

## PROBLEM SOLVING ABILITY IN MATHEMATICS IN RELATION TO THEIR ACADEMIC ACHIEVEMENT AMONG HIGHER SECONDARY STUDENTS

J. Lizzie\*

---

### ABSTRACT

*Mathematics is absolutely important in the field of education. Mathematics is closely related to our daily life. The basis of modern civilization is mathematics. There is no other subject than our mother tongue which is so closely related to our daily life. At present, mathematics has been given a special place among school subjects. It is because mathematics enables a child to earn his livelihood and enhance his knowledge, and it assists him to learn and do different tasks in life. It effects his mental development and sharpens his intelligence. This inculcates the traits of clarity, self-confidence, regularity, purity, concentration, etc. and assists information of his character. The present paper briefly describes the Problem Solving Ability in Mathematics in relation to their Academic Achievement among Higher Secondary students in Thiruvallur district. The sample for the study consists of 300 higher secondary students selected random from Government, Government Aided and Private Higher secondary Students of Tiruvallur city. The investigator has used descriptive survey method. Descriptive analysis and inferential analysis had been utilized for this study. Null hypothesis were framed and tested by the researcher. To assess the Problem Solving Ability in Mathematics, the questionnaire was constructed by the investigator. To assess the Academic Achievement quarterly and half yearly marks were calculated. The reliability co-efficient of Problem Solving Ability in Mathematics was 0.82 and validity was 0.91. The tool was found to be reliable and valid. The main finding is there exist a positive relationship between Problem Solving Ability in Mathematics and Academic Achievement.*

**Keywords: Problem Solving Ability and Academic Achievement**

---

### INTRODUCTION

Problem solving is an important component of Mathematics because students would be able to achieve all the three values namely functional, logical and aesthetic. The main objective of teaching Mathematics is to trail up the students in the art of problem solving. Problem solving in Mathematics is helpful in the proper development of one's mental powers. Every problem in Mathematics trains an individual in scientific method of reasoning and thinking. The habit of thinking and problem solving developed by the study of Mathematics helps in establishing an intelligent and good understanding of our surroundings and in the development of some common abilities like arithmetic reasoning, numerical ability and logical reasoning which are very much essential for the day to day life situations. Mathematics is an essential discipline because of its practical role to the individual and

society. Present in a problem and developing the skills needed to solve that problem is more motivational than teaching the skills without a context. Academic achievement is acquisition of principles and generalizations and the capacity to perform efficiently certain manipulations of objects symbols and ideas assessment of academic performance has been largely confined to the evaluation in terms of information knowledge and understanding. This apparent inconsistency between the stated purposes of the process of education and devices commonly used for assessing them is perhaps due largely to the difficulty involved in constructing devices that would provide true measures of ability of the students, to think for himself and solve problems.

### RATIONALE

Mathematics is considered as the queen of all Sciences. It is an essential subject taught to the

---

\*Research Scholar, Lady Willingdon IASE, Triplicane, Chennai (Tamil Nadu)

students to develop the skills of reasoning, logical thinking and problem solving. Majority of the pupils feel that Mathematics is a difficult subject and it can be understood and followed only by intelligent students. Those who fail in the subject develop hatred towards it. At present majority of the Mathematics teachers follow traditional methods of instruction and learners tend to be passive listeners. No lesson can be effectively learned unless there is active pupil participation in it. In order to teach a heterogeneous group, teachers need to use a variety of different instructional strategies. "It is impossible to reach every student in the classroom by using only one instructional strategy. Students learn Mathematics by connecting new ideas to ideas that they already know. Teachers of Mathematics need to be able to understand what students know and how they can present new material, with their prior knowledge of Mathematics." Hence, there is an imperative need to adopt learner centered approaches in the classroom. Educators are challenged more than ever before with the need to develop students who will be adaptable in fast changing environments. This calls for equipping students with better thinking skills and learning abilities. Problem solving is an essential but complex activity in Mathematics. One of the aims to reach Mathematics through problem solving helps students to construct a deep understanding of mathematical ideas and process by engaging them in doing Mathematics, creating, conjecturing, exploring, testing and verifying. As we know, this society is a social entity, with a premium on group behavior and interaction. Students need mental flexibility, critical thinking skills and problem solving ability to survive in a rapidly changing world. This involves engaging students in discovering how to analyse, synthesize, make judgments, and create new knowledge and to apply those skills to realworld situations. Teacher's behavior and method of teaching take both direct and indirect effects on critical thinking and problem solving abilities of students. Higher secondary period is the crucial one for the adolescents. Critical thinking and Problem solving abilities play a significant role in preparing the adolescent to set

realistic goals and think of solutions needed to reach these goals. Hence, the responsibility of the teacher especially at the higher Secondary level becomes increasingly important to develop their ability to think critically and solve problems independently for better adjustment in a future complex society.

#### **OBJECTIVES OF THE STUDY**

1. To find out the level of Problem Solving Ability in Mathematics and Academic Achievement among Higher Secondary Students.
2. To find out whether there is any significant difference in Problem Solving Ability in Mathematics and Academic Achievement among Higher Secondary Students based on Gender, Type of School Management and Parent's Education.
3. To find out whether there is any significant relationship between Problem Solving Ability in Mathematics and Academic Achievement among Higher Secondary School Students.

#### **HYPOTHESES OF THE STUDY**

1. The level of Problem Solving Ability in Mathematics and Academic Achievement among Higher Secondary Students is average.
2. There is no significant difference in the Problem Solving Ability in Mathematics of Higher Secondary Students based on Gender, Type of School Management and Parent's Education.
3. There is no significant difference in the Academic Achievement of Higher Secondary Students based on Gender, Type of School Management and Parent's Education.
4. There is no significant relationship between the Problem Solving Ability in Mathematics and Academic Achievement of Higher Secondary Students.

#### **METHODOLOGY OF THE STUDY**

The investigator preferred normative survey method. It describes and interprets what exists at present. The sample of 300 Higher Secondary Students was taken stratified random from different schools giving equal weight-age to sub samples which included.

**TOOLS USED**

- a) Problem Solving Ability in Mathematics questionnaire was used.
- b) Academic Achievement-Average of quarterly and half yearly marks.

**ANALYSIS AND INTERPRETATION OF THE DATA**

**Hypotheses 1:**

The level of Problem Solving Ability in Mathematics and Academic Achievement among Higher Secondary Students is average.

Variable	Range	Category	Frequency	Percentage
Problem Solving Ability in Mathematics	0-13	Low	89	29.66%
	14-20	Average	135	45 %
	21-30	High	76	25.33%
Academic Achievement	0-45	Low	79	26.33 %
	46-60	Average	153	51%
	61-100	High	68	22.66 %

From the above table, as the number of students in the Average category is found to be more than High and low, it is concluded that Problem Solving Ability in Mathematics among Higher Secondary Students is average as hypothesized. For Academic Achievement, as the number of students in the Average category is found to be more than High and low, it is concluded that the Academic Achievement among Higher Secondary Students is average as hypothesized.

**Hypothesis 2:**

There is no significant difference in the Problem Solving Ability in Mathematics of Higher Secondary Students based on Gender, Type of School Management and Parent's Education.

Sub Sample	Group Name	N	Mean	SD	t' Value	Level of Significance
<b>Gender</b>	Male	150	15.64	4.71	4.04	0.01
	Female	150	17.91	5.01		
<b>Type of School Management</b>	Govt	100	16.84	5.55	2.62	0.01
	Govt.aided	100	15.04	4.05		
	Govt.aided	100	15.04	4.05	5.40	0.01
	Private	100	18.45	4.84		
	Govt	100	16.84	5.55	2.19	0.05
	Private	100	18.45	4.84		
<b>Parent's Education</b>	Illiterate	57	15.65	5.08	1.26	NS
	School	202	16.60	4.85		
	School	202	16.60	4.85	2.95	0.01
	College	41	19.19	5.19		
	Illiterate	57	15.65	5.08	3.36	0.01
	College	41	19.19	5.19		

It is observed that the mean score on Problem Solving Ability in Mathematics was high (17.91) for Female students and the same was low (15.64) for Male students. Hence it is concluded that there is significant difference between Male and Female higher secondary students in their Problem Solving Ability in Mathematics. It is observed that there is significant difference between Government, Government Aided and Private higher secondary students in their Problem Solving Ability in Mathematics. It is observed that there is significant difference between School and College Educated Parents and Illiterate and College Educated parents of higher secondary students in their Problem Solving Ability in Mathematics.

**Hypothesis 3:**

There is no significant difference in the Academic Achievement of Higher Secondary Students based on Gender, Type of School Management and Parent's Education.

Sub Sample	Group Name	N	Mean	SD	t Value	Level of Significance
<b>Gender</b>	Male	150	52.45	12.85	0.12	NS
	Female	150	54.33	12.09		
<b>Type of School Management</b>	Govt	100	44.05	8.38	6.39	0.01
	Govt.aided	100	51.17	7.33		
	Govt.aided	100	51.17	7.33		
	Private	100	64.95	10.93		
<b>Parent's Education</b>	Govt	100	44.05	8.38	15.17	0.01
	Private	100	64.95	10.93		
	Illiterate	57	47.44	10.06		
	School	202	53.39	12.11		
	School	202	53.39	12.11		
	College	41	61.66	12.94		
	Illiterate	57	47.44	10.06		
	College	41	61.66	12.94		

From the above table, it is observed that the mean score on Academic Achievement was high (54.33) for Female students and the same was low (52.45) for Male students. Hence it is concluded that there is significant difference between Male and Female higher secondary students in their Academic Achievement. It is observed that there is significant difference between Government, Government Aided and Private higher secondary students in their Academic Achievement. It is observed that there is significant difference between Illiterate, School and College Educated parents of higher secondary students in their Academic Achievement.

**Hypothesis 4:**

There is no significant relationship between the Problem Solving Ability in Mathematics and Academic Achievement of Higher Secondary Students.

- It helps the children developmental traits of open-mindedness and tolerance, as the children see many sides to a problem and listen to many points of view.

Variable	N	Correlation Coefficient	L.S
Problem Solving Ability in Mathematics	300	0.45	0.01
Academic Achievement			

The above table shows positive relationship between Problem Solving Ability in Mathematics and Academic Achievement of Higher Secondary Students.

**SUGGESTIONS**

Problem Solving Method is an appropriate method for teaching mathematics.

Many mathematicians found their formulae and theories only by using this problem solving technique. Problem solving technique can be successfully used by those who have good academic achievement. Implications are as follows:

- Problem Solving Method provides a real life experience to the children.
- It helps the students to develop reflective thinking.
- It helps the students to approach future problems with confidence.
- It builds the mental attitude for effective learning based on critical thinking.

**BIBLIOGRAPHY**

Ali, Riasat, et al. (2010).Effect of using Problem Solving method in teaching Mathematics on the Achievement of Mathematics Students.

Nisha Mary Jose and RinalP.Thomas (2011).Problem Solving Ability and Scholastic Achievement of Secondary Students.GCTE Journal ofResearch and Extension in Education.Vol.6 (1) 145-148.

Sharma, Indira. (2007). Problem Solving Ability and Scientific Attitude a determinant of Academic Achievement of Higher Secondary Students.Journal of Mathematical Education, 7(4), 125 131.

Sidhu, K.S. (2004). The Teaching of Mathematics.New delhi: SterlingPublishers, Pvt.Ltd.

**WEB RELATED RESOURCES**

- <http://www.education.com>
- <http://nzmaths.co.nz>
- <http://dx.dioorg>
- <http://www.mathgoodies.com>
- <http://www.matholympiad.info>