

Research Paper

A Study of Cognitive Style in Relation to Academic Achievement and Problem Solving Ability of Higher Secondary Students

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ABSTRACT

This study was conducted to examine the Cognitive Style in relation to Academic Achievement and Problem Solving Ability of Higher Secondary Students. A representative sample of 210 Secondary school students of Agra city were selected through Multistage Random Sampling Method. For the collection of data, the Cognitive style inventory by Dr. Praveen Kumar Jha, Academic Achievement Test in Science by Dr. S.C. Gakhar and Dr. Rajnish and Problem Solving Ability Test by L. N. Dubey were used. The collected data was analyzed by applying mean, S.D. and correlation. The findings of the study revealed that 31% students had systematic style, 18% had intuitive style, 35% had integrated style, 5% had undifferentiated style and 11% had split style and 22.38% students had low ability, 44.76% had average ability, and 32.85% had high problem solving ability and 15% had low ability, 57% had average ability, and 28% of higher secondary students had high Academic Achievement. Cognitive style don't have any relationship between academic achievement and problem solving ability because Learning style can't be utilized as a premise to assess the execution of learners, however, inspiration, scholarly capacity, and approach when studying are the elements that influence learner's accomplishment.

Keywords: *Cognitive Style, Academic Achievement, Problem Solving Ability*

Education is the revolutionary instrument to bring about behavioral change among the Learners. It is the level of education that helps pupils to earn respect and recognition in this present era of evolution. The importance of education is undeniable for every single person in this world. It goes to say that education has a positive effect on human life. Human beings may become more useful and civilized if better educated. Education is the top most priority of every individual. It is a tool by which we can transform any individual into a productive individual. If we want a change in a society without any violence, the only way is to provide productive and qualitative education to all its individuals' equality (Education Commission 1964-1966). Education is the process of facilitating learning; or the acquisition of knowledge, skills, values, and beliefs. The main objective of education is learning, not teaching.

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Received: June 14, 2024; Revision Received: September 07, 2024; Accepted: September 11, 2024

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According to the Annual Status of Education Report (ASER) 2019, released by NGO Pratham; focus on cognitive skills rather than subject learning in the early years can make big differences to basic literacy and numeracy abilities (Annual status of Education Report flags poor learning outcomes in schools. (2020, Jan15).

Annual Status of Education Report (ASER) reported that, “ASER data shows that children’s performance on tasks requiring cognitive skills is strongly related to their ability to do early language and numeracy tasks.” “This report also suggests that focusing on play-based activities that build memory, reasoning and problem-solving abilities is more productive than early focus on content knowledge.”

Cognitive Style

The way learners learn and deal with problem largely depends upon the link between personality and cognition. This type of link is called cognitive style. Cognitive style describes the process in which information is acquired and processed by brain. It is process of dealing with problems and making decisions and solutions. Cognitive Style includes one’s way of processing and acquiring information (Vranic & Martin, 2019).

According to Coop and Sigel (1971), “Cognitive style is modes of behavior rather than a meditating processes, it denotes consistencies in individual modes of functioning in a variety of behavioral situations.” Cognitive style is also known as thinking style; which is a concept used in cognitive psychology to describe the way individual think, perceive and remember information. Cognitive style differs from cognitive ability, being measured by aptitude tests or so-called intelligence tests. It also determines the possible effect of individual differences on problem solving ability and level of social maturity of an individual.

Dimensions of Cognitive Style

According to Martin (1983), there are five dimensions of cognitive style; which are as follows:

1. Systematic Style: Systematic Style is associated with logical patterns that uses a systematic or step-by-step approach of problem solving, learning and thinking process.
2. Intuitive Style: Intuitive Style is associated with spontaneous holistic and visual approach that uses unsystematic approach of thinking and problem solving.
3. Integrated Style: Integrated Style is associated with both (Systematic and Intuitive Style) kinds of Cognitive style; that uses proactive approach to problem solving.
4. Undifferentiated Style: Undifferentiated Style is not associated with any kind of Style i.e., systematic style and intuitive style. In this style individuals often need guidance of others to solve the problems.
5. Split Style: Split style is associated with equal degree of systematic and intuitive style; that selecting the most appropriate style while solving the problems.

Problem Solving Ability

According to Flewelling and Higginson (2005), “Problem solving ability gives students the opportunity to use their imagination and to get into the habit of doing so.” The problem solving abilities are directed by the goal/ aim and perception of the essential relationship in the situation. According to Skinner (1968), “Problem Solving is the frame work or pattern within which creative thinking and reasoning takes place.”

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It is goal directed, selective, insightful, creative and critical ability to deal with something. Problem solving ability helps an individual in the growth and development of his/her personality, critical thinking and make life happier and wise by appropriate adjustment. Thus, using problem solving abilities should be beneficial for increasing students' academic achievement (Jena, 2014).

Academic Achievement

Academic achievement or academic performance is the outcome of education. It is the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement is commonly measured by continuous assessment or examination. According to Good (1973), "Academic achievement is the knowledge attained or skill developed in the school subject usually designated by test scores or marks assigned by the teacher or both."

Academic achievement represents the performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of all activities in instructional environments, specifically in school, college, and university. School system mostly define cognitive goals that either apply across multiple subject areas (e.g., critical thinking, problem solving ability etc.) or include the acquisition of knowledge and understanding in a specific intellectual domain (e.g., numeracy, literacy, science, etc.). Therefore, academic achievement should be considered to be multifaceted construct that comprises different domains of learning (Ahmadzade & Shojae, 2013).

Objectives

1. To study the Cognitive Style of Higher Secondary students.
2. To study the Problem Solving Ability of Higher Secondary students.
3. To study the Academic Achievement of Higher Secondary students
4. To study the relationship between Cognitive Style and Problem Solving Ability of Higher Secondary students.
5. To study the relationship between Cognitive Style and Academic Achievement of Higher Secondary students.

Hypotheses

1. There will be no significant relationship between Cognitive Style and Problem Solving Ability of Higher Secondary students.
2. There will be no significant relationship between Cognitive Style and Academic Achievement of Higher Secondary students.

RESEARCH METHOD

The Researcher used 'Descriptive Survey Method' in the study.

Delimitations

1. The study was delimited to higher secondary schools of Agra city.
2. The study was delimited to schools of C.B.S.E. board.
3. The study was delimited to class XI students having science stream.

Sample of the Study

The sample of 210 students of Higher Secondary level (XI Class) studying in school affiliated to CBSE Board was selected by Multistage Random Sampling Method.

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Tools Used

1. Academic Achievement Test in Science: By Dr. S.C. Gakhar and Dr. Rajnish (2011)
2. Cognitive Style Inventory: By Dr. Praveen Kumar Jha (2011)
3. Problem Solving Ability Test: By L. N. Dubey (2011)

Data Analysis

The major aim of the present investigation was to study of Cognitive Style in relation to Academic Achievement and Problem solving ability of higher secondary students. Keeping in view the main objectives and variable under study, the investigator had analyzed the data under following sections:

Section 1- Study of Cognitive Style of Higher Secondary Students

The scale of Cognitive Style contains two major dimensions for explaining the Cognitive Style of students; i.e. Systematic and Intuitive Style.

Table 1.0: Descriptive Statistics for the Distribution of Systematic Style

Variable	Sample Size	Mean	Standard Deviation	Skewness	Kurtosis
Systematic Style	210	71.9	2.02	0.09	-1.16

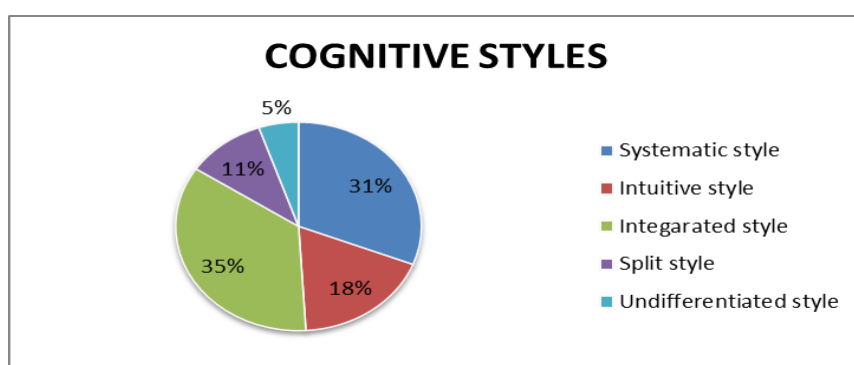
The table 1.0 showing that the mean value of systematic style scores of total students was 71.9. The standard deviation of scores was 2.02.

Table 1.1: Descriptive Statistics for the Distribution of Intuitive Style

Variable	Sample Size	Mean	Standard Deviation	Skewness	Kurtosis
Intuitive Style	210	67.59	6.56	-1.29	-0.04

The table 1.1 showing that the mean value of intuitive style scores of total students was 67.59. The standard deviation of scores was 6.56.

Cognitive style of higher secondary students was studied as of style wise and it had been found by the researcher that in a sample of 210 higher secondary students five different types of cognitive style had been identified. These were systematic style, intuitive style, integrated style, undifferentiated style and split cognitive style. Analysis shows that 31% of higher secondary students had systematic style, 18% had intuitive style, 35% had integrated style, 5% had undifferentiated style and 11% of higher secondary students had split style. These different types of cognitive style reflect the thinking level of the students, how they perceive, forget, store information and how they take decisions in a situation.



Graph 1.1: Different dimensions of Cognitive Style

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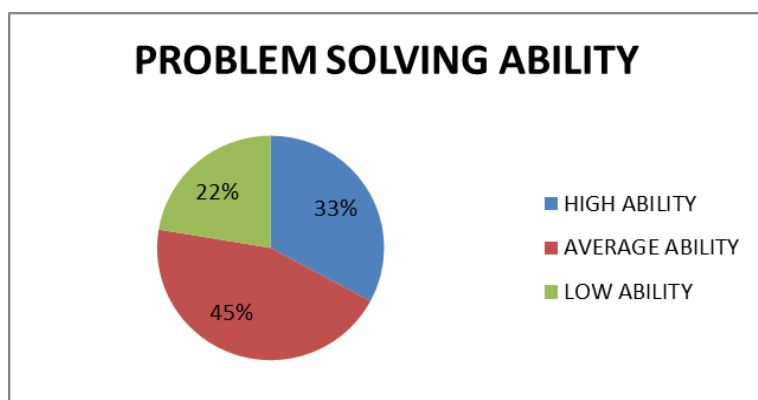
Section 2- Study of Problem Solving Ability of Higher Secondary Students

Table 1.2: Descriptive Statistics for the Distribution of Problem Solving Ability

Variable	Sample Size	Mean	Standard Deviation	Skewness	Kurtosis
Problem Solving Ability	210	10.31	1.96	0.56	0.05

The table 1.2 showing that the mean value of Problem Solving Ability scores of total students was 10.31. The standard deviation of scores was 1.96.

Problem Solving Ability of higher secondary students was studied as of level wise and it had been found by the researcher that in a sample of 210 higher secondary students, three levels of Problem Solving Ability had been identified. These were High ability, Average ability and Low ability. Analysis shows that 22.38% of higher secondary students had low ability, 44.76% had average ability, and 32.85% of higher secondary students had high problem solving ability. These different levels of Problem Solving Ability reflect the intelligence and reasoning ability of students to solve the problems.



Graph 1.2: Different Levels of Problem Solving Ability

Section 3- Study of Academic Achievement of Higher Secondary Students

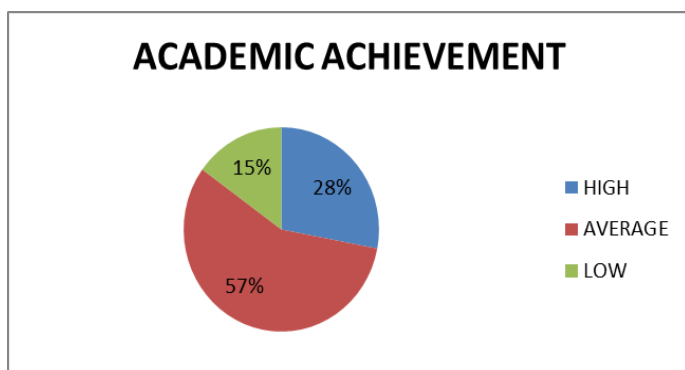
Table 1.3: Descriptive Statistics for the Distribution of Academic Achievement

Variable	Sample Size	Mean	Standard Deviation	Skewness	Kurtosis
Academic Achievement	210	7.24	1.15	0.016	-0.162

The table 1.3 showed that the mean value of Academic Achievement scores of total students was 7.24. The standard deviation of scores was 1.15.

Academic Achievement of higher secondary students was studied as of level wise and it had been found by the researcher that in a sample of 210 higher secondary students, three levels of Academic Achievement had been identified. These are High ability, Average ability and Low ability. Analysis shows that 15% of higher secondary students had low ability, 57% had average ability, and 28% of higher secondary students had high Academic Achievement in students.

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Graph 1.3: Different Levels of Academic Achievement

Section 4- Study the relationship between Cognitive Style and Problem Solving Ability of Higher Secondary Students

In order to find out the relationship between Cognitive style and Problem Solving Ability of higher secondary school students, researcher decided to see the relationship by taking the two dimensions of Cognitive Style. Each dimension had been correlated to Problem Solving Ability separately for obtaining best relationship between Cognitive Style and Problem Solving Ability.

For finding the relationship between the two variables, Pearson’s Product Moment coefficient of correlation was computed.

I: Relationship of Systematic Style and Problem Solving Ability of Higher Secondary Students

Table 1.4: Mean, Standard Deviation and Coefficient of Correlation of Systematic Style and Problem Solving Ability

Variable	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Systematic Style	71.9	2.02	0.04*	Insignificant
Problem Solving Ability	10.31	1.96		

*p<0.05

Table 1.4 showed that the coefficient of correlation between Systematic Style and Problem Solving Ability of higher secondary school students is 0.04 which was negligible relationship between the two variables. The value of correlation coefficient was insignificant at 0.05 level.

II: Relationship of Intuitive Style and Problem Solving Ability of Higher Secondary Students

Table 1.5: Mean, Standard Deviation and Coefficient of Correlation of Intuitive Style and Problem Solving Ability

Variable	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Intuitive Style	67.59	6.56	-0.004*	Insignificant
Problem Solving Ability	10.31	1.96		

*p<0.05

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Table 1.5 showing that the coefficient of correlation between Intuitive Style and Problem Solving Ability of higher secondary school students was -0.004 which was negligible relationship between the two variables. The value of correlation coefficient was insignificant at 0.05 level.

It was found that there was no significant relationship between Cognitive Style and Problem Solving Ability of Higher Secondary Students. It was also found in the past studies of Mimi Mohaffyza & Aliraza Jameli (2018), Vandana V. Joshi & Ajaykumar B Patil (2010) and Dr. Prakash Chandra Jena (2014) that there is no significant relationship exists between Cognitive Style and Problem Solving Ability of Higher Secondary Students.

Section 5- Study the relationship between Cognitive Style and Academic Achievement of Higher Secondary students

In order to find out the relationship between Cognitive style and academic Achievement of higher secondary school students, researcher decided to see the relationship by taking the two dimensions of Cognitive Style. Each dimension had been correlated to academic Achievement separately for obtaining best relationship between Cognitive Style and academic Achievement.

For finding the relationship between the two variables, Pearson's Product Moment coefficient of correlation was computed.

I: Relationship of Systematic Style and Academic Achievement of Higher Secondary Students

Table 1.6: Mean, Standard Deviation and Coefficient of Correlation of Systematic Style and Academic Achievement

Variables	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Systematic Style	71.9	2.02	-0.07*	Insignificant
Academic Achievement	7.24	1.15		

*P < 0.05

In Table 1.6 the value of correlation coefficient was insignificant at 0.05 level showing that coefficient of correlation between Systematic Style and Academic Achievement of higher secondary school students was -0.07 which is negligible relationship between the two variables.

II: Relationship of Intuitive Style and Academic Achievement of Higher Secondary Students

Table 1.7: Mean, Standard Deviation and Coefficient of Correlation of Intuitive Style and Academic Achievement

Variables	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Intuitive Style	67.59	6.56	0.04*	Insignificant
Academic Achievement	7.24	1.15		

*P < 0.05

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Table 1.7 showing that the coefficient of correlation between Intuitive Style and Academic Achievement of higher secondary school students was 0.04 which was negligible relationship between the two variables. The value of correlation coefficient was insignificant at 0.05 level.

Cognitive Style in relation to Academic Achievement of higher secondary students found insignificant. There was no significant relationship between Cognitive Style and Academic Achievement of Higher Secondary Students. It was also found in the past studies of Regina O Arisi (2011), Pezzuti, L., et al (2014), & Omar, N., Mohamad, M.M., & Paimin, A. (2015) that there was no significant relationship between Cognitive Style and Academic Achievement of Higher Secondary Students.

Findings and Conclusion of the Study

The main findings of the study was that there was no significant relationship between Cognitive Style, Problem Solving Ability and Academic Achievement. It is due to because Learning style can't be utilized as a premise to assess the execution of learners, however, inspiration, scholarly capacity, and approach when studying are the elements that influence learner's accomplishment (Pezzuti, 2014).

Mohaffyza & Jameli (2018), Joshi & Patil (2010), Jena (2014), Arisi (2011), and Omar, Mohamad & Paimin (2015) researchers also concluded that Cognitive Style have no significant relationship with Problem Solving Ability and Academic Achievement.

Conclusively, this study revealed that Cognitive Style does not influence the Academic Achievement and Problem Solving Ability of Higher Secondary Students. Learners Problem Solving Ability and Academic Achievement could be influenced by the learner's capacity, motivation, and approach to deal with problems.

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Acknowledgment

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Sharma, A. & Kharbanda, J. (2024). A Study of Cognitive Style in Relation to Academic Achievement and Problem Solving Ability of Higher Secondary Students. *International Journal of Indian Psychology*, 12(3), 2103-2112. DIP:18.01.208.20241203, DOI:10.25215/1203.208