



A STUDY ON COGNITIVE ABILITY AND ACADEMIC ACHIEVEMENT AMONG HIGHER SECONDARY SCHOOL STUDENTS

R. Prabha¹, Dr. K. Dhanalakshmi²

¹Research Scholar, Department of Education, Periyar University, Salem, India

²Professor, Department of Education, Periyar University, Salem, India

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ABSTRACT

The main aim of the study to find out the significance relationship between in cognitive ability and academic achievement of higher secondary school students. Cognitive ability is a term used in cognitive psychology to define the way persons think, perceive and recall information. The school and teacher have a great extend for developing cognitive ability. The present study is about to understand the cognitive ability and academic achievement of higher secondary school students in Salem district of Tamil Nadu. Simple random Sampling method is used to collect the sample. Two fifty higher secondary school students from different types of schools like government, government aided and private were taken for the study. Cognitive ability tool was used to collect the data. For the purpose of analysis level, 't' test and correlation were used. The findings of the study obtained that the there was significant relationship between cognitive ability and academic achievement of higher secondary school students.

KEYWORDS: cognitive ability, systematic ability, intuitive ability, academic achievement, higher secondary school students

INTRODUCTION

Individuals differ from one additional in their ability to understand complex thoughts, to adapt effectively to the environment, to learn from involvement, to engage in various forms of reasoning, to overcome difficulties by occurring the thought. A given person's academic performance will contrast on different events, in different fields, as judged by different criteria. Concepts of intelligence are attempts to clarify and organize this complex set of miracles. During the latter half of the 20th century considerable research had been carried out on the concept of intelligence. In particular there has been much investigation of precise abilities that extend beyond the thought of general undistinguishable ability. According to Sellah et.al (2017) Cognitive ability is a period used to describe the way individuals observe, reflect and recall information. Cognitive ability as a concept is a component of a greater concept termed as learning ability. Learning ability highlight characteristic cognitive, affective and psychomotor behaviors displayed by an individual as they learn. Cognitive ability of a different can be measured from their retort to physical and psychological stimuli and have both internal and external constructions. Internally, they are structured contents of supposed and knowledge in one's mind. Therefore, cognitive ability influence choices and

selections made by both the learner and the teacher through teaching and learning.

Cognitive Ability

Cognition is a general term used to define various aspects of higher mental processes like thinking, reasoning, decision making, memory and problem solving (Robert A. and Baron 2000). The information coming from the senses is altered, reduced or elaborated, recovered and used in the cognition process. This process includes how people perceive, learn, recollect and think about information. Cognitive ability refers to material processing behaviors such as perceiving, thinking, memorizing and problem solving (Goldstein and Black Man.1978). Cognitive ability is a hypothetical construct that has been developed to clarify the process of perceiving, remembering, judging, appraising and problem solving. More or less, it includes one's intellectual activities. It is innate and affects a wide range of individual effective. In education, cognitive ability refers to how the students acquire knowledge how they procedure information and how it is applied in problem solving.



REVIEW OF RELATED LITERATURE

Nwanze Azubuike Cornelius and Konyefa Bridget Izondeme (2021) studied cognitive ability as a determinant of academic achievement of secondary school science students in Onitsha Education Zone. The results revealed that the main cognitive ability among science students was the field dependent ability and that field independent students attained significantly higher than field dependent students. The study also revealed that cognitive ability is a significant factor of the secondary school students' achievement in science. Balasubramaniam and Sivakumar (2018) revealed impact of cognitive ability on academic achievement of higher secondary students. The results revealed that there was no significant difference between male and female higher secondary students in their cognitive ability, there is significant difference between male and female higher secondary students in their academic achievement and there was significant relationship between cognitive ability and academic achievement of higher secondary students. According to Bernard A Atsuwe, Thaddeus T Mtoh (2019) effect of cognitive ability on students' achievement and retention in physics in senior secondary school in Gwer-West Local Government Area, Benue State, Nigeria. The results of the obtained that field independent students attained better than the field dependent students in physics. It also showed that field independent students had a higher preservation memory than field dependent students. Results also revealed that male students achieved better than female students under field dependent in physics.

STATEMENT OF THE PROBLEM

The statement of the present study is “**Relationship between Cognitive Ability and Academic Achievement among higher secondary school students**”

OPERATIONAL DEFINITION OF THE KEY TERMS

Cognitive ability

Cognitive ability refers to the mental process which includes how people perceive, learn, remember and reason about information (Robert J. Sternberg 2006). By the term cognitive ability, the investigator refers to the way in which students acquire knowledge, how they process information i.e., think and solve problems. The cognitive ability consists of two dimensions i.e., systematic ability and intuitive ability.

Academic achievements

Academic achievement is the level to which a student or institution has attained either short- or long-term educational goals. Achievement may be measured through students' grade point average, whereas for institutions, achievement may be measured through graduation rates.

Higher Secondary School Students

It refers to the Investigator means the students doing standards XI and XII in higher secondary schools in Tamil Nadu.

OBJECTIVES OF THE STUDY

- To assess the level of cognitive ability of higher secondary school students
- To find out the level of academic achievement of higher secondary students
- To find out the significant difference in the cognitive ability of higher secondary school students based on the select subsamples
 - ❖ Gender
 - ❖ Locality
- To find out the significant difference in the academic achievement of higher secondary school students based on the select subsamples
 - ❖ Gender
 - ❖ Locality
- To find out the significant relationship between cognitive ability and academic achievement of higher secondary school students

HYPOTHESES OF THE STUDY

- The level of cognitive ability of higher secondary school students of the total sample is moderate
- The level of academic achievement of higher secondary school students of the total sample is moderate
- There is no significant difference in the cognitive ability of higher secondary school students based on the select subsamples
 - ❖ Gender
 - ❖ Locality
- There is no significant difference in the academic achievement of higher secondary school students based on the select subsamples
 - ❖ Gender
 - ❖ Locality
- There is no significant relationship between cognitive ability and academic achievement of higher school secondary students

METHODOLOGY

Method

The investigator has used normative survey method for the present investigation.

Sample

For this present study 250 higher secondary school students from government, government aided and private schools of Salem were selected as the sample for the study. Simple random Sampling technique was used for collect the sample.

Tool Used for Collecting Data

Cognitive Ability Inventory (CSI): For collection of data the investigator used Cognitive Ability Inventory (CSI) constructed and standardized by Praveen Kumar Jha (2001). The



Cognitive Ability Inventory consists of 40 statements and its dimensions viz., systematic ability and intuitive ability.

Academic Achievement Tool: The first term test marks taken by the investigator to measure the achievement test.

Statistical Techniques Used

The investigator has used Percentage analysis, Mean, SD, t-test, Pearson Product Moment Correlation were also used for analysis purpose.

DATA ANALYSIS

Data Analysis based on Cognitive Ability

HO: 1 The level of cognitive ability of higher secondary school students

Table 1- Level of Cognitive Ability of Higher Secondary School Students

Dimensions	Total Sample	Low		Moderate		High
	250	N	%	N	%	N
Systematic ability		46	18.4	153	61.2	51
Intuitive ability		53	21.2	155	62	42
Cognitive ability		49	19.6	160	64	41

It is inferred from the above table shows that 18.4 % of the higher secondary school students have low, 61.2 % of them have moderate and 20.4 % of them have high level of systematic ability. It is inferred that 21.2 % of the higher secondary school students have low, 62% of them have moderate and 16.8% of them have high level of intuitive ability. 19.6%, 64%, 16.4% of higher secondary school students have low, moderate and high-

level Cognitive ability respectively. From the above table shown in overall higher secondary school students have moderate level of cognitive ability.

HO:2 There is no significant difference in the cognitive ability of higher secondary school students based on the select subsamples gender, locality.

Table 2 – Significant difference between male and female higher secondary school students in their cognitive ability

Dimensions	Male (113)		Female (137)		t value
	Mean	SD	Mean	SD	
Systematic ability	11.25	1.832	11.82	1.300	0.125
Intuitive ability	11.87	1.432	11.45	1.171	0.174
Cognitive ability	129.21	3.142	129.06	2.098	0.271
NS- Significant (Null hypothesis is accepted)					

From the above table it is found that the calculated t values are less than 1.96 and are not significant at 5% level in all the cases. Hence the formulated hypothesis is accepted.

Conclusion

It is inferred from the above table that there is no significant difference between male and female higher secondary school students in their Systematic ability, Intuitive ability and over all Cognitive ability.



Table 3 – Significant difference between rural and urban higher secondary school students in their cognitive ability

Dimensions	Rural (117)		Urban (133)		t value
	Mean	SD	Mean	SD	
Systematic ability	16.33	1.242	16.31	1.361	0.103
Intuitive ability	14.26	1.158	14.55	1.165	0.1291
Cognitive ability	129.27	2.125	129.42	2.072	0.111
NS- Significant (Null hypothesis is accepted)					

From the above table it is found that the calculated t values are less than 1.96 and are not significant at 5% level in all the cases. Hence the formulated hypothesis is accepted.

Conclusion

It is inferred from the above table that there is no significant difference between rural and urban higher secondary school

students in their Systematic ability, Intuitive ability and over all Cognitive ability.

Data Analysis based on Academic Achievement

HO: 3 The level of academic achievement of higher secondary students

Table 4- Level of academic achievement of Higher Secondary School Students

Academic Achievement	Low		Moderate		High
	N	%	N	%	N
Total	41	16.4	146	58.4	63

16.4%, 58.4%, 25.2% of higher secondary school students have low, moderate and high level academic achievement respectively. In overall higher secondary school students have moderate level of academic achievement.

HO: 4 There is no significant difference in the academic achievement of higher secondary school students based on the select subsamples gender, locality

Table 5 – Significant difference male and female higher secondary school students in their academic achievement

Category	N	Mean	SD	t value	Remarks
Male	107	58.25	12.81	2.23	S
Female	143	52.18	11.03		
S: Significant (Null hypothesis is not accepted)					

From the above table it is found that the calculated t values is greater than 1.96 and it is significant at 5% level. Hence the formulated hypothesis is not accepted.

Conclusion

It is inferred from the above table that there is a significant difference exists between male and female higher secondary school students in their academic achievement.



Table 6 – Significant difference rural and urban higher secondary school students in their academic achievement

Category	N	Mean	SD	t value	Remarks
Rural	112	57.86	11.23	2.47	S
Urban	138	60.13	12.65		
S: Significant (Null hypothesis is not accepted)					

From the above table it is found that the calculated t values are greater than 1.96 and it is significant at 5% level. Hence the formulated hypothesis is not accepted.

Conclusion

It is inferred from the above table that there is a significant difference exists between rural and urban higher secondary school students in their academic achievement.

HO: 5 There is no significant relationship between cognitive ability and academic achievement of higher school secondary students

Table 7- Relationship between cognitive ability and academic achievement of highersecondary school students

$\sum X$	$\sum X^2$	$\sum Y$	$\sum Y^2$	$\sum xy$	Calculated 'r' value	Remarks
3784	24671	238932	11234953	1287868	0.380	S

It is inferred from the above table that there is significant relationship between cognitive ability and academic achievement of higher secondary school students.

FINDINGS

- 19.6%, 64%, 16.4% of higher secondary school students have low, moderate and high level Cognitive ability respectively. In overall higher secondary school students have moderate level of cognitive ability
- There is no significant difference between male and female higher secondary school students in their Systematic ability, Intuitive ability and overall Cognitive ability.
- There is no significant difference between rural and urban higher secondary school students in their Systematic ability, Intuitive ability and overall Cognitive ability.
- There is a significant difference exists between male and female higher secondary school students in their academic achievement.
- 16.4%, 58.4%, 25.2% of higher secondary school students have low, moderate and high level academic achievement respectively. In overall higher secondary school students have moderate level of academic achievement.

- There is a significant difference exists between male and female higher secondary school students in their academic achievement.
- There is a significant difference exists between rural and urban higher secondary school students in their academic achievement.
- There is a significant relationship exists between cognitive ability and academic achievement of higher secondary school students.

RECOMMENDATIONS

- Higher education organizations are recommended to attach importance to students; cognitive ability and design instructional material accordingly, so that they can prevent the decline in students' academic achievement.
- Higher secondary school students have a proper search for acquiring, interpreting, categorizing, remembering and returning information in making decisions and solving problems.
- Higher secondary school students should improve the systematic ability and intuitive ability with a sequential pedagogy to enhance the cognitive ability.
- Another important contrast between a cognitive ability approach emphasized in intelligence tests lies in their



implications for placement in the broadest sense of higher secondary students.

CONCLUSION

The major findings of the study are there is a significant relationship between cognitive ability and academic achievement of higher secondary school students, and overall higher secondary school students have moderate level of cognitive ability. Schools are the structures of the life of the Nation. They are ultimately responsible for the development of well-integrated, all round, good personalities. In today's acquisitive and highly competitive world, man seems to be losing their identity and direction. The role of students in fostering cognitive ability should in no way be underestimated. They have a magnificent role to play by making use of all opportunities in and out of the school to develop the cognitive ability. The students themselves should first try to develop their information, ideals and academic abilities. From the above findings, it is clear that the systematic, intuitive and cognitive ability make some many differences among higher secondary school students and there is significant relationship between cognitive ability and academic achievement among higher secondary school student. As a higher secondary school student, they should understand about cognitive ability and should identify their students' cognitive ability, according to it only they should teach and avoid partiality among students in a class. It is very much helpful for a student to understand their thinking ability and attain their goal easily.

REFERENCES

1. Antony Raj M and Amalraj, A. (2011), *Cognitive ability and Academic achievement of outgoing undergraduate history students. Journal of Research and Reflections on Education*, 9(9).
2. Atsuwe, B. A., & Mtoh, T. T. (2019). *Effect of cognitive ability on students' achievement and retention in senior secondary school in Gwer-West Local Government Area of Benue State, Nigeria. International Journal of Advance Research and Innovation*, 7(2), 73-78.
3. Balasubramaniam, M. & Sivakumar, D. (2018) *impact of cognitive ability on academic achievement of higher secondary students. International Education & Research Journal (IERJ)*, 4(8), 11-13.
4. Baron, R. A. (2000). *Psychological perspectives on entrepreneurship: Cognitive and social factors in entrepreneurs' success. Current directions in psychological science*, 9(1), 15-18.
5. Cornelius, N. A., Izondeme, K. B., & Chinyere, E. M. *Cognitive Style as a Determinant of Academic Achievement of Secondary School Science Students in Onitsha Education Zone.*
6. Goldstein, M. J. (1980). *Cognitive biases in the maintenance of depression: an experimental investigation of the reformulated learned helplessness model of depression (Doctoral dissertation, University of Kentucky).*
7. Jha, P. K. (2001). *Manual for Cognitive Style Inventory. Rakhi Prakashan, Agra, India.*
8. Renjith (2014). *Cognitive style of Prospective teachers in Malappuram district. Journal of Educational Research and Extension*, 51(3),54
9. Sellah, L., Jacinta, K., & Helen, M. (2017). *Analysis of Student-Teacher Cognitive Styles Interaction: An Approach to Understanding Learner Performance. Journal of Education and Practice*, 8(14), 10-20.
10. Sellah, L., Jacinta, K. & Helen, M. (2018). *Predictive power of cognitive styles on academic performance of students in selected national secondary schools in Kenya. Cogent Psychology*, 5(1).
11. Singh, V. (2017). *Exploring the relationship between cognitive style and learning style with academic achievement of elementary school learners. Educational Quest-An International Journal of Education and Applied Social Sciences*, 8(spl), 413-419.
12. Srinivas Kumar, D. & Nagaraju, K. (2014). *Cognitive Styles of High School Mathematics Teachers. Scholarly Research Journals*, 1(4), 425-431.
13. Sternberg, R. J. (2006). *The nature of creativity. Creativity research journal*, 18(1), 87.
14. Suryalatha, A. (2021). *relationship of cognitive style with academic achievement among student teachers. Information Technology in Industry*, 9(2), 1259-1263.
15. Tinajero, C., Lemos, S. M., Araújo, M., Ferraces, M. J., & Páramo, M. F. (2012). *Cognitive style and learning strategies as factors which affect academic achievement of Brazilian university students. Psicologia: Reflexão e Crítica*, 25, 105-113.