

High School students' Academic Achievement in Science and their Critical Thinking

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Abstract

This study is intended to find out the high school students' Academic Achievement in science and their critical thinking. The study conducted with 985 High School Students studying in Thanjavur District of Tamilnadu, India. The sample was selected by using Simple Random Sampling Technique. Critical thinking dispositions scale constructed validated by Seeja, K. R. and Jangaiah.C (2012). The score for Academic achievement in science taken form II term marks achieved by the selected sample in Science subject in their schools. The results of the study shows the achievement in Science of entire sample of High School students is high. The Critical Thinking of entire sample of High School students also found to be high. There is no significant difference between the male and female, Rural and Urban High School students with respect to their Achievement in Science. There is significant difference between the male and female High School students with respect to their Critical Thinking. There is no significant difference between Rural and Urban High School students with respect to their Critical Thinking. There is a significant relationship between the Achievement in Science and Critical Thinking of High School students.

Key Words: Academic achievement, Critical Thinking and High School students

Introduction

In order to meet scientific development difficulties, science education is vital in motivating students to pursue technical vocations that are regarded essential in modern cultures. A significant issue for formal education is to obtain high levels of achievement in science education and to foster good attitudes toward science. Several studies have found that pupils' attitudes, cognitive ability, and academic achievement are all linked (Vilia PN, et al. , 2017).

Academic achievement is the achievement of proficiency in the performance of given skills or knowledge, which is usually determined by the teacher's test scores or marks, and is strongly tied to learning (Ornstein, 1990). Science does not progress in a linear fashion. It is possible that it will emerge slowly among numerous peoples and nations. One thing that has become evident is that the advancement of knowledge is inextricably linked to how people obtain their means of subsistence. It is underlined that modern man's mental process is greatly impacted by scientific values in practically everything he does or engages with (Yeast,1983).

Science education must continue to expand, evolve, and enhance its standards so that students, educators, and the nation as a whole can benefit from the advantages of a good educational system. Students' academic performance is a fundamental indicator to be taken into account when defining and planning educational intervention both at nationwide level (e.g., curriculum definition) and at classroom level (e.g., teaching strategy) (Vilia PN, et al. , 2017).

In order to advance critical thinking pedagogy and encourage students' critical thinking abilities, however, educators must possess a clear definition of what critical thinking is. As the concept of critical thinking is highly complex, a variety of definitions exist, so it is difficult to pinpoint the exact meaning of the skills involved in this intricate process. Facione (1990), using the two-sentence definition of critical thinking generated from the Delphi Report, identified critical thinking as "the process of purposeful, selfregulatory judgment Karbalaeei, Alireza. (2012).

The inferiority complex is characterised by a sense of self-worth insufficiency and self-doubt. In this complex, the person continuously compares himself to others and believes that he does not meet the expectations. He believes he is less valuable, has a low self-esteem, and believes he is unable of performing tasks as well as others. The inferiority complex will reduce academic achievement as well as the critical thinking. (Venkataraman S and Manivannan S, (2018).

Tools used in the study

Critical thinking dispositions scale constructed validated by Seeja, K. R. and Jangaiah.C (2012). The score for Academic achievement in science taken form II term marks achieved by the selected sample in Science subject in their schools.

Sample of the Study

The present study was conducted with 985 High School Students studying in Thanjavur District of Tamilnadu State. The sample was selected by using Simple Random Sampling Technique.

Analysis of Mean and SD scores of Achievement in Science of High School students

The achievement in Science scale has been administered to 985 High School students. The data were collected from them. The mean and standard deviation were calculated for the entire sample and its sub-samples and are given in TableNo. 1

Table No. 1

The Mean and Standard Deviation of Achievement in Science scores of High School students

Sample and itssub-samples		N	Mean	SD
Entire sample		985	75.46	10.966
Gender	Male	434	74.73	11.113
	Female	551	76.03	10.824
Locality	Rural	510	75.14	11.419
	Urban	475	75.80	10.458

The achievement in Science of entire sample of High School students is high (M=75.46).

The mean value for the sub sample of:

- ✓ gender of High School students indicates that female students are having high achievement in Science than male High School students.
- ✓ locality of High School students indicates thaturban students are having high achievement in Science than rural students.

Analysis of Mean and SD scores of Critical Thinking of High School students

The Critical Thinking Inventory has been administered to 985 High School students. The data were collected from them. The Mean and Standard deviation were calculated for the entire sample and its sub-samples and are given in Table No. 2.

**Table No 4.2
Mean and SD scores of Critical Thinking of High School students**

Sample and its sub-samples		N	Mean	SD
Entire sample		985	211.86	24.402
Gender	Male	434	208.35	26.721
	Female	551	214.62	22.042
Locality	Rural	510	210.81	26.775
	Urban	475	212.98	21.536

The Critical Thinking of entire sample of High School students is high (M=211.86).

The mean value for the sub sample of :

- ✓ gender of High School students indicates that Female students are having high Critical Thinking than Male High School students.
- ✓ Locality of High School students indicates that Urban (M=213.05) students are having high Critical Thinking than Rural students.

Differential Analysis- Achievement in Science Scores

Analysis of Mean Achievement in Science scores of High School students with respect to their Gender

Null hypothesis

There is no significant difference between Male and Female High School students with respect to their achievement in Science.

In order to test the above Null hypothesis value is calculated.

**Table No -3
Significance of difference between Mean Achievement in Science scores of High School students with respect to their Gender**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Male	434	74.73	11.113	1.850	Not significant
Female	551	76.03	10.824		

From the above table, since the ‘t’ value is not significant at 0.05 level , the above null hypothesis is accepted and it is concluded that there is no significant difference between the male and female High School students with respect to their Achievement in Science.

Analysis of Mean achievement in Science scores of High School students with respect to their Locality

Null hypothesis

There is no significant difference between Rural and Urban High School students with respect to their achievement in Science.

In order to test the above Null hypothesis ‘t’ value is calculated.

Table No.4

Significance of difference between Mean Achievement in Science scores of High School students with respect to their Locality

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Rural	510	75.14	11.419	0.948	Not significant
Urban	475	75.80	10.458		

From the above table, since the ‘t’ value is not significant at 0.05 level , the above null hypothesis is accepted and it is concluded that there is no significant difference between Rural and Urban High School students with respect to their achievement in Science.

Differential Analysis- Critical Thinking Scores

Analysis of Mean Critical Thinking Scores of High School students with respect to their Gender

Null hypothesis

There is no significant difference between Male and Female High School students with respect to their Critical Thinking.

In order to test the above Null hypothesis ‘t’ value is calculated.

Table No. 5

Significance of difference between Mean Critical Thinking Scores of High School students with respect to their Gender

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Male	434	208.35	26.721	3.941	Significant
Female	551	214.62	22.042		

From the above table, since the ‘t’ value is significant at 0.05 level , the above null hypothesis is rejected and it is concluded that there is significant difference between the male and female High School students with respect to their Critical Thinking.

Analysis of Mean Critical Thinking Scores of High School students with respect to their Locality

Null hypothesis

There is no significant difference between Rural and Urban High School students with respect to their Critical Thinking.

In order to test the above Null hypothesis ‘t’ value is calculated.

Table No.6
Significance of difference between Mean Critical Thinking Scores of High School students with respect to their Locality

Sub-Samples	N	Mean	S D	t-value	Significance at 0.05 level
Rural	510	210.81	26.775	1.402	Not significant
Urban	475	212.98	21.536		

From the above table, since the ‘t’ value is not significant at 0.05 level , the above null hypothesis is accepted and it is concluded that there is no significant difference between Rural and Urban High School students with respect to their Critical Thinking.

Correlation Analysis

Null hypothesis

There is no significant relationship between the Achievement in Science and Critical Thinking of High School students.

In order to realize one of the objectives of the present study, it has been decided to find out the Correlation between the Achievement in Science and Critical Thinking of High School students. The correlation was computed and the values are given in Table No.7.

Table No. 7
Correlation between the dependent and independent variables

Variables	‘r’ value
Academic achievement in Science	0.814
Critical Thinking	

*-Significant 0.05 level

The correlation for the entire sample is positive and significant between dependent and independent variable, hence it is concluded that there is a significant relationship between the Achievement in Science and Critical Thinking of High School students.

Conclusion

The results of the study shows that the achievement in Science of entire sample of High School students is high. The Critical Thinking of entire sample of High School students also found to be high. There is no significant difference between the male and female, Rural and Urban High School students with respect to their Achievement in Science. There is significant difference between the male and female High School students with respect to their Critical Thinking. There is no significant difference between Rural and Urban High School students with respect to their Critical Thinking. There is a significant relationship between the Achievement in Science and Critical Thinking of High School students. Hence, the teachers should adopt mixed strategies to enhance critical thinking via academic achievement and vice versa.

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