

## **Problem Solving Ability of Higher Secondary Chemistry Students**

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**Abstract:** *This study examines the higher secondary chemistry students' problem solving ability. According to Skinner (1968) problem solving is a process of overcoming difficulties that appear to interface with the attainment of a goal. It is a procedure of making adjustment in spite of interferences. The investigator has taken 180 higher secondary chemistry students from 5 higher secondary schools situated in Kumbakonam taluk of Thanjavur District, Tamilnadu, India by using stratified random sampling technique. For collection of data the investigator has used problem solving ability test developed by Darchhingpuii and t-test has also used for analysis and interpretation data. The result of the study reveals that the higher secondary chemistry students have low level of problem solving ability. Teacher should give practice on problems of a huge variety to develop creative thinking in his students to increase the problem solving ability.*

**Key word:** *Problem solving ability, higher secondary students, Chemistry.*

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### **I. Introduction**

All the people in the society, from infancy to old age are affected with one or the other problem. They need the knowledge and skill to solve the problems that arises in their daily life activities. The Schools teach through different subjects, how to handle the problems. For example, they teach civics on the assumption that the knowledge of civics will help them to face the social problems successfully. In schools, students are taught concepts, rules and principles. They help the people in solving their problems. Students make use of their own life experiences, divergent thinking capacities and practical work experiences which help the people to find a solution for the problem. Problem solving is an individual process which requires various techniques to tackle. The problem should deal with the situations difficult enough to be challenging, yet simple and familiar enough to students, so that they grasp and understand. The Teacher can develop a scientific approach to overcome the problems which the students are expected to face in the society.

### **Problem Solving**

According to Skinner (1968) problem solving is a process of overcoming difficulties that appear to interface with the attainment of a goal. It is a procedure of making adjustment in spite of interferences. Problem solving ability is the basic skill of identifying a problem and taking steps to resolve problem. The skill of problem solving is acquiring the knowledge that will lead one to a solution, and one's ability to combine that knowledge in a ready-to-use format and utilize it to find a solution (Altun. (2003). Problem solving is the highest level of learning in the hierarchy anticipated by Gagne (1970) which depends on the master of next lower type of learning. Problem situation occurs when they can adopt some useful strategies for effective problem solving. Bransford and Stein (1984) advocated five steps that are basically associated with the task of problem solving. These are (i) identifying the problem, (ii) defining and representing the problem, (iii) exploring possible strategies, (iv) acting on the strategies, and (v) looking back and evaluating the effect of one's activities. Problem solving behaviour occurs in novel or difficult situations in which a solution is not obtainable by the habitual method of applying concepts and principles derived from past experience in very similar situations (Woodworth and Marquis 1948).

### **Review Of Related Studies**

Adesoji, (2008) investigated the impact of problem-solving instructional strategy on the performances of students of different ability levels in Chemistry. They concluded that the disparity in the high and low ability students in solving problems in science is as a result of poor teaching technique. The need for good instructional strategy like problem-solving technique was advocated for teachers of science. This would go a long way in improving problem-solving skills of students no matter their ability level.

Devi (2009) examined the relationship between problem solving ability and academic achievement of secondary school students which indicates the scope for development of life skill like problem solving to

improve academic achievement. One of the objectives of the study was to investigate the relationship between problem solving ability and academic achievement of IX standard students. Major finding of the study was there is a positive relationship between problem solving and academic achievement of class IX students hence there is a scope to develop problem solving skill in secondary school adolescents through teaching of curricular subject.

Sunday (2010) was carried out on students' ability level and their competence in problem-solving task in physics. The result of the analysis of data shows that students engagement in problem solving task on physics determines to a greater extent, students; ability in physics. It also found that students who shy away from problem solving will likely be less productive when it comes to physics problem because they may have the ability but since it has not been developed (to think and reason) they lack to know how to operate in that field.

Uchenna and Sunday (2011) was carried out to find out the extent of relationship among teachers' problem solving abilities, students, learning styles, and students' achievement in Biology. The relationship between teachers' problem solving abilities and students academic achievement in biology is positive and significant. The effect of teachers' problem solving abilities, students, learning styles on students' academic performance in biology are positive and significant. Based on these, it was concluded that teachers' problem solving abilities and students' learning styles have significant effects on the student's achievement in biology.

Srimadevi and Saraladevi (2016) conducted a study on decision making and self confidence on problem solving ability among higher secondary students studying Mathematics. They identified that decision making and self confidences have an impact on problem solving ability among mathematics achievers. Positive appraisals over an extended time tend to increase the level of learning. Prolonged or consistent negative appraisals tend to lower learning achievement. Students tend to perform in accordance with teacher expectations and treatment - self-fulfilling prophecy.

### **Importance Of The Study**

Problem solving ability is the prediction of achievement in the school environment. The ability of problem solving has a fundamental role in students' academic performance and their construction of the concepts (Adesoji, 2008). Students, having problem solving ability, have the ability to acquire knowledge of wide applicability, and the development of the same ability to transfer that skill, acquired through problem solving in schools, to find solutions for their personal and community problems. Gupta et al. (2015) concluded that problem solving ability of the students help them building strong cognitive ability, which should be in a better position to reap the benefits of high academic achievement, enrolled in reliable future career choice and job availability. Once the Problem solving ability is acquired by the student, the elimination of error and putting correct discrimination for the practical work is achieved. Problem solving ability brings out the individual differences among the students. The Problem solving ability becomes a necessary and important skill, when the students go for their further studies. Increasing the ability of problem solving is a key factor of the learning content. Piaget and Inhelder (1969) discovered that many students find abstract subjects such as Physics and Chemistry difficult to learn, this is believed to be associated with their cognitive development such reasoning and problem solving ability. Problem-solving into Chemistry learning improves the performance of students with high ability than their counterparts with low ability (Fatoke et al 2013). Under the light of aforementioned information, the present study aims has been designed to find the problem solving ability of higher secondary chemistry students.

### **Objectives Of The Study**

The following are the objectives formulated by the investigator for the present investigation:

1. To study the higher secondary chemistry students' problem solving ability,
2. To study if there is any significant difference between the male and female higher secondary chemistry students in respect of their problem solving ability,
3. To study if there is any significant difference between higher secondary chemistry students residing in urban area and rural area in respect of their problem solving ability,
4. To study if there is any significant difference between higher secondary chemistry students were studying in Tamil medium and English medium in respect of their problem solving ability.

## **II. Methodology**

**Research design-** The investigator adapted normative survey method to pursue his study.

**Sample and sampling technique-** The sample comprises 180 higher secondary chemistry students (students who are studying one of the subject chemistry) from 5 higher secondary schools situated in Kumbakonam taluk of Thanjavur District, Tamilnadu, India. The sample was selected by stratified random sampling technique.

**Tool-** problem solving ability test (PAST) constructed and validated by the Darchhingpuii used for collecting the data. It consisted of 20 items. That is 18 multiple choice questions carrying a weightage of 1 mark each for the correct response, 1 cross-word puzzle question with a weightage of 12 marks and 1 jumbled word puzzle

question carrying 10 marks. The maximum score of this test is 40. Therefore if one who gets a score 20 and above indicates high level of problem solving ability and a score below 20 indicates low level of problem solving ability.

**Data analysis and interpretation:** The data was analysed through descriptive as well as inferential statistics. The normality of data is assessed by calculating the values of mean, median, S.D. In order to study the significant difference in problem solving ability with regard to gender, residence and medium of instruction t-test was employed.

**Table-1:** Mean and standard deviation of the problem solving ability of the higher secondary chemistry student

Variables	N	Mean	SD
Entire sample of higher secondary chemistry students	180	19.77	5.83

It is evident from the table-1 the calculated mean and standard deviation of problem solving ability of entire sample of higher secondary chemistry students is found to be 19.77 and 5.83 respectively which shows that the higher secondary chemistry students have low level of problem solving ability.

**Table-2:** Significance of the difference between the means of the problem solving ability scores based on Gender

Variables	N	Mean	SD	't' Value	Significance at 0.05 level
Male higher secondary chemistry student	105	20.67	5.68	2.48	Significant
Female higher secondary chemistry student	75	18.50	5.84		

It is evident form table-2 the calculated 't' value is 2.48, which is significant at 0.05 level. Hence it is inferred that there is a significant difference between male and female higher secondary chemistry students with respect to their problem solving ability.

**Table-3:** Significance of the difference between the means of the problem solving ability scores based on Residence

Variables	N	Mean	SD	't' Value	Significance at 0.05 level
Higher secondary student residing in urban area	60	20.33	5.53	0.93	Not Significant
Higher secondary student residing in rural area	120	19.49	5.98		

It is evident form table-3 the calculated 't' value is 0.93, which is not significant at 0.05 level. Hence it is inferred that there is no significant difference between higher secondary chemistry students residing in urban area and rural area with respect to their problem solving ability.

**Table-4:** Significance of the difference between the means of the problem solving ability scores based on Medium of instruction

Variables	N	Mean	SD	't' Value	Significance at 0.05 level
Higher secondary chemistry student were studying in Tamil medium	84	19.41	5.49	0.76	Not Significant
Higher secondary chemistry student were studying in English medium	96	20.08	6.12		

It is evident form table-4 the calculated 't' value is 0.76, which is not significant at 0.05 level. Hence it is inferred that there is no significant difference between higher secondary chemistry students were studying in Tamil medium and English medium with respect to their problem solving ability.

### III. Important Findings

The following are the important findings obtained from the present investigation:

- i. The entire samples of the higher secondary chemistry students have low level of problem solving ability.
- ii. There is a significant difference in problem solving ability between male and female higher secondary chemistry students. Moreover male higher secondary chemistry students are found to be better than the female higher secondary students in respect of their problem solving ability.
- iii. There is no significant difference between higher secondary chemistry students residing in urban area and rural area with respect to their problem solving ability.
- iv. There is no significant difference between higher secondary chemistry students were studying in Tamil medium and English medium with respect to their problem solving ability.

### IV. Conclusion

Schools have developed scientific attitude in the students, so that, they may be able to solve their own problems independently for better adjustment in the future complex society. The teacher should help the students to recall all relevant concepts and principles. Recall these concepts and principles in the presence of the problem and discover the relationship between them which will result in solving their problems. And also teacher should give practice on problems of a huge variety to develop creative thinking in his students to increase the problem solving ability.

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