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A study of learning and thinking style of higher secondary school students in relation to their academic performance

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Abstract
Learning is an ongoing process we learn constantly whether deliberately or undeliberately. One individual could employ structure in learning while another might employ different ways of doing thing (Vengopal & Mridula, 2007). These different approaches of students are often termed as styles, that is, style of learning and thinking. Style indicates the hemisphericity function of the brain and students learning strategy and information processing are based on the preferences of the brain area (Venkataraman, 1990). Hemisphericity is the cerebral dominance of an individual in retaining and processing modes of information in his own style of learning and thinking (Venkataraman, 1989). In order to capitalize the opportunities for students learning, a teacher must have the knowledge of the students preferred styles. But the basic question is that 'Is there any relationship exists between style of learning and thinking and academic performance of students? In order to seek the answer of this major question, this paper investigated the relationship between the style of learning and thinking and academic performance of the students and other sub-questions. SOLAT developed by Dr. Venkataraman (1994) was administered on 200 students of 12th standard which were selected randomly by utilizing descriptive survey method of research. Mean, standard deviation, Pearson's product moment correlation ('r') and critical ratio (CR) were used as statistical techniques and the major finding was that there was no significant relationship found between style of learning-thinking and academic performance of higher secondary school students.

Keywords: Style of Learning and Thinking, Hemisphericity, Cerebral Dominance and Academic Performance.

1. Introduction
The search for flawless system of education for our youth is very much in need nowadays. Personnel related to the sphere of education are continuously striving hard in search of that magical solution which will reform our present education system (Edwards as cited in Jones, 2006) [8].

For providing quality education, instructor must know the needs of the learners; every child comes with some innate qualities. These qualities differentiate him from the others. These qualities form the basis of individual differences that is why individual differences exist among the learners. Every student uses different approach for receiving and processing information. These different approaches of students are often termed as styles, that is, style of learning and thinking. Boundless. com (2013) [1] defines Learning style as "It is an individual's natural or habitual pattern of acquiring and processing information in learning situations". Wikipedia (n. d.) states that "Thinking style is a term used in cognitive psychology to describe the way individuals think, perceive and remember information. Cognitive style differs from cognitive ability (or level), the latter being measured by aptitude tests or so-called intelligence tests".

Assessment of style of learning and thinking is very much needed to ensure the better learning of the students and the reliable sources are needed to uncover the details of style of learning and thinking. In this respect Torrance (as cited in Venkataraman, 1994) [10] constructed a tool for assessing styles of learning and thinking of students on the basis of 'Hemisphericity Dominance'. He claimed that since brain is divided into two hemispheres and these function differently to each other. He gave the dimensions which constitute learning style of individuals and through these dimension one can assess the learning style of the individuals. Now we have the reliable equipment to measure the above mentioned variable that is style of learning and thinking. Let us talk about that we know the importance of styles of learning and thinking in order to deliver the effective education but what the other researchers say about style of learning and thinking in order to clear the urgent need of the discussed variable.

The idea that people learn differently is venerable and probably had its origin with the ancient Greeks (Wratcher, Morrison, Riley & Scheirton as cited in Diaz & Cartnal, 1999) [6]. Cassidy and Eachus; Zhang (as cited in Garg, 2011) [7] demonstrated that the style of learning and thinking do affect the academic performance of the learners. Garcia and Hughes (2000) [2] found significant correlations between academic achievement and thinking styles. Contrary to this, the results of researches by Argon *et al.* (as cited in Garg, 2011) [7], Dentino (2001) [4], De Ture *et al* (2004) [5] led to infer that learning styles are poor predictors of success. These differences in the opinions of the above discussed researches raise the questions in the researcher's mind:

- Does the style of learning and thinking differ of students studying in different streams?

- Are students' academic performances associated with their style of learning and thinking?
- Is there any relationship exists between style of learning and thinking and academic performance of students?

In order to get answers of these questions the present study was undertaken to research upon.

2. Objectives

Objectives of the present study were as follows:

1. To study the style of learning and thinking of higher secondary school students.
2. To compare the style of learning and thinking of science stream and commerce stream students.
3. To study the academic performance of higher secondary school students.
4. To compare the academic performance of science stream and commerce stream students.
5. To study the relationship between learning-thinking style and academic performance of higher secondary school students.

3. Methodology of the Study

1. Method of the Study

Descriptive Survey Method has been utilized in the present research.

2. Sample Selection

The target sample included 200 students of class XII (100 Science Students-50M & 50F and 100 Commerce Students-50M & 50F) from four intermediate schools affiliated to CBSE board. 25 boys and 25 were selected from each school by using Simple Random Method. Colleges were selected by using Systematic Random Sampling. They were St. Andrew's Senior Secondary School, John Milton Public School, Kendriya Vidhyalaya No. 2, St. Augustine Senior Sec. School.

3. Tools of the Study

SOLAT (Styles of Learning and Thinking) developed by Dr. Venkataraman (1994) [10] had been used in the present study. It is a modified version of the tool developed by Torrance. It identifies hemisphericity dominance by way of studying the hemisphere functions. It indicates the learning and thinking styles and brain hemisphere preference.

4. Statistical Techniques

The statistical techniques have been used in the analysis and interpretations of the results were:

Descriptive: Mean, Standard Deviation, Kurtosis, Skewness.

Inferential: Pearson's Product Moment Correlation ('r'), Critical Ratio (CR).

5. Limitations of the Study

- The present study has been confined to Agra city (U.P India) only. The sample of the study has been collected from four institutions affiliated with CBSE Board only.
- The sample of the present study was delimited to 200 higher secondary students (100 male and 100 female) who are studying in class XII.
- The sample of the present study was delimited to students of science and commerce streams only.
- In the present study English medium students had been taken only.
- In the present investigation rural population failed to have place in the sample. Therefore the generalization of the results is limited to the urban population of Agra city only.

4. Data Analysis, Interpretation and Findings

The major aim of the present investigation was to study learning and thinking style of higher secondary school students in relation to their academic performance. Keeping in view the main objectives and variables under study, the investigator had analyzed the data under the following sections:

Section 1

Study of Learning and Thinking Style of Higher Secondary School Students

The scale of learning and thinking style contained three major dimensions for explaining the style of learning and thinking of students. These are:

1. Right hemisphere (R): Explaining the function of right hemisphere of brain.
2. Left hemisphere (L): Explaining the function of left hemisphere of brain.
3. Whole brained (W): Explaining the function of both hemispheres of brain.

So, it was necessary to study the nature of distribution of scores of above three dimensions separately in order to understand the nature of distribution of learning and thinking style scale.

1. Nature of the Distribution of Scores of Right Hemisphere Dimension

The mean value was found to be 23.38 out of 50 (n=200). The standard deviation of scores was found to be 4.72 which indicated slight homogeneity among the scores. The scores were found to be slightly positively skewed (0.14) and leptokurtic in nature (< 0.263). This showed that right hemisphere of higher secondary school students is dominant over left hemisphere and whole brained.

2. Nature of the Distribution of Scores of Left Hemisphere Dimension

The mean value was found to be 18.05 out of 50 (n=200). The standard deviation of scores was found to be 4.39 which indicated slight homogeneity among the scores. The scores were found to be slightly positively skewed (0.19) and leptokurtic in nature (< 0.263). This showed that left hemisphere of higher secondary school students is less dominant over right hemisphere and dominant over whole brained.

3. Nature of the Distribution of Scores of Integrated Brain Dimension

The mean value was found to be 5.49 out of 50 (n=200). The standard deviation of scores was found to be 4.60 which indicated slight homogeneity among the scores. The scores of integrated brain were found to be highly positively skewed (0.719) and leptokurtic in nature (< 0.263). This showed that

integrated brain's utilization is very rare among higher secondary school students.

Section 2

Comparison of Learning and Thinking Style of Science Stream and Commerce Stream Students

In order to compare the learning and thinking style of science stream and commerce stream students, CR values between right hemisphere, left hemisphere and integrated brain scores of science stream students and scores of right hemisphere, left hemisphere and integrated brain of commerce stream students were computed.

Table 1.1: Mean, S.D, CR Values of Right Hemisphere Scores

Variable	Groups	Sample Size	Mean	Standard Deviation	CR Value	P Value
Right Hemisphere	Science	100	22.64	4.83	2.72	Significant (.01)
	Commerce	100	24.33	3.98		

Table 1.2: Mean, S.D, CR Values of Left Hemisphere Scores

Variable	Groups	Sample Size	Mean	Standard Deviation	CR Value	P Value
Left Hemisphere	Science	100	18.21	4.21	3.77	Significant (.01)
	Commerce	100	20.55	4.56		

Table 1.3: Mean, S.D, CR Values of Integrated Brain Scores

Variable	Groups	Sample Size	Mean	Standard Deviation	CR Value	P Value
Integrated Brain	Science	100	7.05	4.48	3.83	Significant (.01)
	Commerce	100	4.73	4.08		

Thus it could be said that there was a significant difference between style of learning and thinking of science stream students and commerce stream students. Therefore null hypothesis framed that 'there is no significant difference between style of learning and thinking of science stream students and commerce stream students' has been rejected.

Section 3

Study of Academic Performance of Higher Secondary School Students

Academic Performance has been representing the academic achievement of higher secondary school students. CGPA of XI class was taken as the academic achievement. The mean value of total students (n=200) was found to be 7.24 out of 10. The standard deviation of scores was found to be 1.15 which indicated homogeneity among the scores. The scores were found to be positively skewed (0.016) and the distribution was leptokurtic in nature (< 0.263). Students were above average academically.

The mean values of academic performance of science stream (n=100) and commerce stream (n=100) students were found 7.95 and 6.58 respectively showing the average level of academic performance scores of the two streams.

Section 4

Comparison of Academic Performance of Science Stream and Commerce Stream Students

In order to compare academic performance of science stream and commerce stream students, CR-Value were computed which has been showing through a table given below:

Table 1.4: Mean, S.D, CR Values of Academic Performance Scores

Variable	Groups	Sample Size	Mean	Standard Deviation	CR Value	P Value
Academic Performance	Science	100	7.95	0.89	9.78	Significant (.01)
	Commerce	100	6.58	1.10		

Thus it could be said that there was a significant difference between academic performance of science stream students and commerce stream students. Therefore null hypothesis framed that 'there is no significant difference between academic performance of science stream students and commerce stream students' has been rejected.

Section 5

Study of relationship between Style of Learning and Thinking and Academic Performance of Higher Secondary School Students

The tool had three dimensions; each dimension had been correlated to academic performance separately for obtaining best relationship between style of learning and thinking and academic performance. Pearson's Product Moment coefficient of correlation was computed.

Table 1.5: Mean, Standard Deviation and Coefficient of Correlation of Right Hemisphere and Academic Performance

Variables	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Right Hemisphere	23.38	4.83	-0.12*	Insignificant
Academic Performance	7.24	1.15		

*P< 0.05

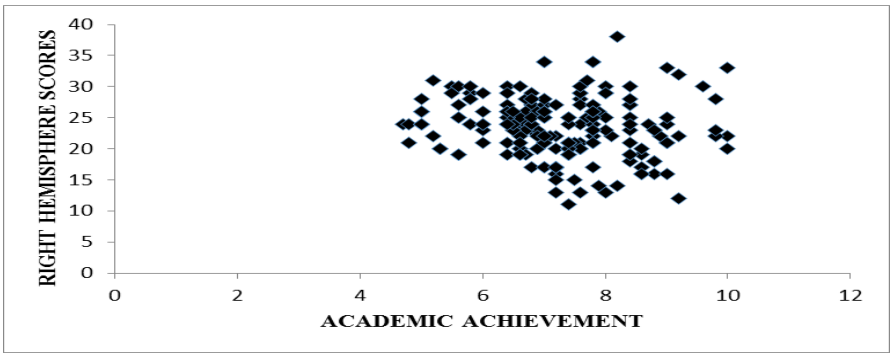

Fig 1.1: Scatter Diagram for the Scores of Right Hemisphere and Academic Performance

Table 1.6: Mean, Standard Deviation and Coefficient of Correlation of Left Hemisphere and Academic Performance

Variables	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Left Hemisphere	18.05	4.39		
Academic Performance	7.24	1.15	0.05*	Insignificant

*P< 0.05

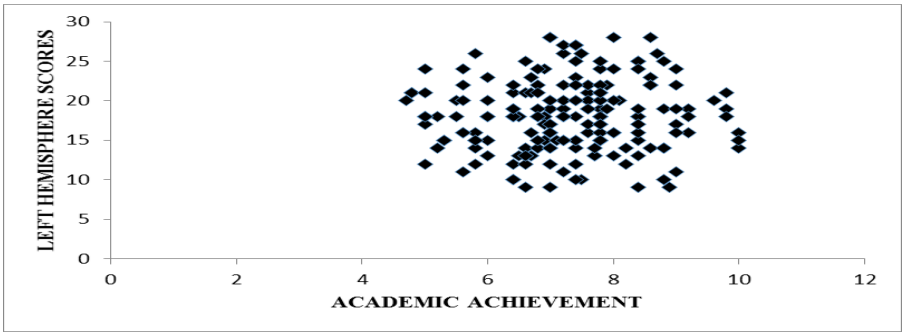

Fig 1.2: Scatter Diagram for the Scores of Left Hemisphere and Academic Performance

Table 1.7: Mean, Standard Deviation and Coefficient of Correlation of Integrated Brain and Academic Performance

Variables	Mean	Standard Deviation	Coefficient of Correlation	Level of Significance
Integrated Brain	5.49	4.60		
Academic Performance	7.24	1.15	0.05*	Insignificant

*P< 0.05

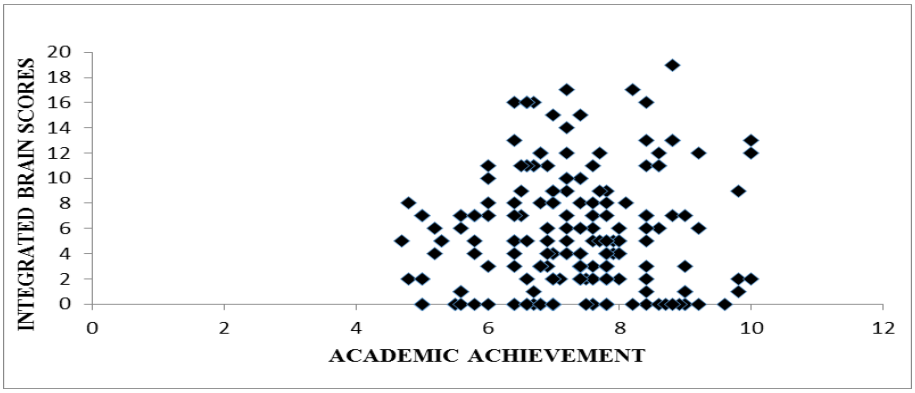

Fig 1.3: Scatter Diagram for the Scores of Integrated Brain and Academic Performance

Thus from the above tables and figures it could be concluded that the correlation between style of learning and thinking and academic performance of higher secondary school students was negligible. Hence, the hypothesis, 'there is no significant relationship between learning-thinking style and academic performance of the higher secondary school students' has been accepted.

5. Conclusions of the Study

The conclusions, which were drawn on the basis of the findings, are stated below:

1. Difference was found between style of learning and thinking of science stream and commerce stream students. Commerce students have dominant right and left hemisphere (evident from the mean of scores) which

shows that they utilize functions of right and left hemisphere more or frequently than the science students.

2. Difference was found between academic performance of science stream students and commerce stream students. Science stream students are more academically brighter than the commerce stream students (evident from the mean of scores). The reasons could be that science stream students have practical sessions which help them to understand content permanently which enable them to score much better in the examinations.
3. There was no relationship found between the learning-thinking style and academic performance of secondary school students. Hence style of learning and thinking does not have any kind of relationship with academic performance of higher secondary school students.
   This conclusion (No.3) is supported by the number of studies: Garg (2011) [7], Warn (2005), Argon *et al*.; Dentino & DeTure *et al*. (as cited in Garg, 2011) [7]**.**

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