

Volume-02, Issue 01

March-2013

ISSN 2277-4556

THE LIGHT OF EDUCATION

(A Bi-annual Refereed Journal of Education)

**INSTITUTE OF EDUCATION, HALDIA
WEST BENGAL**

Academic Achievement of High School Students having Differential Levels of Problem Solving Ability

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Abstract

The main objective of the present research was to study the academic achievement of high school students having differential levels of problem solving ability. The sample comprised of 300 high school students out of which 142 male and 158 were female students. The problem-solving ability test developed and standardized by L.N. Dubey was used to meet the objectives of the study. To test the hypotheses one way ANOVA has been used. The results revealed that male, female and total high school students having high, average and low levels of problem-solving ability differ significantly with respect to their mean academic achievement.

Key words: *Academic Achievement , High School Students, Problem solving Ability*

Introduction :

The quality of a nation depends upon the quality of its citizens. The quality of citizens depends on the quality of their education. Thus an educational institute occupies an important and vital place in the educational life of a student. In one's life academic success is highly valued. People with better academic achievement are better placed in the society. To a great extent, the achievement of the students affects their future success and performance. There is hardly anyone who does not experience some amount of fear and phobia. It may be fear of performance in public, fear of failure, fear of criticism etc. All the above mentioned problems of an individual can be sought out or can be reduced if he or she has a good problem solving ability. There is hardly anyone in our life who does not encounter any problem. Life of an individual is full of obstacles. To reach a goal in life, man has to overcome these obstacles and this can be done only if he possesses good problem-solving ability.

Rationale of the Study:

Performance of an individual is generally assessed by the academic achievement. Poor performance of students in studies often leads to dropouts. School is a major agency which plays a significant role in shaping children in terms of their ideas, habits, attitudes, and abilities have to be promoted among the school students if learning society is to be achieved.

Problem-solving is the highest level of learning in the hierarchy proposed by Gagne. Problem-solving is a deliberate or purposeful act on the part of an individual to realize the set goals by inventing some novel method or systematically following some planned steps for the removal of interferences or obstacles in the path. It occurs in novel or difficult situations in which a solution is not attainable by habitual methods of applying concepts and principles derived from past experiences in very similar situations.

Problem-solving involves the application of principles and facts to explain and solve new phenomena or predict consequences from known conditions. Problem-solving behaviour arises only when the goal is purposeful and essential for the individual.

Problem-solving ability may have different levels such as high, average and low levels of problem solving ability. Learners those have differential levels of problem solving ability are supposed to have differential levels of academic achievement. On the whole, problem-solving ability has a great impact on the academic achievement of the learners which have been clear from the studies undertaken by Kamalakanthan (1968), Jain (1982), Dutt (1992), Singh (1992), Ayodhya (2007) and Behra (2009). But the investigator of the present study found that very few studies are conducted on the relationship of these two variables in general and particular in Himachal Pradesh. In view of such results, the investigator thought to undertake a study on the impact of problem-solving ability on academic achievement with a motive to arrive at conclusion concerning the relationship between these two variables.

Objectives of the Study:

The present study has been conducted keeping in mind the following objectives:

1. To study the differential levels of problem-solving ability of high school students.
2. To study the problem-solving ability of high school male and female students.
3. To study the academic achievement of high school male and female students.
4. To compare the academic achievement of high school students having high, average and low levels of problem-solving ability.
5. To compare the academic achievement of male high school students having high, average and low levels of problem-solving ability.
6. To compare the academic achievement of female high school students having high, average and low levels of problem-solving ability.

Hypotheses of the Study:

The hypotheses formulated and tested in the present study were as follows:

- 1 The high school students having high, average and low levels of problem-solving ability differ significantly with respect to their mean academic achievement.
- 2 The male high school students having high, average and low levels of problem-solving ability differ significantly with respect to their mean academic achievement.
- 3 The female high school students having high, average and low levels of problem-solving ability differ significantly with respect to their mean academic achievement.

Research Method:

Methodology

In the present study, descriptive survey method was used.

Sample :

In the present study the sample of 300, Xth class high school students were selected purposively from district Bilaspur of Himachal Pradesh. These students were selected from five government schools of Bilaspur district. Finally, the sample consists of 300 (142 male and 158 female) high school students.

Tools used :

In the present study a standardized tool called Problem- Solving Ability test developed and standardized by L.N. Dubey was used. This test consists 20 problems. Each problem has four alternative answers. Out of these four answers only one is correct. If the pupil writes the correct answer he/she is given one mark and if he/she writes a wrong answer zero is given.

For ascertaining the academic achievement of the students the investigator has taken the marks scored by the each respondent in the class IX school examination 2010.

Statistical techniques used

In order to test the hypotheses of the present study, the investigator used one way ANOVA i.e. analysis of variance.

Analysis and Interpretation of Data :

A. Study of Significance of Difference among the Mean Scores on Academic Achievement of High School Students having Differential Levels of Problems Solving Ability

The present study aimed to find out whether academic achievement of high school students having differential levels of problem solving ability differs or not. The data were obtained from high school students to find out the difference in the mean academic achievement of high school students having differential levels of problem solving ability. Further, the investigator categorized the high school students into their categories on the basis of their problem solving ability scores.

As such, the students scoring 10 or more, in between 5-9 and 4 or less than it were considered as the students having high, average and low levels of problem-solving ability respectively. In order to find out the differences in academic achievement scores of the students having high, average and low levels of problem solving ability, their respective scores on academic achievement were taken into consideration and the significance of differences among the mean values of these three levels of scores have been calculated by means of adopting by one way analysis of variance. The results obtained subsequently have been presented in table 1.

Table-1 : Significance of Differences in the Mean Scores on Academic Achievement of High School Students having Differential Levels of Problem Solving Ability

Sources of variation	Sum of squares	df	Mean square	F – ratio
Between group	334570.69	2	167285.34	12.88**
Within group	3854548.94	297	12978.27	
Total	4189119.63	299	180263.61	

** Significant at 0.01

The findings of the present study in the above table 1 show that the sum of squares between groups and with in groups have been found to be 334570.69 and 3854548.94 respectively and mean square between groups and with in groups have been found to be 167285.34 and 12978.27 respectively. The F – value has been found to be 12.88 being significant at 0.01 level of significance. It indicates that there is a significant difference in the academic achievement of high school students having differential levels of problem solving ability. Hence, the hypothesis that “The high school students having high, average and low levels of problem solving ability differ significantly with respect of their mean academic achievement” is accepted.

B. Study of Significance of Difference among the Mean Scores on Academic Achievement of Male High School Students having Differential Levels of Problem Solving Ability

The present study aimed to find out whether academic achievement of male high school students having differential levels of problem solving ability differs or not. The data were obtained from high school students to find out the difference in the mean academic achievement of male high school students having differential levels of problem solving ability. Further, the investigator categorized the high school male students into three categories on the basis of their problem solving ability scores.

As such, the male students scoring 9 or more in between 5 to 8 and 4 or less than it were considered as the students having high, average and low levels of problem solving ability respectively. In order to find out the differences in academic achievement, scores of the male students having high, average and low levels of problem solving ability, their respective scores on academic achievement were taken into consideration and the significance of differences among the mean values of the three levels of scores have been calculated by means of adopting by one way analysis of variance. The results obtained subsequently have been presented in table 2.

Table-2: Significance of Differences in the Mean Scores on Academic Achievement of male High School Students Having Differential Levels of Problem Solving Ability

Sources of variation	Sum of squares	df	Mean square	F - ratio
Between groups	855779.51	2	42789.75	7.62**
Within groups	780197.91	139	5612.93	
Total	1635977.42	141	48402.68	

**Significant at 0.01

The findings

of the present study in the above table 2 show that the sum of squares between groups and with in groups have been found to be 855779.51 and 780197.91 respectively and mean squares between groups and with in groups have been found to be 42789.75 and 5612.93 respectively. The F- value has been found to be 7.62 being significant at 0.01 level of significance. It indicates that there is a significant difference in the academic achievement of male high school students having differential levels of problem solving ability. Hence, the hypothesis that "The male high school students having high, average and low levels of problem solving ability differ significantly with respect of their mean academic achievement" is accepted.

C. Study of Significance of Difference among the Mean Scores on Academic Achievement of female High School Students having Differential Levels of Problem Solving Ability

The present study aimed to find out whether academic achievement of female high school students having differential levels of problem solving ability differs or not. The data were obtained from high school students to find out the difference in the mean academic achievement of high school female students having differential levels of problem solving ability. Further, the investigator categorized the high school female students into three categories on the basis of their problem solving ability scores.

As such, the female students scoring 11 or more, in between 6 to 10 and 5 or less than it were considered as the students having high, average and low levels of problem solving ability respectively. In order to find out the differences in academic achievement scores of the female students having high, average and low levels of problem solving ability, their respective scores on academic achievement were taken into consideration and the significance of differences among the mean values of these three levels of scores have been calculated by means of adopting by one way analysis of variance. The results obtained subsequently have been presented in table 3.

Table-3: Study of Significance of Differences in the Mean Scores on Academic Achievement of Female High School Students Having Differential Levels of Problem Solving Ability

Sources of variation	Sum of squares	df	Mean square	F - ratio
Between groups	318407.57	2	159203.785	16.069**
Within groups	1535611.14	155	9907.16	
Total	1854018.71	157	169110.945	

** Significant at 0.01

The findings of the present study in the above table 3 show that the sum of squares between groups and with in groups have been found to be 318407.57 and 1535611.14 respectively and mean squares between groups and with in groups have been found to be 159203.785 and 9907.16 respectively. The F- value has been found to be 16.069 being significant at 0.01 level of significance. It indicates that there is in a significant difference in the academic achievement of female high school students having differential levels of problem solving ability. Hence, the hypothesis that "The female high school students having high, average and low levels of problem solving ability differ significantly with respect of their mean academic achievement" is accepted.

Educational Implications:

On the basis of the above findings, the investigator is inclined to have the following educational implications for both the parents and teachers:

- The parents should provide conducive and free environment to the students in order to develop good academic achievement and problem-solving ability.
- The parents should give time to the students regarding their studies to enhance their academic achievement.
- The parents should encourage their children to study properly so that they can score well in the examination.
- The teachers should provide healthy atmosphere for teaching and learning process.
- Teachers should provide tests like reasoning ability, creative thinking to increase and develop problem-solving ability among students.
- The teacher should try to infuse the spirit of learning to learn among the students.

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