

## **A Comparative Study of Thinking Styles of Science And Arts Teachers In Relation To Their Demographic Factors**

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### **Abstract**

*The present study was undertaken to compare the thinking styles of Science and Arts teachers in relation to their demographic factors. The sample consisted of 148 subjects teaching the subjects of Science and Arts in Government and Private schools of Mandi District of Himachal Pradesh. The data were collected by administering the short form of Thinking Style Inventory (TSI) prepared by Sternberg and Wagner (1992).*

*The data analysis yielded that Arts teachers perceived greater emphasis on Executive thinking styles than their counterparts Science teachers. It was also disclosed that Urban teachers had more inclination towards the use of Executive Thinking Style than Rural teachers. Moreover Younger teachers had adopted 'Executive thinking style' more than older teachers. Additionally, it was bared that teachers with more teaching experience were more judicial in their thinking style as compared to less experienced teachers. Lastly the teachers teaching in private schools were giving more preference towards the use of Executive thinking style than teachers working in government schools.*

Teachers are the key persons and the most valuable resources in contributing to the success of education. Effective teachers are always striven to provide appropriate learning environments with rich resources. They are the successful teachers who are able to monitor children's progress, address their needs and assist them to reconstruct knowledge. From the early 1940s to the 1990s, various investigators observed different style dimensions. A lot of style models have been created. The term has since been used to refer to patterns of behavior that are consistent over long periods of time and across many areas of activity (Sternberg, 1994).

Riding and Rayner (1998) pointed out that 'The significance of an awareness of style is its potential for enhancing and improving human performance in a variety of contexts '. Jones, Reichard and Mokhtari (2003) suggest that increasing students' awareness of their own learning and thinking styles may be quite helpful in increasing control of their learning habits and strategies, which should, in turn, influence their academic performance.

A thinking style preference leads to a learning style preference and in turn determines a student's dominant cognitive mode in which he/she communicates and receives information. Thinking styles are one of the dominant variables. Teachers and students vary in their styles of thinking. It is crucial and essential to investigate styles as they are closely related to school and affect teaching and learning processes.

Huang (1997) claims that cognitive, learning, and thinking styles are not discretely distinguished or mutually exclusive.

According to Sternberg's mental self-government, thinking style is the way people govern their own lives in their everyday living just as the government does for the society. One of the major characteristics of the theory of MSG is that thinking styles are socialized. Thus, thinking styles can be taught.

Sternberg (1997) suggested that thinking styles would be at least in part socialized and to some extent could be modified by the environment in which people stay. Student's styles of thinking are tightly related to parents and shaped by interaction with teachers' styles of teaching.

Sternberg's theory of thinking styles begins with three different governmental functions, legislative, executive and judicial which he attributes to three classifications of people and how they think. Legislative style people do things their own way, executive style people are implementers, and judicial style people are evaluators. Sternberg enumerates fifteen points needed to understand thinking styles as following: Styles are preferences not abilities; a match between styles and abilities creates a synergy; life choices should fit styles and abilities; people have patterns not just one single style; styles vary across tasks and situations; people's preferences differ; people's stylistic flexibility's differ; styles are socialized; life span styles can vary; styles are measurable; styles are teachable; styles value is variable; styles are not universal; styles are not usually good or bad, they should fit; and styles must not be confused with abilities.

### **Need And Justification Of The Study**

Thinking styles are very important components of the learning process of teacher education. The full understanding of their thinking styles is highly desirable if we have to obtain a comprehensive picture of teacher and to base our teaching efforts on the knowledge of the same in order to inject quality control in educational process.

Education of teachers is becoming important in every society of developed or developing countries. Particularly a society of people who make mid life career changes or advance their skills or who must work out of necessity or those whose leisure time permit higher education, all contribute to increase the demand of higher education through formal or non- formal modes. Educators hold that students think and learn in unique individualized ways whether they belong to school, college or university level. In search of the solution of teaching problems of teachers, a little work has been done on thinking styles. Hence there is substantial possibility to probe into the vicinity of thinking styles of teachers in Indian Culture.

Silver, Strong, and Perini (2000) give five suggestions on educators' role:

- (1) Help students develop specific style according to the need of the course in school;
- (2) Differentiating instruction through the use of all the style;
- (3) Integrating curriculum so that it is style-rich and style-fair;
- (4) Providing choice to students in activities and assessment; and
- (5) Supporting students' choice of style, that mean allow students to use another, more well-developed style to enhance their understanding of content rather than insisting on following teachers' style.

Saracho (1997) strongly recommends integrating cognitive style in teacher education. He suggests that knowledge of cognitive style may be presented in an introductory course where student teachers learn the characteristics of cognitive style, the impact of cognitive style on the teaching-learning process, and ways to change their own and their students' cognitive styles.

### **Objectives of the Study**

The present study attempted to investigate the usefulness of the theory of mental self-government in reflecting the general learners' characteristics in Indian educational setting in relations to other individual-difference variables like, stream, gender and age. Its predictive power on area of residence, teaching experience and type of schools has also been examined. The following objectives were pursued in the present study:

1. To explore the differences in the effect of thinking styles of Senior Secondary Science and Arts teachers.
2. To study the effect of gender on thinking styles of Senior Secondary teachers.
3. To study the effect of rural and urban area on thinking styles of Senior Secondary teachers.
4. To study the effect of age on thinking styles Senior Secondary teachers.
5. To investigate the effect of teaching experience on thinking styles of Senior Secondary teachers.
6. To study the effect of type of school on thinking styles of Senior Secondary teachers.

### **Hypotheses**

In pursuance of the objectives of the study the following null hypotheses were formulated for testing: -

1. There will be no significant difference in the thinking styles of Senior Secondary Science and Arts teachers.
2. There will be no significant effect of gender on thinking styles of Senior Secondary teachers.
3. There will be no significant effect of rural and urban area on thinking styles of Senior Secondary teachers.
4. There will be no significant effect of age on thinking styles of Senior Secondary teachers.
5. There will be no significant effect of teaching experience on thinking styles of Senior Secondary teachers.
6. There will be no significant effect of type of school on thinking styles of Senior Secondary teachers.

### **METHOD**

#### **Sample**

In the present study, the sample consisted of 148 teachers teaching in Government and Private schools of Mandi District of Himachal Pradesh. Out of total 148 teachers, 80 teachers were male and 68 teachers were female teachers and out of these 104 teachers were of science stream whereas 44 teachers belonged to arts stream. In the present investigation, 73 teachers were teaching in Private schools while 75 teachers were teaching in government schools. In the selection of the sample random cluster method of sampling was employed.

#### **Tools Used**

The Thinking Style Inventory (TSI) (Short form having only three function based thinking styles) prepared by R. J. Sternberg and Wagner (1992) was pilot-tested on the teachers working in various schools by the investigator. A short form of the inventory consisting of 15 items based on 3 scales corresponding to the 3 thinking styles bottomed on the functions as described in Sternberg's theory of mental self-government. It was used to assess the habitual modes of thinking among teachers as reflected in their preferred way of teaching.

### **Procedure**

After collection of the data, compilation and scoring was done with the help of scoring key. Pertaining to the thinking styles of science and arts teachers with respect to certain demographic factors such as gender, locality, age, teaching experience and types of institution was analyzed by applying 't'-test.

### **RESULTS**

#### **Table 1**

It is obvious from Table 1 that significant difference between science and arts teachers was found to be significant ( $t = 2.45$ ;  $p < 0.05$ ,  $df = 146$ ) with respect to Executive thinking style only. From this it may be inferred that the Arts teachers perceived greater emphasis on Executive thinking styles than their counterparts Science teachers. While weighing up the Legislative and Judicial thinking style for science and arts teachers, no significant differences emerged at even at 0.05 level of significance. Hence the research hypothesis in this view stating that there will be no significant difference in the thinking styles of Senior Secondary Science and Arts teachers was not accepted in case of Executive thinking style and was retained for Legislative and Judicial thinking style.

#### **Table 2**

Table 2 gives us an idea about 't' value of thinking styles of senior secondary teachers with respect to gender. The 't' values for all the three thinking styles (Legislative, Executive and Judicial) were found to be non significant at 0.05 level of significance. It means that both the groups of teachers had similar perception regarding all the three thinking styles (Legislative, Executive and Judicial).

#### **Table 3**

Table 3 further reveals that 't' values of 1.14 and 1.76 were found to be non-significant at 0.05 level of significance for Legislative and Judicial thinking styles. In other words it may be

stated that both Rural and Urban teachers of Science and Arts stream had espoused to these two thinking styles at the same level. Table 3 also unveiled that 't' value of 3.52 for Executive thinking style was found to be highly significant at 0.01 level of significance with  $df = 146$ . Further the Mean scores (20.95) of Urban teachers were greater than mean scores (19.63) of Rural teachers. Hence, it can be said that Urban teachers were more inclined towards Executive Thinking Style than their counterparts Rural teachers. Hence the hypothesis no 2 stating that there will be no significant effect of rural and urban area on thinking styles of Senior Secondary teachers was retained in two thinking styles namely Legislative and Judicial thinking style whereas it was not established in case of Executive Thinking Style.

#### **Table 4**

Table 4 shows that 't' value of 2.05 in case of Executive thinking style was found to be significant at 0.05 level of significance with  $df = 146$ . It means that Younger and Older teachers differ significantly from each other with regard to Executive thinking style. The higher mean value (20.76) pertained to Younger teachers indicated that they adopted 'Executive thinking style' more than older teachers with a lower mean value (19.98). Hence the null hypothesis in this regard was not retained. Table 4 further shows that 't' values for Legislative and Judicial thinking styles were found to be non-significant at 0.05 level with  $df = 146$ . It means that both younger and older teachers had adopted Legislative and Judicial thinking styles at the same level. In this conception the research hypothesis was accepted.

#### **Table 5**

The Table 5 reveals that last t-value (2.72) obtained for the dimension of 'teaching experience' was also highly significant and the mean difference was in favour of more experienced teachers. This disclosed that teachers with more teaching experience were more judicial in their thinking style as compared to their counterparts less experienced teachers. In view of the above it may be stated that significant difference existed between more experienced teachers and less experienced teachers on judicial thinking style. Taking into account the Legislative and Executive thinking styles, no significant differences emerged as the 't' value was not significant. Hence the hypothesis no. 5 which stipulated that there are no significant differences in teaching experience and thinking styles was not accepted in case of Judicial thinking style whereas the same hypothesis for Legislative and Executive thinking style was retained.

**Table 6**

The table 6 elicits that the 't' value came significant for only one thinking style i.e. Executive thinking style, whereas 't' values were non significant for other two thinking styles namely Legislative and Judicial thinking styles. Having a glance on mean values it is accomplished that the thinking style of the school teachers does not change with the change in the type of school when Legislative and Judicial thinking styles were taken into version. Thus the null hypothesis is accepted.

Moreover for Executive thinking style, the above table 6 confirms that 't' value comes out to be 2.66 which is significant even at 0.01 level of significance with  $df = 146$ . Thus it is concluded that the two groups under consideration differ significantly in terms of their type of schools when executive thinking style is considered. Since mean score of teachers teaching in private schools is more as compared to the teachers teaching in Government schools. This clearly indicates that the teachers teaching in private schools have more inclination towards the use of Executive thinking style than their peer groups of teachers working in government schools. Thus the null hypothesis is rejected.

**DISCUSSION AND CONCLUSION**

In the present study, findings related to Stream and thinking styles disclosed that only Arts stream students were more Executive than their counterparts Science teachers. The support to this study was rendered by only two studies namely Zhang and Sternberg (1998) and Verma & Sharma (2003). Whereas opposite result to this study were presented by few researchers namely Wu and Zhang (1999), Cilliers & Sternberg (2001), Murphy (2006), Fer (2007) and Munawwarah (2008), who stated that science teachers were more Executive in their thinking style. The result of our study also indicated that there were no significant differences between Arts and Science teachers on Legislative and Judicial thinking styles. This result was in agreement with only one study conducted by Murphy (2009).

When second hypothesis was taken into account it was revealed in our study that there were no significant gender differences. This result was in agreement with the study earlier studies conducted Kreshner and Ledger (1985), Huang (1993), Grigorenko and Sternberg (1997), Zhang (1999), Kwan (2000), Nora (2000), Kaufman, (2002), Sood (2002), Spelker (2005), Yeh (2005), Ratnasingam (2006), Nassrallah (2008), and Saracaloglu et al. (2008).

When the differences were taken into account by taking into consideration the area of residence, it was exposed that Urban teachers were more Executive than Rural teachers. Only

one study lends support to the present finding relating to Executive thinking style. When Legislative and Judicial styles were taken into consideration, it was set up that there were no significant differences between urban and rural teachers and this result has the goodwill of Verma and Sharma (2003) and Nassrallah (2008).

It was disclosed in our study that younger teachers were more leaning towards the use of Executive thinking style more than the older teachers and there no difference for Legislative and Judicial thinking style based on age. The study was in agreement with the studies of Grigorenko & Sternberg (1997) for Executive thinking style and Jaaskelainen (1984), Zhang (2001b), Cheung (2002), Wen (2004), Ratnasingam, M (2005), Wu (2005), Murphy (2006), and Saracaloglu et al (2008) also supported the research finding for Legislative and Judicial thinking style.

(Zhang, 1999), Chen (2001), Zhang (2001d), Zhang and Sternberg (2002) and Higgins & Zhang (2009) also lend a hand to the research finding of our study in case of Judicial thinking style. While taking into contemplation for Legislative and Executive thinking style the assistance to our study was provided by Jaaskelainen (1984) and Ratnasingam, M. (2006). This is because those teachers had been confronted with a greater variety of situations without a ready resolution. They were challenged to think critically and had more chances to practice the related styles.

For the perception of teachers working in private and government schools only one study Sternberg (1995) provided a supportive hand to our study concerning Executive thinking style whereas there were no significant differences for Legislative and Judicial thinking style and this was having a solid frame hold up by Tucker (1999) and Wu (2005).

It is widely transparent from the above studies that few studies are having a support for the research finding and others are not having a support. The reason is that the cultural variance from one country to other also affects the educational system as there are different curriculum followed and the way of complying with them are also different. Attention to this side is severely demanded so as to improve the thinking styles of teachers as they are the builders of the nation and the future of the nation. Needless to mention that studies on thinking styles are still in their childhood and require lot of improvements in their functioning. Therefore research endeavour in this area should be continuous process.



**Table – 1**  
**Significance of Difference in Mean Scores of Thinking Styles of Science and Arts Teachers**

S.No.	Thinking Styles	Science (N = 104)	Arts (N = 44)	't' Value	Significance
1.	Legislative	M = 20.28 SD = 2.45	M = 20.20 SD = 2.84	0.17	NS
2.	Executive	M = 20.09 SD = 2.38	M = 21.11 SD = 2.08	2.45	*
3.	Judicial	M = 19.45 SD = 2.38	M = 19.77 SD = 2.66	0.72	NS

NS = Not Significant at 0.05 Level.

\* = Significant at 0.05 Level.

**Table – 2**  
**Significance of Difference in Mean Scores of Thinking Styles of Senior Secondary Teachers with respect to Gender**

S.No.	Thinking Styles	Male (N = 80)	Female (N = 68)	't' Value	Significance
1.	Legislative	M = 20.51 SD = 2.28	M = 19.99 SD = 2.82	1.25	NS
2.	Executive	M = 20.25 SD = 2.36	M = 20.60 SD = 2.27	0.92	NS
3.	Judicial	M = 19.68 SD = 2.43	M = 19.39 SD = 2.50	0.71	NS

NS = Not Significant at 0.05 Level.

**Table – 3**  
**Significance of Difference in Mean Scores of Thinking Styles of Senior Secondary Teachers with respect to Area of residence**

S.No.	Thinking Styles	Urban (N = 61)	Rural (N = 87)	't' Value	Significance
1.	Legislative	M = 20.47 SD = 2.60	M = 19.98 SD = 2.46	1.14	NS
2.	Executive	M = 20.95 SD = 1.94	M = 19.63 SD = 2.60	3.52	**
3.	Judicial	M = 19.85 SD = 2.42	M = 19.13 SD = 2.46	1.76	NS

NS = Not Significant at 0.05 Level.

\*\* = Significant at 0.01 level of significance

**Table – 4**  
**Significance of Difference in Mean Scores of Thinking Styles of Senior Secondary Teachers with Respect to Age**

S.No.	Thinking Styles	Older (N = 67)	Younger (N = 81)	't' Value	Significance
1.	Legislative	M = 20.56 SD = 2.03	M = 20.02 SD = 2.89	1.29	NS
2.	Executive	M = 19.98 SD = 2.33	M = 20.76 SD = 2.24	2.05	*
3.	Judicial	M = 19.74 SD = 2.25	M = 19.39 SD = 2.62	0.86	NS

NS = Not Significant at 0.05 Level.

\* = Significant at 0.05 level of significance

**Table – 5**  
**Significance of Difference in Mean Scores of Thinking Styles of Senior Secondary Teachers with Respect to Teaching Experience**

S.No.	Thinking Styles	More Experience (N = 123)	Less Experience (N = 25)	't' Value	Significance
1.	Legislative	M = 20.32 SD = 2.41	M = 20.00 SD = 3.16	0.58	NS
2.	Executive	M = 20.41 SD = 2.35	M = 20.40 SD = 2.17	0.03	NS
3.	Judicial	M = 19.79 SD = 2.23	M = 18.36 SD = 3.16	2.72	**

NS = Not Significant at 0.05 Level.

\*\* = Significant at 0.01 level of significance

**Table – 6**  
**Significance of Difference in Mean Scores of Thinking Styles of Senior Secondary Teachers in Reference to Type of School.**

S.No.	Thinking Styles	Private School (N = 73)	Govt. School (N = 75)	't' Value	Significance
1.	Legislative	M = 20.12 SD = 3.00	M = 20.41 SD = 2.02	0.69	NS
2.	Executive	M = 20.91 SD = 2.24	M = 19.92 SD = 2.30	2.66	**
3.	Judicial	M = 19.71 SD = 2.68	M = 19.40 SD = 2.22	0.77	NS

NS = Not Significant at 0.05 Level.

\*\* = Significant at 0.01 level of significance

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