampling technique was adopted in this study. IX standard students studying in Government and private high schools were randomly selected by lottery method. A sample of 500 students was included in this study. From which the correct responses of 434 samples were selected for further analysis and interpretation.
- **Tool used:** Achievement Test in Mathematics constructed and validated by the investigators and problem solving ability test constructed and validated by the investigators.
- **Statistical Techniques:** Descriptive and differential analysis for further analysis and interpretation of the collected data to arrive at meaningful conclusions.

5. OBJECTIVES OF THE STUDY

1) To study the High School students level of Achievement in Mathematics.
2) To study the High School students level of Home Environment.
3) To find out whether there is any significance difference in their Achievement in Mathematics of High school students with respect to the following sub-samples.
    a. Gender
    b. Location of the School
4) To find out whether there is any significance difference in their Home Environment of High school students with respect to the following sub-samples
    a. Gender
    b. Location of the School
5) To find out whether there is any significant relationship between the Achievement in Mathematics and Home Environment of the High school students.

6. HYPOTHESES OF THE STUDY

1) High School students' level of Achievement in Mathematics is low.

2) High School students' level of Home Environment is low.
3) There is no significance difference in their Achievement in Mathematics of High school students with respect to the following sub-samples.
    a. Gender
    b. Location of the School
4) There is no significance difference in their Home Environment of High school students with respect to the following sub-samples
    a. Gender
    b. Location of the School
5) There is no significant relationship between the Achievement in Mathematics and Home Environment of High school students.

7. ANALYSIS AND INTERPRETATION

Achievement in mathematics scores and problem solving ability scores were analysed and tabulated for further interpretation. The percentile norms were established to find out the level of achievement in mathematics and home environment scores as tabulated below:

Hypothesis 1- High School students' level of Achievement in Mathematics is low.

Table-1: Showing the Mean and Standard Deviation Values of Achievement in Mathematics of high school students

Variable	N	Mean	SD
Achievement in Mathematics	434	47.93	9.09

From the above table, the mean and standard deviation of achievement in mathematics is found to be 47.93 and 19.09. Based on the percentile norms the mean scores lay in between the average scores. Hence, it is inferred that achievement in mathematics of high school students is average.

Hypothesis 2- High School students' level of Home Environment is low.

Table 2: Showing the Mean and Standard Deviation Values of Home Environment of high school students

Variable	N	Mean	SD
Home Environment	434	196.83	22.401

From the above table, the mean and standard deviation of Home Environment is found to be 196.83 and 22.401. Based on the percentile norms the mean scores lay in between the average scores. Hence, it is inferred that home environment of high school students is average.

Hypothesis-3: There is no significance difference in their Achievement in Mathematics of High school students with respect to the following sub-samples.

a. Gender
b. Location of the School

Table 3: showing 't' values for achievement in mathematics of high school students based on gender and location

Variable	Gender	N	Mean	SD	't' Value	Level of Significance at 0.05 level
Achievement in Mathematics	Male	171	47.39	19.29	0.474	Not Significant
	Female	263	48.28	18.98		
	Rural	337	48.78	20.06	2.023	Significant
	Urban	97	44.99	14.97		

In order to find out the significant of difference in achievement in mathematics with regard to gender and location high school students the 't' value was calculated.

The calculated 't' value for gender was found to be .474 which is not significant at 0.05 level. Therefore the null hypothesis is accepted and it is concluded that there is no significant difference between male and female in

achievement in mathematics of high school students.

The calculated 't' value for location was found to be 2.023 which is significant at 0.05 level. Therefore the null hypothesis is rejected and it is concluded that there is a significant difference between rural and urban high school students in achievement in mathematics.

Hypothesis 4: There is no significance difference in their home environment of High school students with respect to the following sub-samples.

a. Gender
b. Location of the School

Table 4: showing 't' values for home environment of high school students based on gender and location

Variable	Locality	N	Mean	SD	't' Value	Level of Significance at 0.05 level
Home Environment	Male	171	193.37	21.597	2.616	Significant
	Female	263	199.09	22.666		
	Rural	337	198.32	22.243	3.593	Significant
	Urban	97	191.67	22.296		

In order to find out the significant of difference in home environment with regard to gender and location of high school students the 't' value was calculated.

The calculated 't' value for gender was found to be 2.616 which is significant at 0.05 level. Therefore the null hypothesis is rejected and it is concluded that there is a significant difference between male and female high school students in their home environment.

The calculated 't' value for location was found to be 3.593 which is significant at 0.05 level. Therefore the null hypothesis is rejected and it is concluded that there is a significant difference between rural and urban high school students in their home environment.

Table 5: ***Showing the relationship between achievement in mathematics and problem solving ability of high school students***

Variables	N	Correlation	Sig.
Achievement in Mathematics & Home Environment	434	.202**	.000

The 'r' value between achievement in mathematics and home environment is found to be .202 which is positive and significant at 0.01 level. Hence the framed hypothesis is rejected and it is concluded that there is a positive and significant relationship between achievement in mathematics and home environment.

8. FINDINGS OF THE STUDY

- High School students' level of Achievement in Mathematics is average.
- High School students' level of Home Environment is average.
- There is no significance difference between male and female High school students in their Achievement in Mathematics.
- There is a significance difference between rural and urban High school students in their Achievement in Mathematics.
- There is a significance difference between male and female High school students in their Problem Solving Ability.
- There is a significance difference between rural and urban High school students in their Problem Solving Ability.
- There is a positive and significant relationship between achievement in mathematics and home environment.

9. CONCLUSION

The study focused on two important aspects of high school students namely Achievement in mathematics and home environment. Findings revealed that improving home environment will improve achievement in mathematics. A supportive home environment is crucial in promoting students' success in

mathematics. Parents' educational background, the presence of learning resources, and the general attitudes toward mathematics at home significantly impact students' performance and achievement in mathematics. In homes where financial and educational resources are limited, schools should provide additional academic support through after-school programs or tutoring, ensuring that students from low-income families have opportunities to catch up with their peers.

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