

A Study On Problem-Solving Ability Of Rural Learners In Mathematics At Higher Secondary Level

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Abstract

Problem-solving is the highest operation of the cognitive process. The approach leads to the formulation of generalization that is useful in future situations involving the solution of similar problems. Problem-solving is an activity that involves the student Engagement in a variety of cognitive action including and accessing and using previous knowledge and experience. The study deals with higher secondary school students in Nagapattinam educational district. The study is limited to only higher secondary schools in Nagapattinam Educational District. The sample for the study is limited to only 331 students. To find out the level of problem-solving ability and its dimensions of higher secondary school students. This study will be more fruitful when suggestions given by the investigator are applied for further study and it will be of great help for those who want to study further.

Key words: Problem-Solving Ability, Rural Learners And Mathematics., etc.

Introduction

Problem-solving is the highest operation of the cognitive process. This is also termed as the most thoughtful teaching-learning. The highest objective of teaching-learning is related to the problem-solving operation. John Dewey has emphasized the social problems for developing social efficiency and the student's efficiency Kurt Lewin's theory is also related to problem-

solving. Every person has some goals to attain. There are some obstacles or barriers is between the person and the goal. The problem-solving method is one which involves the use of the process of problem-solving or reflective thinking and reasoning. Problem-solving purposes of the existing learning situation. A problem is an obstruction of some sort to the attainment of an objective, a sort of difficulty which does not enable the individual to reach the goal easily. The main objective of the problem solving method is to stimulate the reflective and creative thinking of students. It involves the thought process that results from doubt, a perplexity or a problem. The approach leads to the formulation of generalization that is useful in future situations involving the solution of similar problems.

SIGNIFICANCE OF THE STUDY

Problem-solving ability is an important factor in the academic achievement of the students. Some students have good learning styles, some students have poor learning styles which may be due to several factors such as family background, economic status, size of the family, education of the parents etc., and Individual differences also play a vital role in learning styles of children. The Problem-solving ability also varies among the students from school to school, management to management, locality to locality etc. Every human being is born with an innate urge to know. This urge to know is the seed and in an environment, it grows and yields the fruit of knowledge. This knowledge is the source of happiness, joy and peace of mind leading to a state of bliss. Problem-solving is an activity that involves the student “Engagement in a variety of cognitive action including and accessing and using previous knowledge and experience”.

STATEMENT OF THE PROBLEM

The problem selected for the present study is entitled “**A STUDY ON PROBLEM-SOLVING ABILITY OF RURAL LEARNERS IN MATHEMATICS AT HIGHER SECONDARY LEVEL**”.

DEFINITIONS OF THE STUDY

Mathematics

Mathematics is real science is a science of space and quantity that helps us in solving the problems of life needing numeration and calculations. It is an exact science and involves high cognitive abilities and powers.

Problem-solving ability

The investigator means the ability of the students to find the solution to mathematical problems. Problem-solving ability includes understanding ability, ability in forming equations, ability in estimating the results, ability in substitution of values, ability in writing results and ability in verifying the results.

OBJECTIVES OF THE STUDY

General objectives

1. To find out the level of problem-solving ability in the mathematics of the higher secondary school students.

Specific objectives

The problem-solving ability of higher secondary school students.

1. To find out whether there is any significant difference between Boys and Girls in their Problem-solving ability in mathematics and its dimensions.
2. To find out whether there is any significant difference between XI and XII standard students in their problem-solving ability in mathematics and its dimensions.
3. To find out whether there is any significant difference between day scholar and hostel students in their problem-solving ability in mathematics and its dimensions.
4. To find out whether there is any significant difference among government; government-aided and self-finance school students in their problem-solving ability in mathematics and its dimensions.

NULL HYPOTHESES

Problem-solving ability and its dimensions.

1. There is no significant difference between Boys and Girls in their Problem-solving ability in mathematics and its dimensions.
2. There is no significant difference between XI and XII standard students in their problem-solving ability in mathematics and its dimensions.
3. There is no significant difference between day scholar and hostel students in their problem-solving ability in mathematics and its dimensions.
4. There is no significant difference among government, government-aided and self-finance higher secondary school students in their problem-solving ability in mathematics and its dimensions.

LIMITATIONS OF THE STUDY

Limitations are these conditions within the control of investigators that may place restrictions on the conclusions of the study their application to other situations.

1. The study deals with higher secondary school students in Nagapattinam educational district.
2. The study is limited to only higher secondary schools in Nagapattinam Educational District.
3. The sample for the study is limited to only 331 students.
5. In studying the problem-solving ability in the mathematics of higher secondary school students, the investigator has used a questionnaire having only four dimensions - understanding ability, ability in forming equations, ability in substitutions of values and ability in verifying the results.

METHOD ADOPTED IN THE PRESENT STUDY

The investigator adopted the survey method to find out the problem-solving ability in the mathematics of higher secondary school students. The survey method involves interpretation, comparison, measurement, classification, evaluation and generalization.

TOOLS USED IN THE PRESENT STUDY

The investigator used the following tools for collecting data that were very useful for the fulfillment of various objectives of his study.

- a) General Data Sheet
- b) Problem-solving ability Scale

ADMINISTRATION OF THE TOOL

After seeking permission from the respected headmasters of schools, the investigator visited higher secondary schools in Nagapattinam Educational District, Nagapattinam. The investigator explained the purpose of his study. The students were asked to answer the tool promptly. The filled-in tools were scored and the data were tabulated for analysis.

POPULATION OF THE STUDY

The population of the study consists of higher secondary school students studying in a higher secondary school in Nagapattinam Educational District.

SAMPLE FOR THE STUDY

The investigator has used a stratified random sampling technique. 331 higher secondary school students have randomly selected 6 schools.

DESCRIPTION OF THE PROBLEM-SOLVING SCALE IN MATHEMATICS

The problem-solving ability in mathematics consists of 16 questions from higher secondary school state board mathematics textbooks. The tool was prepared by an investigator. Each item of the tool focused on problem-solving ability in mathematics.

ESTABLISHING VALIDITY OF THE TOOL

In order to establish the tool, it has been submitted to experts and the teachers in higher secondary school. The experts have given suggestions regarding items. Thus the content validity of the tool has been established.

ESTABLISHING RELIABILITY OF THE TOOL

Reliability is the degree of accuracy and consistency. The investigator has used the test-retest method for establishing the reliability of the tool. The investigator randomly selected 50 higher secondary school students. The tool for problem-solving ability in mathematics was administered to them. The same tool was administered to the same sample of 50 students after an interval of 15 days. The responses were scored. The correlation coefficient was found to be 0.68. Thus the reliability of the tool was established.

PROBLEM-SOLVING ABILITY SCALE

Problem-solving ability scale for XI and XII standard students for the present study, the investigator studied some of the available tools and the scale developed by the investigator. There are four specific types of problem-solving ability of the tool is the ability to understanding, the ability to formulating the equations, ability to substitute values and ability to verify the results.

The following table shows the items falling under the dimensions.

Dimensions	Statements
Ability in understanding	1-4
Ability in forming the equations	5-8
Ability to substitute the values	9-12
Ability in verifying the results.	13-16

SCORING PROCEDURE

The tool consists of 16 questions and each question has four dimensions. The dimensions are given below.

The scoring of the items was done as follows:

Response	Scoring the Mark
Ability in understanding	4
Ability in forming equations	4
Ability in substitutions of values	4
Ability in verifying the results	4

TESTING HYPOTHESES

Objective. 1

To find out the level of problem-solving ability and its dimensions of higher secondary school students.

Table - 1

LEVEL OF PROBLEM SOLVING ABILITY AND ITS DIMENSIONS OF HIGHER SECONDARY SCHOOL STUDENTS

Dimensions	Low		Average		High	
	Count	%	Count	%	Count	%
AU	73	22.1	177	53.5	81	24.5
AFE	54	16.3	228	68.9	49	14.8
ASV	74	22.4	200	60.4	57	17.2
AVR	0	0.0	250	75.5	81	24.5

It is inferred from the above table that 24.5% of higher secondary school students have a high level of Ability in understanding problem-solving ability. It is inferred from the above table

that 14.8% of higher secondary school students have a high level of Ability in forming equations problem-solving ability. It is inferred from the above table that 17.2% of higher secondary school students have a high level of Ability in forming equations problem-solving ability. It is inferred from the above table that 24.5% of higher secondary school students have low, average, high level of Ability in verifying the results problem-solving ability.

Null hypothesis 1

There is no significant difference between male and female high students in their problem-solving ability in mathematics and its dimension.

TABLE 2

SIGNIFICANT DIFFERENCE BETWEEN MALE AND FEMALE HIGH STUDENTS IN THEIR PROBLEM-SOLVING ABILITY IN MATHEMATICS AND ITS DIMENSIONS

DIMENSION	Category	N	Mean	SD	‘t’ value	Remarks
AU	Male	165	9.63	2.309	1.444	NS
	Female	166	9.98	2.116		
AFE	Male	165	7.25	2.887	1.835	NS
	Female	166	7.83	2.833		
ASV	Male	165	5.89	2.996	1.987	S
	Female	166	6.54	2.966		
AVR	Male	165	4.12	3.113	1.795	NS
	Female	166	4.75	3.228		
TOTAL	Male	165	26.89	9.963	2.014	S
	Female	166	29.10	9.956		

(At 5%level of significance the table value of ‘t’ value is 1.96)

It is inferred from the above table that there is no significant difference between male and female higher secondary school students in their Ability in understanding problem-solving ability, Ability in forming equations problem-solving ability and Ability in verifying the results problem-solving ability. But there is a significant difference between male and female higher

secondary school students in their Ability in substitution of values problem-solving ability and total.

Null hypothesis 2

There is no significant difference between XI and XII standard students in their problem-solving ability in mathematics and its dimensions.

Table 3

SIGNIFICANT DIFFERENCE BETWEEN XI AND XII STANDARD STUDENTS IN THEIR PROBLEM-SOLVING ABILITY IN MATHEMATICS AND ITS DIMENSIONS

Dimension	Category	N	Mean	SD	't' value	Remarks
AU	XI	178	9.50	2.473	2.082	S
	X	153	10.16	1.823		
AFE	XI	178	7.31	2.754	1.520	NS
	X	153	7.80	2.988		
ASV	XI	178	5.98	2.823	1.526	NS
	X	153	6.49	3.169		
AVR	XI	178	3.99	3.111	2.739	S
	X	153	4.95	3.197		
TOTAL	XI	178	26.79	9.938	1.380	NS
	X	153	29.40	9.932		

(At 5%level of significance the table value of 't' value is 1.96)

It is inferred from the above table that there is no significant difference between XI and XII standard in their Ability in forming equations and Ability in substitution of values. But there is a significant difference between XI and XII standard in their Ability in understanding and ability in verifying the results.

Null hypothesis 3

There is no significant difference between day scholar and hostel school students in their problem-solving ability in mathematics and its dimensions.

TABLE 4

**SIGNIFICANT DIFFERENCE BETWEEN DAY SCHOLAR AND HOSTEL OF
SCHOOL STUDENTS IN THEIR PROBLEM-SOLVING ABILITY IN MATHEMATICS
AND ITS DIMENSIONS**

Dimension	Category	N	Mean	SD	't' value	Remarks
AU	Home	195	9.74	2.177	0.614	NS
	Hostel	136	9.90	2.281		
AFE	Home	195	7.33	2.916	1.568	NS
	Hostel	136	7.83	2.788		
ASV	Home	195	6.05	2.977	1.208	NS
	Hostel	136	6.46	3.013		
AVR	Home	195	4.30	3.097	0.896	NS
	Hostel	136	4.63	3.302		
TOTAL	Home	195	27.43	9.764	1.222	NS
	Hostel	136	28.81	10.324		

(At 5%level of significance the table value of 't' value is 1.96)

It is inferred from the above table that there is no significant difference between day scholar and hostel higher secondary school students in their Problem-solving ability and its dimensions.

Null hypothesis 4

There is no significant difference among government, government-aided and self-finance school students in their problem-solving ability in mathematics and its dimensions.

TABLE 5

**DIFFERENCE AMONG GOVERNMENT, GOVERNMENT AIDED AND SELF
FINANCE SCHOOL STUDENTS IN THEIR PROBLEM-SOLVING ABILITY IN
MATHEMATICS AND ITS DIMENSIONS**

Dimension	Source of	df=2, 328		Calculated	Remarks
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	variation	Sum of Squares	Mean Square	'F' value	
AU	Between Groups	4.986	4.986	1.013	NS
	Within Groups	1618.640	4.920		
AFE	Between Groups	6.149	6.149	0.746	NS
	Within Groups	2712.129	8.244		
ASV	Between Groups	13.037	13.037	1.456	NS
	Within Groups	2945.301	8.952		
AVR	Between Groups	.054	.054	0.005	NS
	Within Groups	3341.299	10.156		
TOTAL	Between Groups	13.137	13.137	0.131	NS
	Within Groups	33021.860	100.370		

(At 5% level of significant the table value of F for df 2, 328 is 3.03)

It is inferred from the above table that there is no significant difference among government, government-aided and self-finance higher secondary school students in their problem-solving ability and its dimensions.

Results and findings

It is inferred from the above table that there is no significant difference between XI and XII standard in their Ability in forming equations and Ability in substitution of values. But there is a significant difference between XI and XII standard in their Ability in understanding and ability in verifying the results.

It is inferred from the above table that there is no significant difference between male and female higher secondary school students in their Ability in understanding problem-solving ability, Ability in forming equations problem-solving ability and Ability in verifying the results problem-solving ability. But there is a significant difference between male and female higher secondary school students in their Ability in substitution of values problem-solving ability and total.

It is inferred from the above table that there is no significant difference between day scholar and hostel higher secondary school students in their Problem-solving ability and its dimensions.

It is inferred from the above table that there is no significant difference among government, government-aided and self-finance higher secondary school students in their problem-solving ability and its dimensions.

It is inferred from the above table that 24.5% of higher secondary school students have a high level of Ability in understanding problem-solving ability. It is inferred from the above table that 14.8% of higher secondary school students have a high level of Ability in forming equations problem-solving ability. It is inferred from the above table that 17.2% of higher secondary school students have a high level of Ability in forming equations problem-solving ability

CONCLUSION

Even though there are some limitations in the present study, it is evident that the problem-solving ability of higher secondary school students is average. The former president of India Dr. A.P.J. Abdul Kalam expresses his faith in youths who would contribute the national development. The recommendations given by the investigator may be very helpful for improving their problem-solving ability of higher secondary school students in mathematics. This study will be more fruitful when suggestions given by the investigator are applied for further study and it will be of great help for those who want to study further.

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