

**A STUDY ON PROBLEM SOLVING ABILITY OF HIGHER SECONDARY SCHOOL STUDENTS IN RELATION TO THEIR ACADEMIC ACHIEVEMENT**

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**Abstract**

The purpose of the study is to analyse the problem solving ability of higher secondary school students in relation to their Academic Achievement. The students of class XI and XII standard studying in higher secondary schools of Thiruvallur District constitute the population of the study. The sample consists of 300 students of Class XI and XII<sup>th</sup> standard from 6 different higher secondary schools of Thiruvallur District. The Problem Solving Ability Test (PSAT) developed by L.N.Dubey was used for the study. The marks obtained in the half yearly examination were considered as academic achievement of higher secondary students. The finding of the study reveals that the moderate level of problem solving ability among higher secondary students and It was found that the moderate level of academic achievement among higher secondary students. The study reveals that there is no significant difference between the Male and Female Higher Secondary School Students on their Problem solving ability and Academic Achievement. It was found that there is a significant difference between the rural and urban higher secondary school students on their Problem Solving Ability and Academic Achievement. The study also reveals that there is a positive relationship between problem solving ability and Academic Achievement of higher secondary Students.

**Keywords:** Problem Solving Ability, Academic Achievement, Higher Secondary Students.

**Introduction**

Problem solving skills refers to our ability to solve problems in an effective and timely manner without any impediments. It involves being able to identify and define the problem, generating alternative solutions, evaluating and selecting the best alternative, and implementing the selected solution. According to Mayer and Wittrock (2006), problem solving is cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver. This definition consists of four parts: first part, problem solving is cognitive i.e. problem

solving occurs within the problem solver's cognitive system and can only be inferred from the problem solver's behavior.

Problem solving is a mental process and is a part of the larger problem process that includes problem finding and problem shaping. Considered the most complex of all intellectual functions, problem solving has been defined as higher-order cognitive process that requires the modulation and control of more routine or fundamental skills. Problem solving occurs when an organism or an artificial intelligence system needs to move from a given state to a desired goal state. Problem solving activities get students more involved in the process of learning and enhance the use of higher level thinking process. Problem solving involves the application of principles and facts to explain new phenomena or predict consequences from known conditions. The task of problem solving requires prediction, analysis of facts and principles to cause and effect relationship in physical phenomena.

Problem solving is the frame work or pattern within which creative thinking and reasoning takes place. It is the ability to think and reason on given levels of complexity. The state of tension created by unsatisfied wants and drives enable the individual to exercise his greatest effort and to use his best language techniques, observations, predictions and interferences to control the difficulties that hinder the progress towards his goal of wants and satisfaction. Problem solving ability plays an important role in the academic achievement of students. It has also a great influence on the academic achievement of students.

Academic achievement or academic performance is the extent to which a student, teacher or institution has attained their short or long-term educational goals. In the present study the marks obtained in the half yearly examination were considered as academic achievement of higher secondary students. Academic Achievement is one of the most important aspects of a student entire school life. It shows the overall performance of how well the student has performed or how low the student has performed. Academic Achievement generally means that a performance outcome that an individual has accomplished specific goals through the different activities in school. School activities may be scholastic and co-scholastic areas.

### **Need and Significance of the Study**

Problem solving is a process of overcoming difficulties that appears to interface with the attainment of a goal. Simple problems can be well solved by instructive and habitual behaviour.

More difficult problems require a series of attempts, until the successful solutions is reached, a Mathematical problem like any problem in life is defined as a problem because it causes is much difficulty in attaining a solution. The beliefs of mathematics students, parents, policy makers and the general public about the roles of problem solving in mathematics become prerequisite or co requisite to develop problem solving. Problem solving ability helps in solving the problem constructively. This skill assists in resolving a conflict, reaching a solution and settles an issue. It develops the ability to get out of difficult situation and achieve the goal without using anger, coercion, defiance and aggressive behaviour. Problem solving is a process that provides an opportunity for a positive act. It enables a student to solve the problem by adopting creative and critical thinking.

Problem solving ability is a vital force, which is in combination with mental setup and interest towards a fruitful education. The problem is the actual evidences of life that everybody in the world has tactlessly, problems are not always insulated. They tend to be like onions where difficulties disappear one after another. In short, they always face difficulties, complications chase people every day and night, even youngsters have their own problems they face in the classroom and at home. Children can deal with any type of difficulty in their own way. Some of the methods they use can be very systematic, while others are much lower. In many cases, the methods that children use to solve their difficulties are at best elementary for children; this can mean a lot of things. If children do not solve their problems, they may feel disappointed and frustrated. On the other hand, children who solve problems can feel very safe and courageous. Problem solving helps the individual develop a stronger and more cohesive sense of self among students. In this way the current research mainly focus on various problem solving abilities of higher secondary students. Hence the present problem is need of the hour.

### **Review of Literature**

**Rani, K. V. (2017)** conducted study on reasoning ability is the 'problem solving skills' or 'analytical ability' or 'deductive and inductive reasoning'. Academic achievement is the total score one achieved at school, college, or university from class, laboratory, library, or field work. The objectives of the study were to explore the relationship between reasoning ability and academic achievement among secondary school students in Trivandrum district. Study also evaluated the difference in the mean scores of reasoning ability and academic achievement in

terms of their background variables, such as gender, age, and type of school. Population of the study includes all students studying in secondary schools of Trivandrum district. The sample of the study consisted of 225 secondary school students of Trivandrum district. The tool adopted here was the Reasoning Ability of Secondary School Students Scale developed by the investigator herself and academic achievement by the term test conducted in the school by the state government. Statistical techniques involved here were t-test and Pearson's Product Moment coefficient of correlation. The result of the study showed that, there was significant high positive correlation between reasoning ability and academic achievement among secondary school students. Also male students showed more reasoning ability and academic achievement than that of female students. With reference to age, and type of school also there existed significant differences in reasoning ability and academic achievement. Educators need to recognize that the age and the type of the school are also influencing the student's reasoning ability and academic achievement of the students. Hence, it is necessary to allow the students to keep in touch with the latest facilities free of cost. So, the instructors have to arrange various competitive programmes, scientific exhibitions, various programs like quiz, talent test, puzzles, etc. Society allows students to access science and technology museums to students at low cost and encourages clubs and NGOs to arrange various programmes, such as seminars, symposium, etc., which promote the reasoning ability.

**Veerasamy, Ashok Kumar (2019)** reported on the relationship between students' perceived problem-solving skills and academic performance in introductory programming, in formative and summative programming assessment tasks. We found that the more effective problem solvers achieved better final exam scores. There was no significant difference in formative assessment performances between effective and poor problem solvers. It is also possible to categorize students on the basis of problem-solving skills, in order to exploit opportunities to improve learning around constructivist learning theory. Finally, our study identified transferability skills and the study may be extended to identify the impact of problem solving transfer skills on student problem solving for programming.

**Kumar, M.(2020)** conducted study on Problem-solving ability is a mental process that is the conducting part of the larger problem process that includes problem finding, shaping, and reaching towards a final goal. There is a need for the development of the same among school

students who will become the future citizens of the country. This paper presents our attempt to study problem-solving ability and creativity among higher secondary students in Nagapattinam District. The results of the study indicate that the level of problem-solving ability among the higher secondary students is high. The results of the study indicate that the level of creativity among the higher secondary students is moderate. There is no correlation between creativity and problem-solving ability among the higher secondary students, there is no significant difference between boys and girls concerning their problem-solving ability, and there is no significant difference between higher secondary boys and girls in their creativity.

**Zulkarnain (2021)** investigated the common problems faced by most students in learning mathematics include their inability to answer problem-solving questions and low mathematical self-efficacy. Search, Solve, Create and Share (SSCS) is a teaching model that provides opportunities for students to enhance their problem-solving skills and self-efficacy. This quasi-experimental study was conducted to determine the effects of the SSCS teaching model on high school students' ability and self-efficacy in solving mathematical problems. A total of 129 high school students were involved in this study and categorised into two groups: 69 and 60 students in the treatment and control groups, respectively. The one-way analysis of covariance test was used with the SPSS 25.0 software to answer the research questions. Results show a significant difference in mathematical problem-solving ability and self-efficacy between students who experienced the SSCS teaching models and students who were taught by using conventional methods. The former has a better problem-solving ability and self-efficacy than the latter. This study supports the adoption of the SSCS teaching model by teachers as an alternative teaching method for improving students' problem-solving ability and self-efficacy. In addition, this study can serve as an impetus in the efforts of encouraging the use of the SSCS teaching model at various levels of education.

### **Objectives of the study**

- ❖ To find out the level of problem solving ability among higher secondary students.
- ❖ To find out the level of Academic achievement among higher secondary students.
- ❖ To find out whether there is any significant difference in problem solving ability of higher secondary students with respect to
  - Gender

- Location
- ❖ To find out whether there is any significant difference in Academic Achievement of higher secondary students with respect to
  - Gender
  - Location
- ❖ To find out significant relationship between the problem solving ability and Academic Achievement among higher secondary students.

### **Hypotheses of the study**

- ❖ The level of problem solving ability among higher secondary students is moderate in nature.
- ❖ The level of Academic achievement among higher secondary students is moderate in nature.
- ❖ There is no significant between difference in problem solving ability of higher secondary students with respect to;
  - Gender
  - Location
- ❖ There is no significant difference in Academic achievement of higher secondary students with respect to;
  - Gender
  - Location
- ❖ There is no significant relationship between the problem solving ability and Academic Achievement among higher secondary Students.

### **Methodology of the Study**

The present study was primarily designed to determine the relationship between problem solving ability and Academic Achievement of the Higher Secondary School Students. The study has been conducted by involving descriptive survey method of research. The random sampling techniques were adopted for the present study.

### **Tools used**

The following research tools were used for the present study.

(a) The Problem Solving Ability Test (PSAT) developed by L.N.Dubey was used for the study.

(b) Academic Achievement: The marks obtained in the half yearly examination were considered as academic achievement of higher secondary students.

**Reliability**

The reliability coefficient of the test was calculated by the following methods:

- Spearman Brown formula (Split Half Method) and it was computed 0.78
- Kudar Richardson formula (Rational equivalence method) and it was computed 0.76

**Validity**

The validity of the tool has calculated by taking the square root of reliability value. i.e. 0.883 and 0.871 respectively.

**Statistical Techniques Used**

The following statistical techniques to be used for analyze the data:

- Percentile, Mean and Standard Deviation.
- t- Test and ANOVA: to know the difference between the means of variables.
- Co-efficient of correlation: to find out the correlation between the selected variables.

**Table 1 Showing the frequency and percentage for the problem solving Ability among the higher secondary school students**

Variable	No. of Samples	Range	Category	Frequency	%
Problem solving ability	300	Below 7	Low	63	21.00%
		8-14	Average	164	54.66%
		Above 15	High	73	24.33%

From the above table we inferred that maximum percentage falls under the Average. Hence the above mentioned hypothesis is not retained. Therefore the level of Problem solving ability is found to be Average among the higher secondary School students.

**Table .2 Showing the frequency and percentage for the Academic achievement among the higher secondary school students**

Variable	No. of Samples	Range	Category	Frequency	%
Academic Achievement	300	Below 42	Low	60	20%
		42-78	Average	180	60%
		Above 78	High	60	20%

From the above table we inferred that maximum percentage falls under the Average. Hence the above mentioned hypothesis is not retained. Therefore the level of Academic achievement is found to be Average among the higher secondary School students.

**Table -3**

**Table shows the significant difference between the higher secondary school Students Problem solving ability based on their Gender using mean scores**

VARIABLE	GENDER	N	MEAN	SD	t - value	L.S
Problem solving ability	Male	150	58.72	14.008	0.035	NS
	Female	150	58.77	12.226		

From the above table, it is inferred that t- value (0.035) is lesser than the table value (1.96) at 0.05 levels. Hence there is no significance difference between the Male and Female higher secondary school Students on their Problem solving ability mean scores. Therefore the above null hypothesis is accepted.

**Table -4**

**Table shows the significant difference between the higher secondary school Students Academic achievement based on their Gender using mean scores.**



VARIABLE	GENDER	N	MEAN	SD	t - value	L.S
Academic achievement	Male	150	46.43	15.024	1.523	NS
	Female	150	48.83	12.106		

From the above table, it is inferred that t- value (1.523) is lesser than the table value (1.96) at 0.05 levels. Hence there is no significance difference between the Male and Female higher secondary school students on their Academic achievement mean scores. Therefore the above null hypothesis is accepted.

**Table -5**

**Table shows the significant difference between the higher secondary school Students Problem solving ability based on their Location using mean scores.**

VARIABLE	GENDER	N	MEAN	SD	t - value	L.S
Problem solving ability	Rural	221	56.91	11.081	4.164	0.01
	Urban	79	63.89	16.665		

From the above table, it is inferred that t- value (4.164) is greater than the table value (2.58) at 0.01 levels. Hence there is a significance difference between the rural and urban area higher secondary school Students on their Problem solving ability mean scores. Therefore the above null hypothesis is rejected.

**Table -6 shows the Significant Difference between higher secondary school Students Academic achievement based on Students Location Using Mean Scores**

VARIABLE	GENDER	N	MEAN	SD	t - value	L.S
Academic achievement	Rural	221	45.75	12.221	3.601	0.01
	Urban	79	52.89	16.042		

From the above table, it is inferred that t- value (3.601) is greater than the table value (2.58) at 0.01 levels. Hence there is a significance difference between the rural and urban area higher secondary school Students on their Academic achievement mean scores.

Therefore the above null hypothesis is rejected.

**Table 4.7 Showing the relationship between the problem solving ability and Academic Achievement**

Variable	Number	Correlation
Problem solving ability Vs Academic Achievement	300	0.918

From the above table, it is observed that there is a positive relationship between problem solving ability and Academic Achievement of higher secondary Students. Therefore the null hypothesis is rejected. There exists a positive relationship among these two groups.

**Major findings**

1. The level of Problem solving ability is found to be Average among the higher secondary School students.
2. The level of Academic achievement is found to be Average among the higher secondary School students.
3. It was found that there exists no significant difference between the Male and Female higher secondary school Students based on their Problem solving ability.
4. It was found that there exists no significant difference between the Male and Female higher secondary school students based on their Academic achievement.

5. It was found that there exists significant difference between the rural and urban area higher secondary school Students based on their Problem solving ability.
6. It was found that there exists significant difference between the rural and urban area higher secondary school Students based on their Academic achievement.
7. It was observed that there is a positive relationship between problem solving ability and Academic Achievement of higher secondary Students.

### **Educational implications**

In order to increase the problem solving ability of the adolescent girls, congenial home environment need to be created by the parents for their desirable sufficient positive growth. The parents should pay special attention to them. They should encourage their daughters to solve their day to day problems by using their cognitive abilities. Moreover, the parents should also provide rich and balanced diet to their daughters, so that they remain physically fit and mentally alert and they have high problem solving ability. It is the responsibility of the teachers to identify such girls who have low problem solving abilities and try to modify their learning and thinking power through various audio-visual aids. The teachers should inform the parents regarding the poor academic achievement of their children. Parents should help their children in solving their problems independently at their own pace. They should engage their children in specially designed problem solving activities to increase their problem solving ability. It is desirable to organize problem solving contexts and competitions in the society especially for these students. The students should be encouraged to participate in these contexts which will definitely increase their problem solving activities.

### **Conclusion**

The study revealed that the problem solving ability is one of the key elements in the cognitive psychology; it has to be given importance to develop those skills necessary to apply theoretical knowledge in varied situations. Teachers should take special care in providing problem based situations to the students in the classroom itself and motivate them to use multi dimensional approach in solving problems which will enhance their ability to solve everyday ill defined problems to some extent. Problem solving depends on the knowledge and skill of the problem solver. In sum, problem solving is cognitive processing directed at transforming a problem from the given state to the goal state when the problem solver is not immediately aware

of a solution method. Problem solving is related to other terms such as thinking, reasoning, decision making, critical thinking, and creative thinking.

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