



## COGNITIVE STYLES AS RELATED TO SCIENTIFIC ATTITUDE AMONG ADOLESCENTS

Sandeep Kaur and Shaveta Sharma

*Cognitive styles are the consistent patterns of organising and processing information. It describes how the individual acquires knowledge (cognition) and processes information (conceptualisation). The present study is an attempt to study the relationship between cognitive styles and scientific attitude among adolescents. The sample comprised 400 adolescents from government and private schools in the four districts of Punjab. The Districts, schools and the adolescents were selected by using a simple random sampling technique. A descriptive survey method was employed. The findings of the study indicate that there is a significant and positive relationship between cognitive styles and scientific attitude among adolescents with respect to gender, locale and type of institution.*

**KEYWORDS:** Cognitive Styles, Scientific Attitude, Adolescents

### INTRODUCTION

The term 'cognitive style' refers to the characteristic ways in which an individual conceptually organizes the environment (Sharma & Sood, 2015). It is the way an individual filters and processes stimuli so that environment takes on psychological meaning. Cognitive style refers to the way an individual responds to his stimulus (Saxena & Jain, 2014). In other words, it refers to how information is received and organized (Ahmadzade & Shojae 2013). Liu (2008) defined cognitive style as "individual's habitual way of organizing and processing information." Tang (2009) stated that cognitive style is considered

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Sandeep Kaur  
Research Scholar, Deptt. of Education, CT University, Ludhiana, India.  
Email: [guricheema224@gmail.com](mailto:guricheema224@gmail.com)

Shaveta Sharma ✉  
Associate Professor, Dept. of Education, CT University, Ludhiana, India.  
Email: [sshaveta18@gmail.com](mailto:sshaveta18@gmail.com)



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to be an important part of learning style and it has great contributions to second language acquisition. In simple words it can be said that cognitive styles are the characteristic, self-consistent modes of functioning which individuals show in their perceptual and intellectual activities. [Noroozi \(2003\)](#) described it as a border between mental abilities and personality types. They are thinking styles and probably affect and are affected by cognitive abilities and it should be noted that cognitive styles influence preferences for dealing with the environment, social relations, and personality types. It means that the characteristic way in which an individual goes about taking information from the world as referred as cognitive style. It is a characteristic and systematic procedure within the psycho-physical functioning of an individual that helps him to grasp or hold certain signals, power from environment and to arrive at a desired end with the help of his innate potentialities, perceptions and his intellectual abilities like knowledge, understanding, application, analysis and synthesis etc.

[Kumar \(2013\)](#) indicated that students possess two cognitive styles, namely, systematic and intuitive styles and there exists gender-wise difference in this regard. Men students are built with systematic cognitive style and women students are in possession of intuitive cognitive style and it is in accordance with the general notion that men are systematic and women are intuitive. A study conducted by [Dhiman and Verma \(2013\)](#) who found that tribal and non-tribal students show significant difference in their cognitive style. Non-tribal students are found more inclined towards field-independent cognitive style in comparison to tribal students. Male students are more field-independent in their cognitive style than female students. They also found that Cognitive style of students is moderated by the joint influence of culture and gender of the students. Another study conducted by [Pannu \(2013\)](#) who investigated that there is no influence of interaction between location and cognitive style, location and systematic cognitive style, location and intuitive cognitive style, gender and systematic cognitive style on academic achievement of adolescents and there is significant influence of interaction between gender and intuitive cognitive style on academic achievement of adolescents. At low, medium low and high level of intuitive cognitive style the academic achievement of females is higher than male adolescents whereas at medium high level of intuitive cognitive style the academic achievements of males are higher than female adolescents. [Sharma and Sood \(2015\)](#) concluded that cognitive style is significantly and positively related with problem solving ability among adolescents. But there is no significant relationship between I (intuitive) cognitive style and problem-solving ability of adolescent boys and significant positive relationship was found between both S (systematic) and I (intuitive) cognitive styles and problem-solving ability of adolescent girls. A Study conducted on 200 adolescents of Ludhiana where researchers found that that there is significant

difference in mean scores of S (systematic) cognitive style of adolescent boys and girls and no significant difference was found in mean scores of I (intuitive) cognitive style of adolescent boys and girls. It was further concluded that there is significant difference in mean scores of problem-solving abilities of adolescent boys and girls. Boys have higher problem-solving ability than their female counterparts ([Sharma & Sood, 2015](#)).

Cognitive style is conceived as one of the aspects of psychological differentiation. Psychological differentiation refers to differentiate mode of perceiving, judging and appraising things to which people are exposed to under different conditions. The notion of cognitive style has been defined as self-evident modes of functioning which the individual shows in his perceptual and intellectual activities ([Witkin, Dyk, Patterson, Goo, & Keerk, 1962](#)). It is conceptualized as stable attitude or habitual strategy which determines a person's typical modes of perceiving, remembering and problem solving.

In a study conducted by [Gogoi and Munda \(2016\)](#) on 404 secondary school students of Sivasagar district Assam, India the researchers found that higher the achievement in science, higher the scientific attitude of secondary school students. Dalal and Manisha (2017) studied the relationship between home environment and scientific attitude among 600 adolescents. The results of the study show insignificant correlation exists between scientific attitude and home environment of adolescents. [Revati and Meera \(2017\)](#) found that there is no significant difference in the scientific attitude of secondary school students with respect to gender, type of management and locale. Study was conducted on 180 secondary school students of Kottayam District, Kerala, India. Nooguri (2018) concluded that there is no significant difference between government and private science teachers' scientific attitude, but significant differences are found between government male science teachers and government female science teachers. Government male science teachers have more positive scientific attitude.

Right from the beginning a child acts with curiosity to know about the things around him. A distinguishing feature of human beings is the passion to have an understanding of this world. That passion has created science. Without science, we would not have understood the answers to questions like why night follows day and why solar eclipse occurs and so on. The inventions and discoveries have changed the face of life on earth. Not only the way of living has been revolutionized but attitudes, curiosities and interest of society have also undergone change and this has created the importance of scientific attitude in our lives. Today, a man is not only incomplete but also handicapped without a scientific attitude in his life. Thus, there arises a dire need to develop scientific attitude among the adolescents. Scientific attitude involves critical observation, open-mindedness, suspended judgement, being

free from superstitions and false beliefs etc. It is this attitude which enables us to think rationally, helps us to weigh the pros and cons and brings a rational outlook on issues and problems.

From review of related literature, it can be concluded that cognitive styles have been studied with different variables like academic achievement, learning strategies and problem-solving ability. Studies on cognitive styles indicated that students' cognitive style has a relationship with students' academic performance (Kolb & Kolb, 2009; Rasmussen, 1998; Riding & Grimley, 1999; Ross & Schultz, 1999; Snyder, 2000). In science education, teaching methodologies focussing on developing scientific attitude among students facilitate them in scoring academically high and thus scientific attitude may work as determinant of academic performance of students. A descriptive survey was carried out on 208 students at secondary schools in Delhi. The data analysis showed that there was gender difference, in the favour of girl students, with respect to scientific attitude and science achievement scores. A significantly positive correlation between scientific attitude and science achievement scores of students was found. Interaction effects also supported these findings (Ahuja, 2017).

The researchers, however, could not find any study examining the relationship between cognitive style and scientific attitude among adolescents. Scientific attitude is really a composite of a number of mental habits or of tendencies to react consistently in certain ways to a novel or problematic situation. These habits or tendencies include accuracy, intellectual honesty, open-mindedness, suspended judgment, criticalness, and a habit of looking for true cause and effect relationships. It is a cognitive concept; scientific attitudes are normally associated with the mental processes of scientists (Monisugithar & Venkatarathanam, 2017).

Definitely, the scarcity of research in this area especially in Punjab provides a convincing rationale to undertake further investigation into examining the relationship between cognitive styles and scientific attitude among adolescents. Therefore, the investigators made an attempt to find out the relationship between cognitive styles and scientific attitude among adolescents.

## OBJECTIVE OF THE STUDY

The main objective of the study is to find out the relationship between cognitive styles and scientific attitude among adolescents with respect to (a) Gender (b) Locale (c) Type of Institution.

## HYPOTHESES OF THE STUDY

For this study, the following hypotheses were proposed:

1. There is no significant relationship between cognitive styles and scientific attitude among adolescents.
2. There is no significant relationship between cognitive styles and scientific attitude among adolescents with respect to their:
  - Gender
  - Locale
  - Type of Institution

## SAMPLE AND TOOLS FOR THE STUDY

A sample of 400 adolescents studying in government and private schools in the four districts of Punjab were selected for the study. Multistage random sampling technique (three stage) was employed. Districts, schools and the adolescents were selected by using simple random sampling technique. Descriptive survey method was employed. In the present investigation the following tools were used to collect the data:

1. Cognitive Style Inventory (CSI) by Jha (2001) and
2. Science Attitude Scale (SAS-GA) by Grewal (2012).

## RESULTS OF THE STUDY

**Hypothesis 1 states that there is no significant relationship between cognitive styles and scientific attitude among adolescents.**

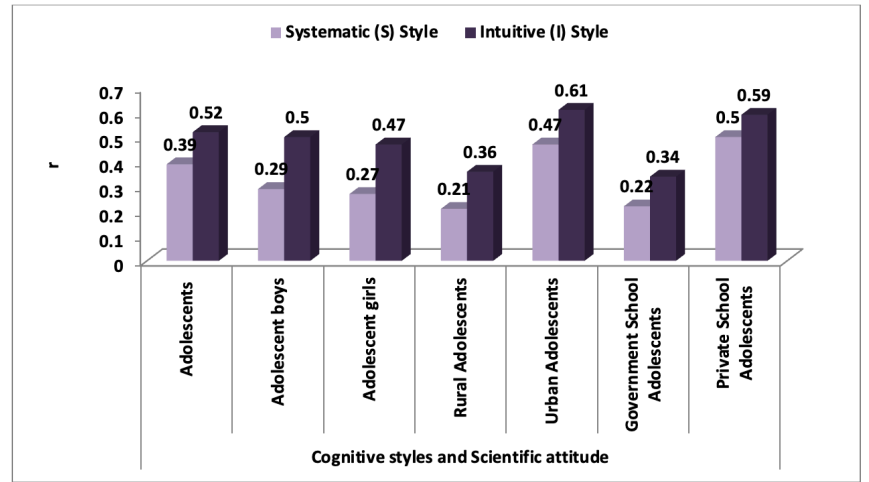
To achieve this objective, Pearson's Product Moment correlation was employed on the scores of cognitive styles and scientific attitude of adolescents. The values of 'r' are given in Table 1 and the pictorial form is shown in Figure 1

It can be seen from Table 1 and Figure 1 that the values of coefficient of correlation between systematic (S) cognitive style and intuitive (I) cognitive style and scientific attitude of total sample of adolescents are 0.39, 0.52 respectively, which are positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) and intuitive (I) cognitive style and scientific attitude among adolescents.

**Table 1**  
**Coefficient of Correlation Between Cognitive Styles and Scientific Attitude Among Adolescents.**

Variables	Group	N	Systematic Style (S)	Intuitive Style (I)
<b>Cognitive Styles and Scientific Attitude</b>	Adolescents	400	0.39*	0.52**
	Adolescent Boys	200	0.29*	0.50*
	Adolescent Girls	200	0.27*	0.47*
	Rural Adolescents	200	0.21*	0.36*
	Urban Adolescents	200	0.47*	0.61*
	Government School Adolescents	200	0.22*	0.34*
	Private School Adolescents	200	0.50*	0.59*

\* Significant at 0.01 level



**Figure 1. Coefficient of correlation between cognitive styles and scientific attitude among adolescents.**

As a significant positive relationship exists between systematic (S) and intuitive (I) cognitive styles and scientific attitude of adolescents, therefore Hypothesis 1 stating, "There is no significant relationship between cognitive styles and scientific attitude of adolescents" stands not accepted. This implies that higher the cognitive style among adolescents, higher will be the scientific attitude.

**Hypothesis 2: To find out the relationship between cognitive styles and scientific attitude among adolescents with respect to (a) Gender (b) Locale (c) Type of Institution:**

**a) There is no significant relationship between cognitive styles and scientific attitude among adolescents with respect to gender.**

The coefficient of correlation between systematic (S) cognitive style and intuitive (I) cognitive style and scientific attitude of adolescent boys are as 0.29 and 0.50 respectively which is positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) cognitive style and scientific attitude of adolescent boys. Further, the values of the coefficient of correlation between systematic (S) cognitive style and intuitive (I) cognitive style and scientific attitude of adolescent girls are calculated as 0.27 and 0.47 respectively which are positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) cognitive style and scientific attitude among adolescent girls, meaning thereby, a significant positive relationship exists between systematic (S) and intuitive (I) cognitive styles and scientific attitude of adolescent boys and girls, therefore Hypothesis 1(a) stating, "There is no significant relationship between cognitive styles and scientific attitude of adolescents with respect to gender" is not accepted.

**b) There is no significant relationship between cognitive styles and scientific attitude among adolescents with respect to locale .**

Results presented in Table 1 and Figure 1 show that the coefficient of correlation between systematic (S) cognitive style and intuitive (I) cognitive style and scientific attitude of rural adolescents is calculated as 0.21 and 0.36 respectively which are positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) cognitive style and scientific attitude of rural adolescents. This shows that a significant positive relationship exists between intuitive (I) cognitive style and scientific attitude of rural adolescents. It can be further seen that the coefficient of correlation between systematic (S) cognitive style and scientific attitude of urban

adolescents was calculated as 0.47 which is positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) cognitive style and scientific attitude of urban adolescents and the coefficient of correlation between intuitive (I) cognitive style and scientific attitude of urban adolescents is calculated as 0.61 which was positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between intuitive (I) cognitive style and scientific attitude of urban adolescents.

As a significant positive relationship exists between systematic (S) and intuitive (I) cognitive styles and scientific attitude of rural and urban adolescents, this leads to the rejection of Hypothesis 1(b) i.e. "There is no significant relationship between cognitive styles and scientific attitude of adolescents with respect to locale".

**c) There is no significant relationship between cognitive styles and scientific attitude among adolescents with respect to type of institution.**

In order to verify this hypothesis, product moment method was employed to find out the coefficient of correlation between systematic (S) cognitive style and intuitive (I) cognitive style and scientific attitude of adolescents studying in government schools. The values of coefficient of correlation are 0.22 and 0.34 respectively as shown in Table 1 and Figure 1. The values of coefficient of correlation between systematic (S) cognitive style and scientific attitude of adolescents studying in private schools are calculated as 0.50 and 0.59 respectively which are positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between systematic (S) cognitive style and scientific attitude of adolescents studying in private schools. The coefficient of correlation between intuitive (I) cognitive style and scientific attitude of adolescents studying in private schools is calculated as 0.59 which is positive and significant at 0.01 level of confidence. This shows that a significant positive relationship exists between intuitive (I) cognitive style and scientific attitude of adolescents studying in private schools.

As a significant positive relationship exists between systematic (S) and intuitive (I) cognitive styles and scientific attitude of adolescents studying in government and private schools, therefore Hypothesis 1(c) stating, "There is no significant relationship between cognitive styles and scientific attitude of adolescents with respect to type of institution" is not accepted.



## CONCLUSIONS

A significant positive relationship was found to exist between cognitive styles and scientific attitude of adolescents with respect to gender, locale and type of institution. Based on the findings and conclusion of this study, it is recommended that teachers must learn how to gather inventories on students' cognitive style vis-à-vis their academic performance. Students' varying learning needs should also be accommodated when varying instructional styles and teachers should teach students with learning styles that will enhance their learning. Moreover, teachers must be able to encourage students to recognize and use their varying personal styles. The study also recommends that counsellors should assess students' cognitive style vis-a-vis teachers' cognitive style and teaching methods. They must also develop a counselling activity based on students' needs as well as plan teaching outcome for teachers so as to find out how teachers' methods and teaching styles are comparable with students' cognitive

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