A Study on Problem Solving Ability of Higher Secondary School Students in Puducherry region

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Abstract: Problem Solving ability is one important and essential skill for every individual to be successful in education, career and personal life. It also helps an individual to solve a problem or achieve a goal. In this paper, the researcher made an attempt to study the problem solving ability of Higher Secondary School students. For this purpose, 300 Higher Secondary School students were randomly sampled from 6 Higher Secondary Schools in Puducherry region and were subjected to the L.N. Dubey's Standardized Problem Solving Ability Test. The data collected was statistically analyzed using SPSS version 21 package. The findings revealed that the Higher Secondary School students' problem solving ability is very low also the problem solving ability of male students, private higher secondary school students, students from rural areas, and science stream students is high compared to the arts stream students.

1.Introduction:

The world is changing and will continue changing. Change is permanent. In our everyday and professional lives, the primary intellectual activity in which we engage is problem solving. (Popper, 1999) averred, "All life is problem solving". To be successful in life, individuals should be capable of tackling any situation. Problem-solving ability helps us to tackle anything from simple to complex. As far as beneficial lifelong learning skills are concerned, solving real-world problems is crucial to survive and thrive in the present and future. The world is full of roses for those who have the ability to solve problems. Education is one effective tool which aids in developing problem solving ability in students'. This is possible only when the education imparted would be application oriented rather than rote memorization. Children of today face challenges that require skills to identify the problem, choose among the alternatives of solution, and use it to solve the problem.

2. Review of related literature:

(Kumar, 2020) conducted a study to find out if there exists a relationship between Problem Solving Ability and Creativity among the Higher Secondary Students. The findings revealed that the problem solving ability of higher secondary students is high and 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 substantial difference in problem-solving ability between boys and girls, and there is no significant difference in creativity between higher secondary boys and girls.

(Veer, 2018) in his study made an attempt to find out if there exists a relation between Problem Solving Ability and Academic Achievement of Senior Secondary Students. The findings of the study revealed that the students having high academic achievement were found to have better problem solving ability compared to the students having low academic achievement.

(Bhat, 2011) conducted a study to find out the effectiveness of problem solving ability on the achievement in mathematics at high school level. The findings of the study revealed that a strong relationship exists between problem solving ability and academic achievement in mathematics and also reveals that the problem solving ability is the best predictor of achievement in mathematics of high school students as well when sex was taken as a demographic variable.

3. Need for the study

Problem Solving is the key to success and has been regarded as the most significant aspect of human behaviour. In this, complex world, human beings are encountering different problems in different ways. Many researches reveal that the number of youth committing suicide has been increasing year by year. The reason is that they do not know how to approach the problem. As averred by Henry Ford "Many people spend more time and energy going around problems than trying to solve them".

3.1. Problem:

A problem is a circumstance that prevents something from being accomplished. To put it another way, it is the impediment that prevents you from doing or doing anything.

3.2. Problem-solving:

The National Council of Supervisors of Mathematics states that "The process of applying previously learned knowledge to new and unexpected situations is known as problem solving." (NCSM, 1977).

A student with effective problem solving ability can be identified by their use of a variety of problem-solving tactics, solid arithmetic abilities, high self-confidence, checking responses for reasonableness, and capacity to analyse and solve the problem using critical and analytical skills. Students that possess these abilities have a strong problem-solving capacity and can tackle any challenge they confront.

Problem solving ability can be developed in students to help them effectively deal with problems that they face daily. The ability involves critical thinking skills, analytical skills, creative thinking ability and logical reasoning of the student towards a problem that is presented in their daily life. Students' capacity to address problems systematically and effectively improves when they develop problem-solving skills.. A good problem solving ability makes the student feel confident and enables him/her to tackle any situation confronted to. Problem solving is the method we use to understand what is happening in our environment, determine what we want to alter and then determine what has to be done to achieve the desired result. It is the foundation for lifelong learning, communication, and progress.

4. Research Questions:

1. Do higher secondary school students of Puducherry region possess problem solving ability?

2. Do the demographic variables influence the problem solving ability of higher secondary school students?

5. Objectives of the study:

- To find out the problem solving ability of Higher Secondary school students in Puducherry region.
- To analyse the problem solving abilities of higher secondary school students with respect to their demographic variables gender, type of school, locality and stream of study.

6. Hypotheses of the study:

- There will be no significant difference between male and female Higher Secondary School students in their problem solving ability.
- There will be no significant difference between private and government school Higher Secondary School students in their problem solving ability.
- There will be no significant difference between urban and rural Higher Secondary School students in their problem solving ability.
- There will be no significant difference in the problem solving ability of the Higher Secondary School students with respect to their stream of study.

7. Method of study:

The researcher has used normative survey method to obtain relevant and meaningful information related to the area of study and to draw valid general conclusions whenever possible from the facts discovered. The method gives us an idea about what exists at present by determining the nature and degree of existing conditions.

The sample for the investigation was drawn from various private and government schools of Puducherry region, a total of 300 students were selected by random sampling technique.

Table 1: Distribution of the sample

S.No.	Moderate Variable	Sub variables	No. of students	Total
1	Gender	Male	150	300
		Female	150	
2.	Type of School	Private	150	300
		Government	150	
3.	Locality	Urban	158	300
		Rural	142	
4.	Stream of Study	Science	100	300
		Maths	100	
		Commerce	100	

8. Tool used:

L.N. Dubey's standardized tool "Problem Solving Ability Test" was used to collect the data. The tool consists of 20 questions which needed to be answered in 40 minutes. Each question carries four alternatives answers out of which the student is to choose one correct answer. One mark is allotted for the correct answer and zero marks for the wrong answer.

9. Statistical techniques used for data analysis

Following are the statistical analysis used for analysing the data:

1. Descriptive Analysis (mean, median, SD)
2. Differential Analysis (t-test)
3. Inferential Analysis (ANOVA)

Descriptive Analysis:

Table2: Total Mean, SD scores of problem solving ability of HSS students

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
300	2	17	11.383	2.227	0.129

The total mean and standard deviation of the Higher Secondary School students is 11.383 and 2.227 respectively. The Higher Secondary School students of Puducherry have a low problem solving ability.

Table 3: Mean, SD scores of problem solving ability of the male and female HSS students

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
Male	2	17	11.713	2.147	0.175
Female	2	17	11.053	2.264	0.185

The mean and standard deviation of the problem solving ability of male is 11.713 and 2.147 respectively. The mean and standard deviation of the problem solving ability of female is 11.053 and 2.264 respectively.

Table 4: Mean, SD scores of problem solving ability of private and government HSS students

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
Private	2	17	12.060	2.303	0.188
Government	2	17	10.707	1.930	0.158

The mean and standard deviation of the problem solving ability of private Higher

Secondary School students is 12.060 and 2.303 respectively. The mean and standard deviation of the problem solving ability of government Higher Secondary School students is 10.707 and 1.930 respectively.

Table 5: Mean, SD scores of problem solving ability of urban and rural HSS students

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
Urban	2	17	11.146	2.335	0.186
Rural	2	17	11.648	2.077	0.174

The mean and standard deviation of the problem solving ability of urban Higher Secondary School students is 11.146 and 2.335 respectively. The mean and standard deviation of the problem solving ability of rural Higher Secondary School students is 11.648 and 2.077 respectively.

Table 6: Mean, SD scores of problem solving ability of HSS students based on their stream of study

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
Science	2	17	11.830	2.198	0.220
Maths	2	17	11.530	2.276	0.228
Commerce	2	17	10.790	2.095	0.210

The mean and standard deviation of the problem solving ability of science stream Higher Secondary School students is 11.830 and 2.198 respectively. The mean and standard deviation of the problem solving ability of maths stream Higher Secondary School students is 11.530 and 2.276 respectively. The mean and standard deviation of the problem solving ability of commerce stream Higher Secondary School students is 10.790 and 2.095 respectively.

Differential Analysis

Hypotheses 1:

There will be no significant difference between male and female Higher Secondary School students in their problem solving ability.

Table 7: Mean, SD, t-test scores of Male and Female HSS students' problem solving ability

Variable	N	Mean	Standard Deviation	df	t-test
Male	150	11.713	2.147		
Female	150	11.053	2.264	294	2.591*

*Significant at 0.05 level, ** Not significant at 0.05 level

Since the calculated value 2.591 is more than that of the t-value, there exists significant difference in the Problem Solving ability of male and female Higher Secondary School students. Hence the null hypothesis is rejected. That is, the problem solving ability of male Higher Secondary School students is higher than that of the female Higher Secondary School students.

Hypotheses 2:

There will be no significant difference between government and private school Higher Secondary School students in their problem solving ability.

Table 8: Mean, SD and t-test scores of Private and Government HSS students' problem solving ability

Variable	N	Mean	Standard Deviation	df	t-test
Private	150	12.060	2.303		
Government	150	10.707	1.930	289	5.516*

*Significant at 0.05 level, ** Not significant at 0.05 level

Since the calculated value 5.516 is more than that of the t-value, there exists significant difference in the Problem Solving ability of government and private school Higher Secondary School students. Hence the null hypothesis is rejected. That is, the problem solving ability of private Higher Secondary School students is higher than the problem solving ability of government Higher Secondary School students.

Hypotheses 3:

There will be no significant difference between rural and urban Higher Secondary School students in their problem solving ability.

Table 9: Mean, SD and t-test scores of Urban and Rural of HSS students' problem solving ability

Variable	N	Mean	Standard Deviation	df	t-test
Urban	158	11.146	2.335		
Rural	142	11.648	2.077	298	1.972*

*Significant at 0.05 level, ** Not significant at 0.05 level

Since the calculated value 1.972 is more than that of the t-value, there exists significant difference in the Problem Solving ability of Urban and Rural Higher Secondary School students. Hence the null hypothesis is rejected. That is, the problem solving ability of rural Higher Secondary School students is higher than the problem solving ability of urban Higher Secondary School students.

Hypotheses 4:

There will be no significant difference in the problem solving ability of the Higher Secondary School students with respect to their stream of study.

Table 10: Mean, SD and F-value of HSS students' Problem Solving ability based on their stream of study

Number of Samples	Minimum	Maximum	Mean	Standard Deviation	Standard Error of Mean
Science	2	17	11.830	2.198	0.220
Maths	2	17	11.530	2.276	0.228
Commerce	2	17	10.790	2.095	0.210

ANOVA

Problem Solving Ability	Sum of Squares	df	Mean Square	F	p-value
Between Groups	57.307	2	28.653	5.969	0.003**
Within Groups	1425.61	297	4.800		

**Significant at 0.05 level

Since the significant value (0.003) is less than 0.05, there exists significant difference in Problem Solving ability of Higher Secondary School students with respect to their Stream of study. Hence, the null hypothesis is rejected. That is, the problem solving ability of Science Higher Secondary School students is higher than the problem solving ability of Maths and Commerce Higher Secondary School students.

10. Result and findings:

Following are the findings obtained from the descriptive, differential and inferential analysis of the data related to Problem Solving ability of Higher Secondary School students.

- The Problem Solving Ability of the Higher Secondary School students of Puducherry region is low.
- There exists a significant difference in the Problem Solving ability of Higher Secondary School students with respect to their gender. The male students Problem Solving ability is high compared to the female students.
- There exists a significant difference in the Problem Solving ability of government school and private school Higher Secondary School students. The private Higher Secondary School students' problem solving ability is high compared to the government Higher Secondary School students.

- There exists a significant difference in the Problem Solving ability of rural and urban Higher Secondary School students. The rural Higher Secondary School students exhibit more Problem Solving ability compared to the urban Higher Secondary School students.
- There exists a significant difference in the Problem Solving ability of Higher Secondary School students among various streams (Science, Maths and Commerce), Also the Problem Solving ability of Science students is higher than that of the other two streams.

11. Educational implications:

Problem solving ability is one important life skill in the present 21st century. The more problem solving ability the individual showcases, the more successful he/she is in educational, professional and personal life. When it comes to problem-solving, teachers must encourage pupils to take reasonable risks. Risk-taking attitude leads the students to overcome mental fixation while solving problems in skill tests, such as, reasoning skills test, problem solving ability test, personality test, and so on. Hence, schools should take utmost care to develop this skill at the earlier stage itself before students are confronted to real life.

Problem solving is one important life skill to all individual which incorporates many other skills in it like creativity, analytical skill, decision making skill etc. No gender disparity is to be entertained in this regard. The stakeholders at various level, parents and society should take utmost care to provide equal opportunities to both male and female students in this regard.

12. Conclusions and Discussion:

To conclude, the overall problem solving ability of Higher Secondary School students of Puducherry region is low. The reason behind low Problem Solving ability is, students up to school level are being prepared for securing marks than for knowledge. Up to Secondary grade, students are trained for rote memorization rather than comprehension learning (Dawngliani, 2019).

The male students exhibit high problem solving ability. This is due to their biological and socio-economic set-up and attitude of parents towards male child. This fact is supported (Nasrin & Usma Nazir &, 2019), (Manohara, J.L. and Ramganesh, 2009) and (Zhu, 2007).

The private school students exhibit high problem solving ability. The reason behind this is they are being exposed to various sources of knowledge.

The rural students exhibit high problem solving ability. This shows that students of rural locality have come in par with urban students in educational opportunities and facilities.

The science stream students perform better in problem solving compared to maths and commerce stream students as the science stream students use a structured way of analysing the situation and arriving at a solution.

On the whole, the school and the teachers play an important role in developing students' problem-solving dispositions. They must select problems that pique pupils' interest.. They need to create an environment that gives confidence to students to discover, take risks, share failures and successes, and question one another. In such supportive environments, students develop the confidence they

need to explore problems and the ability to make adjustments in their problem-solving strategies (NCTM, 2000).

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