Academic Achievement of Secondary School Students with Varying Reasoning Ability

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Abstract : *In the present study, the investigators have made an attempt to study the academic achievement of high school students with different levels of reasoning abilty. Sample of the study consisted of 200 secondary school students, including 100 boys and 100 girls, of Mandi District of Himachal Pradesh. Reasoning ability test developed by L. N. Dubey was used for the collection of data; and marks obtained in previous examination were considered as the indicator of academic achievement. Analysis and interpretation of data were carried out with the help of 't' test and one way Analysis of Variance. On the basis of analysis and interpretation of data, the investigators arrived at the findings such as; the secondary school students with high, average and low level of reasoning ability differ significantly with respect to their mean academic achievement scores; and the three groups of secondary school students such as high vs. average, high vs. low, and average vs. low, differs significantly with respect to their mean academic achievement scores. The girl secondary school students with high, average and low level of reasoning ability differs significantly with respect to their mean academic achievement scores and the three groups of girls secondary school students such as: high vs. average, high vs. low and average vs. low, differs significantly with respect to their mean academic achievement scores. The boy secondary school students with high, average and low level of reasoning ability, differs significantly with respect to their mean academic achievement scores and the three groups of boys secondary school students such as: high vs. average, high vs. low and average vs. low, differs significantly with respect to their mean academic achievement*

Keywords: *Reasoning Ability, Academic Achievement, Differential Levels, Secondary Schools.*

Introduction

Achievement is the end product of learning and its level and performances are affected by psychological conditions like intelligence, mental health and reasoning ability etc. Reasoning is a valuable mental activity which helps to solve problems pertaining to any field of education. Reasoning basically is a process of thinking, involving inferences by employing general principles. It is a form of controlled association which starts with some problems of interest to the person and directed towards its solution. It is essentially a cognitive ability and is like thinking in many ways. Reasoning is therefore, a highly

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purposeful, controlled, selective, thinking process, the material of which is predominantly factual reproduction of past experience. Reasoning and learning are closely related, both being methods of solving problems, learning usually resulting from the process of reasoning. More and more exercise in problem solving will develop a child's reasoning ability. If a child starts taking interest in problem solving, he will develop self confidence and thus he may improve his reasoning ability.

Rationale of the Study

Academic achievement of any student mainly depends upon the psychological conditions like intelligence, mental health and reasoning ability etc. Reasoning ability plays a significant role in the life of students. Reasoning is a valuable mental activity, which helps to solving problems pertaining to any field of education. Many researchers like Chhikara (1985), Garg (1988), Singh (1988), Ramachandran (1990), Nagailankim (1991), Muthumanickam(1992), Lalitabhai(1993) Sumangla (1995), Dubey (2007, 2010) had reported positive and significant relationship between reasoning ability and academic achievement. The present study is likely to add to the corpus of knowledge related to the field of psychology of adolescent students. Hence, attempt has been made to study the academic achievement of secondary school students with different levels of reasoning ability, viz. high, average and low.

Objectives of the Study

The present study was conducted with the following objectives:

  i. To study the academic achievement of secondary school students with high, average and low level of reasoning ability.

  ii. To study the academic achievement of secondary school girl students with high, average and low level of reasoning ability.

  iii. To study the academic achievement of secondary school boy students with high, average and low level of reasoning ability.

Hypotheses of the Study

On the basis of the objectives of the study the following null hypotheses have been formulated;

  H_{01} The mean academic achievement scores of secondary school students with high, average and low level of reasoning ability do not differ significantly.

  H_{02} The mean academic achievement scores of secondary school girls with high, average and low level of reasoning ability do not differ significantly.

  H_{03} The mean academic achievement scores of secondary school boys with high, average and low level of reasoning ability do not differ significantly.

Method of Study

Depending upon the objectives of the study, the descriptive survey method of research was employed for the present study.

Sample

This study was carried out on a sample of 200 high school students of standard X. These students were selected randomly from four different high schools of Mandi district of Himachal Pradesh. However, the sample schools were selected on the basis of purposive sampling technique.

Tools Used

For the present investigation, the investigator used the Reasoning Ability Test as standardized by L. N. Dubey. This test consists of 60 items. The marks obtained in previous examination were considered as the indicator of academic achievement.

Statistical Techniques Used

The researcher used t-test and one way Analysis of Variance in order to analyze and interpret the data.

Analysis and Interpretation of Data

The summary of results as obtained through t-test and one way analysis of variance are presented below;

Achievement and Reasoning Ability of Secondary School Students

H_{01} The mean academic achievement scores of secondary school students with high, average and low level of reasoning ability do not differ significantly.

Table1: Significance of Difference among the Mean Scores on Academic Achievement of Secondary School Students with Different Levels of Reasoning Ability

Sources of variation	df	Sum of squares	Mean square (Variance)	F- ratio	Remarks
Between groups	2	250368.88	125184.44		
Within groups	197	771494.71	3916.22	31.97**	Sig. at 0.01 level
Total	199	1021863.59			

** Significant at 0.01 level (p < 0.01)

An analysis of the results of table 1 reveals that the secondary school students with different levels of reasoning ability differs significantly on their academic achievement. But it is not clear that which of the two groups differs. Therefore, it is necessary to calculate the significance of difference of the different groups such as high vs. average, high vs. low and average vs. low. The data pertaining to the significance of mean difference between the mean scores of the respective groups have been presented in the table 2

Table 2: Significance of Mean Difference in the Academic Achievement of Secondary School Students with Different Levels of Reasoning Ability

Category	N	M	SD	SE_D	df	't'value	Remarks
High vs. Average	38	451.05	67.72	12.39	161	4.42**	Sig. at 0.01
	125	396.29	64.02				
High vs. Low	38	451.05	67.72	13.52	73	8.54**	Sig. at 0.01
	37	335.54	47.92				
Average vs. Low	125	396.29	64.02	9.74	160	6.24**	Sig. at 0.01
	37	335.54	47.92				

** Significant at 0.01 level (p < 0.01)

Table 2 concluded that the three groups namely high vs. Average, high vs. low and average vs. low differs significantly on their academic achievement. As obtained value of the respective groups are found to be significant at 0.01 level of significance with df values 161, 73 and 160 respectively. Therefore, it can be concluded that the reasoning ability of secondary school students is having some bearing on the academic achievement.

Achievement and Reasoning Ability of Secondary School Girl Students

H_{02} The mean academic achievement scores of secondary school girls with high, average and low level of reasoning ability do not differ significantly.

The present study aimed to find out whether the academic achievement of secondary school girls with different levels of Reasoning Ability differ or not. The results obtained subsequently have been presented in table 3.

Table 3: Significance of difference among the Mean Scores on Academic Achievement of girls Secondary School Students with Different Levels of Reasoning Ability

Sources of variation	Df	Sum of squares	Mean square (Variance)	F- ratio	Remarks
Between groups	2	121588.01	60794.00		
Within groups	97	401249.30	4136.59	14.70**	Sig. at 0.01 level
Total	99	522837.31			

*** Significant at 0.01 level ($p < 0.01$)*

Analysis of the table 3 reveals that the secondary school girls having differential levels of reasoning ability differs significantly on their academic achievement. But it is not clear that which of the two groups differs. Therefore, it is necessary to calculate the significance of difference of the different groups such as high vs. Average, high vs. Low and Average vs. Low. The data pertaining to the significant of mean difference between the mean scores of the respective groups have been presented in the table 4 as follows:

Table 4: Significance of Mean Difference in the Academic Achievement of Girls Secondary School Students with Different Levels of Reasoning Ability

Category	N	M	SD	SE$_D$	Df	't'value	Remarks
High vs. Average	18	460.11	67.43	18.20	78	2.20*	Sig. at 0.05
	62	420.13					
High vs. Low	18	460.11	52.99	16.96	36	6.45**	Sig. at 0.01
	20	350.35					
Average vs. Low	62	420.13	65.58	17.05	80	4.09**	Sig. at 0.01
	20	350.35					

*** Significant at 0.01 level ($p < 0.01$)*

** Significant at 0.05 level ($p < 0.05$)*

From the above analysis of table 4 it is concluded that the three groups namely high vs. Average, high vs. low and average vs. low differs significantly on their academic achievement as obtained 't' ratio of the respective groups are found to be significant at 0.01 level with df values 78, 36 and 80 respectively. Therefore, it can be concluded that the reasoning ability of secondary school girls is having some bearing on the academic achievement.

Achievement and Reasoning Ability of Secondary School Boy Students

H_{03} The mean academic achievement scores of secondary school boys with high, average and low level of reasoning ability do not differ significantly.

The present study aimed to find out whether the academic achievement of secondary school boys with different levels of Reasoning Ability differs or not. The results obtained subsequently have been presented in table 5.

Table 5: Significance of difference among the Mean Score on Academic Achievement of Boys Secondary School Students with Different Levels of Reasoning Ability

Sources of variation	df	Sum of squares	Mean square (Variance)	F- ratio	Remarks
Between groups	2	174862.39	87431.20		
Within groups	97	427985.40	4412.22	19.82**	Sig. at 0.01 level
Total	99	602847.79			

** Significant at 0.01 level (p < 0.01)

Analysis of the table 5 reveals that the secondary school boys having differential levels of reasoning ability differs significantly on their academic achievement. But it is not clear that which of the two groups differs. Therefore, it is necessary to calculate the significance of difference of the different groups such as high vs. Average, high vs. Low and average vs. Low. The data pertaining to the significant of mean difference between the mean scores of the respective groups have been presented in table 6 as follows:

Table 6: Significance of Mean Difference in the Academic Achievement of Boy Secondary School Students with Different Levels of Reasoning Ability

Category	N	M	SD	SE_D	df	't'value	Remarks
High vs. Average	17	455	53.50	13.91	82	6.37**	Sig. at 0.01
	67	366.36					
High vs. Low	17	455	62.40	21.84	31	6.50**	Sig. at 0.01
	16	313					
Average vs. Low	67	366.36	44.45	11.56	81	4.62**	Sig. at 0.01
	16	313					

** Significant at 0.01 level (p < 0.01)

Table 6 shows that the three groups namely high vs. Average, high vs. low and average vs. low differs significantly on their academic achievement. As obtained 't' ratio of the respective groups are found to be significant at 0.01 level of significance with df values 82, 31 and 81 respectively. Therefore, it can be concluded that the reasoning ability of secondary school boys is having some bearing on the academic achievement.

Major Findings of the Study

After careful analysis of the obtained data and interpretation of the result with regard to the objectives and hypotheses of the study, the investigator reached at the following findings:

i. The secondary school students with high, average and low levels of reasoning ability differs significantly with respect to their mean academic achievement score; and three groups of secondary school students namely high vs. average, high vs. low and average vs. low also differs significantly with respect to their mean academic achievement.

ii. The girls secondary school students with high, average and low levels of reasoning ability differs significantly with respect to their mean academic achievement score; and three groups of girls secondary school students namely high vs. average, high vs. low and average vs. low differs significantly with respect to their mean academic achievement score.

iii. The boys secondary school students with high, average and low levels of reasoning ability differs significantly with respect to their mean academic achievement score; and three groups of boys secondary school students namely high vs. average, high vs. low and average vs. low differs significantly with respect to their mean academic achievement score.

Educational Implications

The knowledge, expertise, resourcefulness and efficiency of teachers may also improve the academic achievement and reasoning ability of the students. Skilful and trained teachers are the main ingredient of good academic achievement. Teachers should provide tests like problem solving ability test, creative thinking test to increase and develop reasoning ability among students. The elements of convergent and divergent thinking should be continuously applied to the solution of problems throughout the entire course. Teachers of all schools give proper attention towards the academic achievement of the students in all the subjects and also towards their reasoning ability and assign different projects, assignments etc. to improve students reasoning ability and develop reasoning ability among students by giving some additional exposure like seminars, expert's lectures, field trips and training programmes.

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