Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 4, 8168 – 8173

Critical Thinking and Academic Achievement of Secondary School Students

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Abstract

Critical thinking predicts a person's ability to consider from different points of view and to judge the causes of certain phenomena. It includes both logical thinking and the ability to ask questions. Developing critical thinking skills is an essential aspect of education as it is believed that it can lead to higher academic achievement. The purpose of this research study is to examine the relationship between critical thinking skills and academic achievement in science of secondary school students in Thoothukudi district. A sample of 150 secondary level students at Thoothukudi district was selected through random sampling technique to collect the data. Critical thinking was measured by using an adapted tool and students' science scores in half yearly examination was taken as academic achievement. The findings of the study reveals that there is significant relationship between critical thinking and academic achievement of the secondary school students in Thoothukudi district. Hence it helps the teachers in designing their classroom activities and modifications in teaching methodologies and thereby enhance the critical thinking of secondary school students.

Keywords: Critical Thinking, Academic Achievement, Secondary School, Thoothukudi.

1. INTRODUCTION

This important aim of education is to bring the child from darkness to light. Individual development occurs physically and psychologically through education. School education is the foundation upon which the edifice of whole educational system rests. In teaching and learning, critical thinking plays an important role in maximizing students' academic achievements. Academic achievement is attainments of learning objectives, acquisition of knowledge, skills and competencies, satisfaction and improved performance. (York et al., 2015) The question what should be taught and how should it be taught are immediately connected as it would greatly affect the performance of the students. The teachers should focus on developing critical thinking as it includes higher order thinking abilities and improves students' flexibility and learning skills. In the first decade of the 21st century, the language for levels of thinking was changed and named as cognitive processes such as applying, analyzing, evaluating and creating (Dilley, et al, 2015: Yousufi & Mohammadi, 2016). Critical thinking among students can be developed by encouraging the students to take part in discussions, posing questions, providing opportunities to solve problems and make decisions. Critical thinking ability can also enhanced by exposing the students to interact with the learning materials. As the ability to think critically is associated with the academic achievement, the investigator chose the problem to find out the critical thinking and academic achievement in science of secondary school students.

2. LITERATURE REVIEW

Ralston and Bays (2018) found out the impact of Paul-Elder Critical Thinking Framework to improve undergraduate students' critical thinking skills. The results of the study indicated that there was a significant increase in critical thinking scores for each of three students.

Thalib, Corebima and Ghofur (2017) conducted a study on students with a high and low level of academic success and showed a negative relationship between critical thinking and academic achievements.

Yu, Lin, Ho and Wang (2016) assessed the impact of various teaching methodologies on academic achievement and critical thinking dispositions of the undergraduate nursing major students. The results indicated no significant differences among the groups in critical thinking dispositions for truth-seeking, open-mindedness, analyticity, systematicity, confidence, inquisitiveness, and maturity at both the pretest and post test.

Halpern (2014) generalised that critical thinking is the application of skills and techniques to make sure the achievement of intended outcomes. It is focused, rational and goal-driven thinking which is used to effectively solve problems, make inferences and make meaningful decisions in a certain situation.

Semerci (2011) analyzed the relationship between achievement focused motivation and Critical Thinking and found that sub dimensions of Achievement focused motivation and sub-components of Critical Thinking skills are positively correlated.

Villavicencio (2011) tried to relate three important variables namely Critical Thinking, Negative academic emotions and achievement with each other.

Sheeba (2011) conducted research on the development of critical thinking among the B.Ed. students in relation to variables such as academic achievement, gender, subjects, level of education and teaching strategies.

Pillai (2010) analysed the correlation between critical thinking and school science marks among students. From the above reviews the investigator found that the studies on the relationship between critical thinking and academic achievement left gaps. This study was conducted to fill the gaps by measuring critical thinking and academic achievement of secondary school students at Thoothukudi district.

3. OPERATIONAL DEFINITIONS OF THE KEY TERMS

3.1. Critical Thinking

Critical thinking is the type of thinking about any content or problem in which the thinker improves the quality of thinking by skillfully using the inbuilt structures in thinking and imposing intellectual standards upon them. It is the ability to make decisions by evaluating different sources of information objectively. Critical thinking develops the skills such as observation, analysis, reasoning, problem-solving and decision making that are highly essential for the students to learn science.

3.2. Academic Achievement in Science

Academic achievement represents performance outcomes that indicate the extent to which a person has attained specific goals that were the focus of activities in instructional environments, specifically in school. In this study students' science scores in half yearly examination was taken as academic achievement.

4. OBJECTIVES OF THE STUDY

4.1. To find out whether there is any significant difference between male and female secondary school students in their critical thinking and academic achievement in science.

4.2. To find out whether there is any significant difference between government aided and private secondary school students in their critical thinking and academic achievement in science.

4.3. To find out whether there is any significant difference between joint and nuclear family secondary school students in their critical thinking and academic achievement in science.

4.4. To find out whether there is any significant relationship between critical thinking and academic achievement in science of secondary school students.

5. NULL HYPOTHESES OF THE STUDY

5.1 There is no significant difference between male and female secondary school students in their critical thinking and academic achievement in science.

5.2 There is no significant difference between government aided and private secondary school students in their critical thinking and academic achievement in science.

5.3 There is no significant difference between joint and nuclear family secondary school students in their critical thinking and academic achievement in science.

5.4 There is no significant relationship between critical thinking and academic achievement in science of secondary school students.

6. METHODOLOGY

The researcher adopted survey method to study. The population for the present study consisted of 150 secondary school students in Thoothukudi district. They were selected randomly from secondary schools in Thoothukudi district. Data was collected using the tool developed by the researcher.

7. DATA ANALYSIS AND INTERPRETATION

Statistical test for data analysis was applied to 150 respondents. 'T' test was used to find the level of critical thinking and academic achievement in science. Pearson product moment correlation coefficient was calculated to study the relationship between critical thinking and academic achievement in science of secondary school students.

7.1. Null Hypothesis 1

Table 1 *Difference between male and female secondary school students in their critical thinking and academic achievement in science*

Variable	Male (N = 44)		Female (N = 106)		Calculated 't' value	Remarks
	Mean	S.D.	Mean	S.D.		
Critical Thinking	28.23	5.126	26.45	3.877	2.064	S
Academic Achievement in Science	73.23	10.753	87.00	13.078	6.688	S

Table value for df 148 is 1.96 at 0.05 level of significance

It is inferred from the above table that there is significant difference between male and female secondary school students in their critical thinking and academic achievement in science. Male secondary school students have better mean value than female secondary school students in their critical thinking. Female secondary school students have better mean value than male secondary school students in their academic achievement in science.

7.2. Null Hypothesis 2

Table 2 *Difference between government aided and private secondary school students in their critical thinking and academic achievement in science*

Variable	Government Aided School (N = 83)		Private School (N = 67)		Calculated ' t' value	Remarks
	Mean	S.D.	Mean	S.D.		
Critical Thinking	26.59	3.551	27.45	5.141	1.160	NS
Academic Achievement in Science	88.63	12.648	75.94	12.150	6.242	S

Table value for df 148 is 1.96 at 0.05 level of significance

It is inferred from the above table that there is no significant difference between government aided and private secondary school students in their critical thinking. There is significant difference between government aided and private secondary school students in their academic achievement in science. Government aided secondary school students have better mean value than private secondary school students in their academic achievement in science.

7.3. Null Hypothesis 3

Table 3 *Difference between joint and nuclear family secondary school students in their critical thinking and academic achievement in science*

Variable	Joint Family (N = 45)		Nuclear Family (N = 105)		Calculated ' t' value	Remarks
	Mean	S.D.	Mean	S.D.		
Critical Thinking	27.29	4.551	26.84	4.261	0.567	NS
Academic Achievement in Science	85.51	12.855	81.87	14.257	1.539	NS

Table value for df 148 is 1.96 at 0.05 level of significance

It is inferred from the above table that there is no significant difference between joint and nuclear family secondary school students in their critical thinking and academic achievement in science.

7.4. Null Hypothesis 4

Table 4 *Relationship between critical thinking and academic achievement in science of secondary school students*

Variable	N	' R' value	Table value	Remarks
Critical Thinking and Academic	150	0.444	0.159	S

Table value for df 148 is 1.59 at 0.05 level of significance

It is inferred from the above table that there is significant relationship between critical thinking and academic achievement in science of secondary school students.

This research study investigated the relationship between critical thinking and the academic achievement of secondary school students. Through a questionnaire, critical thinking was measured and the scores of half yearly examination were taken as academic achievements. Analysis of data revealed that the critical thinking of male secondary school students was higher than the critical thinking of female secondary school students. But the academic achievement of female secondary school students was found to be higher than the male secondary school students. Also the academic achievement of government aided secondary school students was found to be higher than the private secondary school students. There was a significant relationship between the critical thinking and academic achievement in science of secondary school students. Secondary school students with high critical thinking was found to have high academic achievement in science than the secondary school students with low critical thinking.

8. CONCLUSION

The results of this study showed that critical thinking of male secondary school students is higher than the critical thinking of female secondary school students. This may be due to the ability of male students to solve the problems encountered in daily life particularly in academic areas (Muhammad Zafar Iqbal, et al, 2021). The high academic achievement in science of female secondary school students can be the result of understanding the concepts well in science by taking part in the teaching and learning activities effectively. The high academic achievement in science of government aided secondary school students may be due to the role of school in promoting active learning and developing thinking skills and enhancing motivation.

The study also showed that a significant relationship was found between the critical thinking and academic achievement of secondary school students. This research is consistent with the research study carried out by Akbarilakeh, et al (2018) who found that the students with higher level of critical thinking performed better than the students who had low level of critical thinking. Therefore, it is recommended for the school to create more opportunities for participation in thinking skills related programmes, debates, discussions, multidisciplinary projects etc., to widen students' critical thinking. In addition, the teachers can frame more questions which are relevant to science subject and give more situations to solve the problems independently by thinking critically. According to Halpern (2014), teachers can achieve what they expect from students when they teach explicitly critical thinking in classrooms. Hence desired results can be achieved if critical thinking and academic achievement are aligned in the teaching and learning process.

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