

PROBLEM SOLVING ABILITY OF HIGHER SECONDARY STUDENTS

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Abstract

Every problem is an opportunity for learning. Everybody faces many problems in life. Problem solving is the natural process in human being, but we cannot that it will develop at its best level. It is also a slow process, but with deliberate efforts and special training, skill of problem solving can be developed. Various types of co-curricular activities can be organized frequently to promote qualities such as cooperation, tolerance, open-mindedness and sharing of responsibilities to enhance the Problem Solving Ability. Problem solving forms an important ingredient of all scientific disciplines and it also constitutes an integral part of all programmes at all level of studies viz. primary, secondary and higher secondary, almost everything that an individual does involves problem solving which is directed towards achieving a goal. In the present study descriptive survey method of research will be used. In present study population consists of 12th class students of higher secondary schools of Theni districts. In present study sample will be collected from Theni districts through random sampling. Sampling will be done as per the requirement of multistage sampling. In stage Government, aided and private higher secondary schools will be selected randomly from Theni district. The data was analysed using descriptive as well as differential statistics were used. Data was computed using SPSS version 20. Where as t test and F test were employed to study difference between samples. The result indicate that problem solving ability of higher secondary students have average level towards gender, locality of the school, nature of school, medium of school, locality of residence, parental occupation and type of family further the results indicate that there is no significant difference in problem solving ability of gender, nature of school, medium of school, locality of residence, parental occupation and type of family. The results also show that the significant difference in locality of school of higher secondary students towards problem solving ability.

Introduction

From birth onwards everybody in this world is faced with some problem or the other. There are needs and motives in the life of the individuals which are to be satisfied. For this purpose definite goals or aims are set. In an attempt for their realization and experiences cause of a serious attention and deliberated efforts on the part of man are needed so that the obstacles or cause of interference in the attainment of the objectives may be overcome. For this purpose one has to think reason and proceed systematically by following the scientific steps.

Problem solving ability

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 has been defined in several ways. Problem solving is selective in the sense so that selective relevant experiences are recalled for finding the successful solution.

According to Skinner problem solving is a process of overcoming difficulties that appear to interfere with the attainment in spite of interference.

Problem solving is a process of overcoming difficulties that appear to interfere with the attainment of a goal. It is a procedure of making adjustment in spite of interference.

Problem solving is a goal directed activity. In which goal is to remove the obstacles. Problem solving occurs when interference must be overcome in the attainment of an objective.

Problem solving is creative in the sense that it results in an essentially new construct and reorganization of ideas or movements or both.

Problem solving ability has played a critical role in human history (Chi & Glaser, 1985; Ohlsson, 2012). Problem solving involves people's efforts to find a solution to a problem using analytical thinking, critical thinking, creativity, reasoning,

and experiences along with available information (Chi & Glaser, 1985; Schunk, 2004; Reeve, 2013). Since childhood, we actively solve problems presented by the world. We acquire information about people, objects, events, or phenomena and organise the information into the structure of knowledge that is stored in our memory. The structure of knowledge contains bodies of understanding, mental models, convictions and beliefs, and influences how we relate our experiences together and how we solve problems that we encounter in everyday life at school, work, even at play (Resnick & Glaser, 1975; Chi & Glaser, 1985).

Although inquiry-based curricula and teaching practices certainly enhance students' problem solving and knowledge application in dealing with real-world problems, it is not clear that assessment in the classroom demonstrates an adequate description of a student's problem solving ability and understanding of scientific conceptions (Docktor & Heller, 2009; Schoenfeld, 1985).

Mayer and Wittrock (2006) defined Problem solving as "cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver.

Need and Significance of the Study

Problem solving is the key to success and has been regarded as the most significant aspect of human behaviour. One of the major aims of education is to develop the ability to attain better performance. A student having good problem solving ability will be properly adjusted in the class as well as at home. A problem cannot be solved without thinking. The need of problem solving behavior is to create the power of thinking which helps to find out the solution of the problem. The main objective of problem solving is to go through the physical, psychological, social and environmental factors which hinder the progress of an individual to attain certain goals. The levels of problem solving ability of students speak for the degree of their future success in life and hence in turn their contribution to the development of the society. Poor problem solving ability of the students is a matter of grave concern and challenges to education. There are many factors which are recognized to be affecting problem solving ability such as academic motivation, personality, Socio- economic status, school and home environment. Some students excel in problem solving ability

and other performs poorly. However, little research work has been done on the problem solving ability of higher secondary school students. So the need was felt by the investigator to make an attempt to systematic probe into problem solving ability of higher secondary students of Theni district of Tamilnadu.

Methodology and Procedure

In the present study descriptive survey method of research will be used.

Population

In present study population consists of 12th class students of higher secondary schools of Theni districts.

Sample

In present study sample will be collected from Theni districts through random sampling. Sampling will be done as per the requirement of multistage sampling. In stage Government, aided and private higher secondary schools will be selected randomly from Theni district.

Statistical Techniques Used

The data was analysed using descriptive as well as differential statistics were used. Data was computed using SPSS version 20. Where as t test and F test were employed to study difference between samples.

Objectives of the Study

1. To find out the level of problem solving ability of following sub samples of higher secondary students.
 - Gender : Male / Female
 - Locality of the School : Rural / Urban
 - Nature of School : Government / Aided / Private
 - Medium of School : Tamil / English
 - Locality of residence : Rural / Urban
 - Parental occupation : Government employed / Self employed
 - Type of family : Joint / Nuclear
2. To find out the difference if any between the following sub samples of higher secondary students in respect of their problem solving ability
 - Gender : Male / Female

- Locality of the School : Rural / Urban
- Nature of School : Government / Aided / Private
- Medium of School : Tamil / English
- Locality of residence : Rural / Urban
- Parental occupation : Government employed / Self employed
- Type of family : Joint / Nuclear

Hypotheses of the Study

1. The problem solving ability of following sub samples of higher secondary students is high.
 - Gender : Male / Female
 - Locality of the School : Rural / Urban
 - Nature of School : Government / Aided / Private
 - Medium of School : Tamil / English
 - Locality of residence : Rural / Urban
 - Parental occupation : Government employed / Self employed
 - Type of family : Joint / Nuclear
2. There is no significant difference between the following sub-samples with respect to the problem solving ability of higher secondary students
 - Gender : Male / Female
 - Locality of the School : Rural / Urban
 - Nature of School : Government / Aided / Private
 - Medium of School : Tamil / English
 - Locality of residence : Rural / Urban
 - Parental occupation : Government employed / Self employed
 - Type of family : Joint / Nuclear

Tool Used In The Present Study

Problem solving ability by L.N. Dubey, 1971.

Descriptive Analysis –Problem Solving Ability

TABLE – 1
DESCRIPTIVE STATISTICS FOR PROBLEM SOLVING ABILITY OF
HIGHER SECONDARY STUDENTS

Categories	Sub Samples	N	Mean	SD	Level
Gender	Male	130	11.10	2.69	Avg
	Female	140	11.46	3.05	Avg
Locality of the school	Rural	137	11.73	2.95	Avg
	Urban	133	10.83	2.75	Avg
Nature of School	Government	58	11.72	2.56	Avg
	Private	74	11.44	2.96	Avg
	Aided	138	11.02	2.97	Avg
Medium of School	Tamil	167	11.48	2.87	Avg
	English	103	10.98	2.90	Avg
Locality of residence	Rural	91	11.16	2.80	Avg
	Urban	179	11.35	2.93	Avg
Parental occupation	Government employed	139	11.36	2.73	Avg
	Self employed	131	11.21	3.05	Avg
Type of family	Joint	113	11.43	2.97	Avg
	Nuclear	157	11.19	2.83	Avg

In this study, based on normal curve of higher secondary students secured scores in between 8.61 and 14.37 (-1σ to $+1\sigma$) are classified as having average level of problem solving ability. In the table 4.1 shows the problem solving ability mean and standard deviation values. The calculated mean values are less than 14.37 and more than 8.61. Therefore, it is found that the higher secondary students irrespective of their gender, locality of the school, nature of school, medium of school, locality of residence, parental occupation and type of family have average level of problem solving ability.

Differential Analysis For Problem Solving Ability

TABLE 2

‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES – HIGHER SECONDARY STUDENTS– BASED ON GENDER

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Gender	Male	130	11.10	2.69	1.013
	Female	140	11.46	3.05	NS

Table 2 further reveals the mean, standard deviation and ‘t’ values of male and female higher secondary students on problem solving ability. The calculated ‘t’ value is 1.013, which is lower than the table value of 1.97 to be significant at 0.05 level. Therefore, the research hypothesis is rejected and null hypothesis is accepted. Further it is found that both male and female higher secondary students not differ significantly in their problem solving ability.

TABLE 3

‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES – HIGHER SECONDARY STUDENTS– BASED ON LOCALITY OF SCHOOL

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Locality of the school	Rural	137	11.73	2.95	2.593
	Urban	133	10.83	2.75	S

Table 3 further reveals the mean, standard deviation and ‘t’ values of rural and urban higher secondary student on problem solving ability. The calculated ‘t’ value is 2.593, which is greater than the table value of 1.97 to be significant at 0.05 level. Therefore, the research hypothesis is rejected and null hypothesis is accepted. Further

it is found that both rural and urban higher secondary students do not differ significantly in their problem solving ability.

TABLE 4

**‘F’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES –
HIGHER SECONDARY STUDENTS – BASED ON NATURE OF SCHOOL**

Nature of School	Sum of Squares	df	Mean Squares	‘F’ Value	Level of Significance
Between Groups	22.131	2	11.066	1.329	NS
Within Groups	2223.754	267	8.329		
Total	2245.885	269			

Table 4, the calculated ‘F’ value is 1.329, which is not significant at 0.05 level. Hence, the framed null hypothesis is accepted and research hypothesis is rejected. It is inferred that there is no significant difference among sub samples of nature of school with respect to their problem solving ability of higher secondary students.

TABLE 5

**‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES – HIGHER
SECONDARY STUDENTS– BASED ON MEDIUM OF SCHOOL**

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Medium of school	Tamil	167	11.48	2.87	1.396
	English	103	10.98	2.90	NS

Table 5, further reveals the mean, standard deviation and ‘t’ values of English and Tamil medium of higher secondary students on problem solving ability. The calculated ‘t’ value is 0.396, which is lesser than the table value of 1.97 to be significant at 0.05 level. Therefore, the research hypothesis is rejected and null hypothesis is accepted. Further it is found that the English medium and Tamil medium

of higher secondary students do not differ significantly in their problem solving ability.

TABLE 6

‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES – HIGHER SECONDARY STUDENTS– BASED ON LOCALITY OF RESIDENCE

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Locality of residence	Rural	91	11.16	2.80	0.517
	Urban	179	11.35	2.93	NS

Table 6 further reveals the mean, standard deviation and ‘t’ values of rural and urban higher secondary students on problem solving ability. The calculated ‘t’ value is 0.517, which is lesser than the table value of 1.97 to be significant at 0.05 level. Therefore, the research hypothesis is rejected and null hypothesis is accepted. Further it is found that both rural and urban higher secondary students do not differ significantly in their problem solving ability.

TABLE 7

‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES –HIGHER SECONDARY STUDENTS – BASED ON PARENTAL OCCUPATION

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Parental occupation	Government employed	139	11.36	2.73	0.435
	Self employed	131	11.21	3.05	NS

Table 7, further reveals the mean, standard deviation and ‘t’ values of government employ and self employ of parental occupation of higher secondary students on problem solving ability. The calculated ‘t’ value is 0.435, which is lower than the table value of 1.97 to be significant at 0.05 level. Therefore, the research

hypothesis is rejected and null hypothesis is accepted. Further it is found that government employ and self employ of parental occupation of higher secondary students do not differ significantly on problem solving ability.

TABLE 8

‘t’ TEST VALUES FOR PROBLEM SOLVING ABILITY SCORES –HIGHER SECONDARY STUDENTS – BASED ON TYPE OF FAMILY

Categories	Sub-Samples	N	Mean	S.D	‘t’ Value
Type of family	Joint	113	11.43	2.97	0.680
	Nuclear	157	11.19	2.83	NS

Table 8, further reveals the mean, standard deviation and ‘t’ values of joint and nuclear of type of family of higher secondary students on problem solving ability. The calculated ‘t’ value is 0.680, which is lower than the table value of 1.97 to be significant at 0.05 level. Therefore, the research hypothesis is rejected and null hypothesis is accepted. Further it is found that joint and nuclear type of family of higher secondary students do not differ significantly on problem solving ability.

Major Findings of the Study

1. It is found that the higher secondary students irrespective of their gender, locality of the school, nature of school, medium of school, locality of residence, parental occupation and type of family have average level of problem solving ability.
2. It is found that both male and female higher secondary students do not differ significantly in their problem solving ability.
3. It is found that both rural and urban higher secondary students differ significantly in their problem solving ability.
4. It is inferred that there is no significant difference among sub samples of nature of school with respect to their problem solving ability of higher secondary students.

5. It is found that the English medium and Tamil medium of higher secondary students do not differ significantly in their problem solving ability.
6. It is found that both rural and urban higher secondary students do not differ significantly in their problem solving ability.
7. It is found that government employ and self employ of parental occupation of higher secondary students do not differ significantly on problem solving ability.
8. It is found that joint and nuclear type of family of higher secondary students do not differ significantly on problem solving ability.

Educational Implications:

In order to increase the problem solving ability of the adolescent, 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 them to solve their day to day problems by using their cognitive abilities. Moreover, the parents should also provide rich and balanced diet, 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 student who have low problem solving abilities and try to modify their learning and thinking power through various audio-visual aids. In order to increase the problem solving ability and academic achievement of the students, qualified and well-trained teachers should be appointed in the schools so that they may understand the difficulties faced by the students and help them in developing their cognitive abilities. 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. The students should be encouraged to participate in these contexts which will definitely increase their problem solving activities.

Suggestions on improving students' problem solving abilities:

Within the classroom environment, it is difficult to monitor and interpret the habits of each individual student; however, educators can certainly use the results of

the study to impact the methods that they use to deliver the information to the students in the classroom and also in more individualized settings. Educators not only provide content information, but serve as role models to the students in the problem-solving process. While working with the students, educators should emphasize the key aspects of the problem, whether that is the terminology, the values provided, or the like, that directed them in the problem-solving process.

Within smaller environments, such as recitation sections or office hours, individualized attention can be given to the student, and recommendations regarding the problem-solving process can be implemented with dramatic impact on the individual student. Simply asking the student to read the problem and perform a short think aloud protocol can assist the educator in understanding the misconceptions that arise from the lecture material in the mind of the students, not only helping the student at the moment, but also assisting in the continual improvement of the lecture environment.

Conclusion

The problems may create disturbances and disequilibrium in developing process of an individual. Therefore, the educators must re-define traditional teaching methodologies which often do not match students learning styles and skills needed in society. Educators can play an instrumental role in fostering an environment of teaching and learning by presenting topics in an activity oriented manner to mitigate or prevent anxiety. Computer programming enhances problem-solving abilities and promotes creativity and reasoning ability of students. Teachers who teach mathematics to the students need a strong background in content. Inquiry-oriented mathematics instruction, tasks and activities, can assist students to develop his/her talents. Various types of co-curricular activities can be organized frequently to promote qualities such as cooperation, tolerance, open-mindedness and sharing of responsibilities to enhance their Problem Solving Ability.

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