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COGNITIVE STYLES OF HIGH SCHOOL MATHEMATICS TEACHERS

D. Srinivas Kumar
Professor & Chairman-BOS
Dept of Education & HRD
Dravidian University
Srinivasavanam, Kuppam – 517 426
Chittoor District (AP), India

K.Nagaraju
Lecturer
Sri Srinivasa Junior College
Pedda Vadugur Mandal
Anantapuram District (A.P.)

Abstract

The chief objective of the present study is to profile the cognitive styles of high school Mathematics teachers. It is based on data collected from 72 high school Mathematics teachers. Simple random sampling technique has been used to collect the sample. The Cognitive Style Inventory (CSI) has been used as tool to collect the data. Results indicate that the high school Mathematics teachers possess three types of cognitive styles, namely, split cognitive style, integrated cognitive style, and undifferentiated cognitive style. It has also been found that there exists difference in cognitive styles of teachers based on variation in their gender and types of management of their schools.

Keywords: *Cognitive Style, Systematic cognitive style, Intuitive cognitive style, Integrated cognitive style, Undifferentiated cognitive style, Split cognitive style, high school Mathematics teacher*

1. Introduction: Cognitive style connotes the concept that individual consistently exhibit stylistic preferences for the ways in which they organize stimuli and construct meanings for themselves out of their experiences. It has become a popular theory of perception, intellect and personality. It is described as a personality dimension which influences attitudes, values and social interaction. It is need-based. Herman Witkin (1950) introduced the term 'cognitive style' to describe the concept that individuals consistently exhibit stylistic preferences for the ways in which they organize stimuli and construct meanings for themselves out of their experiences and further suggested that these styles include variables within single dichotomy like global-holistic versus focus-detailed, field dependent versus field independent. It is a fact that these two styles have gained lots of popularity in terms of perceptual processes of persons. Paivio (1971) indicated that cognitive style assesses whether an individual tends to think in verbal terms, using sequential processing of information, or in visual terms, using parallel processing. Cornett (1983) described cognitive style as a predictable pattern of behaviour within a range of individual variability. Messick (1984) indicated

that cognitive style deals with the manner in which people prefer to make sense out of their world by collecting, analyzing, evaluating, and interpreting data. Srinivas Kumar (2011) defined that cognitive style has to be considered as a wholistic process of cognition that begins with the perception, and mediated by information processing, and the resultant retrieval; it varies from person to person and it is affected by various personality factors, such as, previous information, heredity and environment, interest, thinking, attitude, value system, intelligence, creativity, social and economic status and so on.

Human beings are gregarious by nature and it appears - right from birth to death. Individual variations among persons especially in ways of perception, understanding, and retrieval etc processes become an important focus for the cognitive style differences. Teachers form significant portion of the human population who has an aim in building citizenry for the country. They are the torchbearers for any nation. Their role is crucial as transmitters of culture to the new members of the society and they are also dynamic participants in social change. Among other teachers, Mathematics teachers are considered to be important because they develop different kinds of problem-solving skills among school students. The subject Mathematics is taught with an intention to inculcate essential habits like punctuality, discipline, reasoning power, etc. The 'cognition' is incidental and the 'learning' is goal-directed (Srinivas Kumar, 2013). These are complementary to each other. Hence, an attempt is made in the present study to prepare a profile of cognitive styles of high school Mathematics teachers for facilitating better learning for themselves and for their students. Probably, by finding the cognitive styles, the perceptions, ways of information processing, retrieval etc., of Mathematics teachers could be gauged. This kind of exploration would help in understanding, presumably, the styles of analyses, reasoning, inductive and deductive thinking, problem-solving and so on of the Mathematics teachers. In view these aspects, the objectives of the present study are stated as under.

2. Objectives

1. To find out the types of cognitive styles that exists among high school Mathematics Teachers.
2. To explore the kinds of cognitive styles that are available among high school Mathematics teachers due to variation in their age, gender, type of family, and types of management of their schools.

In the subsequent step, the following hypotheses have been formulated in null-form.

3. Hypotheses

1. There may not be any significant difference in the type of cognitive styles that exist among the high school mathematics teachers due to variation in their gender.
2. There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in their age.
3. There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in their type of family.

4. There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in the types of management of their schools.

4. Method

Survey method has been used in the current study to explain the cognitive styles that exist among Mathematics teachers. The 'simple random sampling technique' has been used for selection of sample of 72 Mathematics teachers working in high schools located in Kuppam and Gudupalli mandals located in Chittoor district of Andhra Pradesh State.

The Cognitive Styles Inventory (CSI) has been used as a tool in this investigation. The CSI is standardized for Indian population by Praveen Kumar Jha (2001). It is a self-report inventory of the ways of thinking, judging, remembering, storing information, decision making, and believing in interpersonal relationships. The CSI comprises 40 statements from which 20 statements are related to Systematic Style and the other 20 statements to Intuitive Style and are to be responded on five-point scale running from 'Strongly Agree' to 'Strongly Disagree' with three middle responses of 'Agree', 'Undecided', and 'Disagree'. It enables to assess the five styles, namely, systematic style, intuitive style, integrated style, undifferentiated style, and split style.

A. Systematic Style: An individual who typically operates with a systematic style uses a well defined step-by-step approach while solving a problem; looks for an overall method or pragmatic approach; and then makes wholistic plan for problem solving.

B. Intuitive Style: An individual with intuitive style uses an unpredictable ordering of analytical steps when solving a problem, depends on experience pattern characterized by universalized areas or hunches and explores and abandons alternatives quickly.

C. Integrated Style: A person with an integrated style is able to change styles quickly and easily. Such style changes seem to be unconscious and take place in a matter of seconds. The result of this 'rapid fire' ability is that it appears to generate energy and a proactive approach to problem-solving. In fact, integrated people are often referred to as 'problem-seekers' because they consistently attempt to identify potential problems as well as opportunities in order to find better ways of doing things.

D. Undifferentiated Style: A person with such style appears not to distinguish or differentiate between the two style extremes, that is, systematic and intuitive, and therefore, appears not to display a style. In a problem-solving situation, he/she looks for instructions or guidelines from outside sources. Undifferentiated individuals tend to be withdrawn, passive and reflective and often look to others for problem-solving strategies.

E. Split Style: A person with split style shows fairly equal degrees of systematic and intuitive characteristics. However, persons with split-style do not possess an integrated behavioural response; instead they exhibit each separate dimension in completely different settings using only one style at a time based on the nature of the

tasks. In other words, they consciously respond to problem-solving by selecting the most appropriate style.

5. Results and Discussion

Upon analyses of the data gathered from the said sample of Mathematics teachers, it has been noticed that there exist in a major way the Split Cognitive Style (30 out of 72 (42%)) followed by the Integrated Cognitive Style (16 out of 72 (22.22%)), and the Undifferentiated Cognitive Style (14 out of 72 (19.44%)) among high school Mathematics teachers. Dramatically, a small chunk of high school Mathematics teachers possess Systematic Cognitive Style (8 out of 72 (11.11%). Minor part of these teachers fall under Intuitive Cognitive Style category (4 out of 72 (5.56%)). Further, the following results have been obtained in respect of cognitive styles, in terms of Systematic Style, Intuitive Style, Integrated Style, Un-differentiated Style, and Split Style, due to variation in gender, age, type of family, and types of management of their schools. Chi-square test has been used for testing the hypotheses set for the study.

Hypotheses-1: There may not be any significant difference in the types of cognitive styles among the high school mathematics teachers due to variation in their gender. Chi-square test has been used to test this hypothesis and the calculated value is given in the following table.

Table 1: Showing the chi-square test value for the cognitive styles among high school mathematics teachers (N=72) due to variation in their gender

Gender	N	Systematic style	Intuitive style	Integrated style	Undifferentiated style	Split style	Chi-square test value
Male	42	6 (4.66)	1 (2.33)	05 (9.33)	11 (8.16)	19 (17.5)	10.263*
Female	30	2 (3.33)	3 (1.66)	11 (6.66)	3 (5.83)	11 (12.5)	

The table value is 9.49 at 0.05 level for df=4. ** Significant at 0.05 level.*

The obtained chi-square test value (10.263) is greater than the table value (9.48) at 0.05 level, and hence, the null-hypotheses rejected. There is a significant difference between cognitive styles among the high school mathematics teachers due to variation in their gender.

Hypotheses-2: There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in their age.

Table 2: Showing the chi-square test value for the cognitive styles among high school mathematics teachers (N=72) due to variation in their age

Age	N	Systematic style	Intuitive style	Integrated style	Un differentiated style	Split style	Chi-square test value
Below 35 years	44	5 (4.88)	3 (2.44)	11 (9.77)	10 (8.55)	15 (18.33)	2.92@

Above 35 years	28	3 (3.11)	1 (1.55)	5 (6.22)	4 (5.44)	15 (11.66)

The table value is 9.488 at 0.05 level for df = 4 @ Not Significant

The calculated Chi-square test value (2.92) is less than the table (9.488) at 0.05 level. Therefore, the null hypothesis has been accepted that there is no significant difference between cognitive styles among the high school mathematics teachers due to variation in their age.

Hypotheses-3: There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in their type of family.

Table 3: Showing the chi-square test value for the cognitive styles among high school mathematics teachers (N=72) due to variation in their type of family

Type of family	N	Systematic style	Intuitive style	Integrate Style	Un-different iated style	Split style	Chi-square test value
Small family	31	1 (3.44)	1 (1.73)	5 (6.88)	6 (6.02)	18 (12.91)	8.012@
Joint family	41	7 (4.55)	3 (2.27)	11 (9.11)	8 (7.97)	12 (17.08)	

The table value is 9.488 at 0.05 level for df = 4 @ Not Significant

The calculated chi-square test value (8.012) is less than the table value (9.48) at 0.05 level. Hence, the null hypothesis is accepted that there is no significant difference between cognitive styles among the high school mathematics teachers due to variation in their type of family.

Hypotheses-4: There may not be any significant difference in the type of cognitive styles among the high school mathematics teachers due to variation in the types of management of their schools.

Table 4: Showing the chi-square test value for the cognitive styles among high school mathematics teachers (N=72) due to variation in the type of management of their schools

Type of Management of School	N	Systematic style	Intuitive style	Integrated style	Un-differentiated style	Split style	Chi-square test value
Government	41	(4.56) 5	(2.28) 1	(9.12) 8	(7.98) 4	(17.09) 23	
Private	31	(3.45) 3	(1.73) 3	(6.89) 8	(6.03) 10	(12.92) 7	11.43*

*The table value is 9.49 at 0.05 level for df=4. * Significant at 0.05 level*

The calculated chi-square test value (11.428) is greater than the table values (9.488) at 0.05 level. Hence, the null hypothesis has been rejected and it reveals that there is a significant difference between cognitive styles among the high school mathematics teachers due to variation in the types of management of their schools.

6. Conclusion

The present investigation has informative results. It has been found that the Mathematics teachers working in high schools possess three cognitive styles in a major way, namely, split cognitive style, integrated cognitive style, and undifferentiated cognitive style. It is dramatic that very minor chunk of them appears to possess systematic and intuitive styles. Conceptually, split cognitive style is a combination of intuitive and systematic style. This feature points towards their ability to perceive and operate in a situation-based manner either systematic or intuitive, however, integrated style is not a part of the split-style. Results revealed that the next major portion of Mathematics teachers have the integrated cognitive style. It is indicative of their ability to change the styles very rapidly between systematic and intuitive and to use them in an integrated manner as is required in a given context. Further, it is a pointer of their problem-seeking and problem-solving ability. The third large segment of sample of Mathematics teachers have fallen under the category of undifferentiated cognitive style that which is an unusual dimension among them. Because a person with such style appears not to distinguish or differentiate between the two style extremes, that is, systematic and intuitive, and therefore, appears not to display a style. In a problem-solving situation, he/she looks for instructions or guidelines from outside sources. Undifferentiated individuals tend to be withdrawn, passive and reflective and often look to others for problem-solving strategies. Presumably, such a result has appeared for some other significant factors like their thought processes, interests, value-system, attitudes, social and economic statuses, inhibitions etc., that which have a bearing on the cognitive style of an individual. The remaining minor portion of Mathematics is seen to possess two cognitive styles, that is, systematic, and intuitive which is again unusual. However, both these aspects need further investigation to corroborate the present results.

References

Cornett, C. E. (1983). What you should know about Teaching and Learning styles. Bloomington, IN: Phi Delta Kappa Educational Foundation.

Messick, S. (1984). The nature of Cognitive Styles: problems and promise in educational practice. *Educational Psychologist, 19,59-74.*

Paivio, A. (1971). Imagery and Verbal Processes. New York: Holt, Rinehart.

Praveen Kumar Jha. (2001). The Cognitive Styles Inventory. Agra: Rakhi Prakashan.

Srinivas Kumar, D. (2011). Introduction to Cognitive Styles and Learning Styles. Kuppam: Prasaranga (Publications Bureau), Dravidian University.

Srinivas Kumar, D & Siva Kumar, M. Profile of Cognitive Styles of High School English Teachers. *American International Journal of Research in Humanities, Arts and Social Sciences* 14-194 (online / print / CD-ROM), 5(2), December 2013 – February 2014.

Witkin, Herman A. "Individual Differences in Case of Perception of Embedded Figures." *Journal of Personality 19 (1950):1-15.*