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# Style of Learning and Thinking and Academic Performance among Secondary School Students: An Explorative Study

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## ABSTRACT

**Introduction:** Learning is a lifelong process and naturally every individual can think and learn based on one's own pace governed by cognitive, affective and psychomotor domain which has a direct bearing on academic performance.

**Aim:** The study aims to determine the influence of the style of learning and thinking on Academic Performance among ninth class students of different schools.

**Methods:** For this research work, a survey method was adopted and a sample of 300 was chosen through random sampling.

**Result:** The findings show that girls having more of a whole-brain dominance than boys. Urban students have more right brain and left brain dominance than rural students. Aided school students seem to have more Right Brain and Whole Brain dominance whereas Government school students seem to have more Left Brain dominance, which is interesting. There is a significant negative relationship between age and academic performance among high school students, as they grow old, they seem to perform badly in academics. There is no relationship between right-brain dominance and academic performance. The most intriguing finding is a significant (5%) negative relationship between left-brain dominance and academic performance. The student with a dominant left brain seems to perform badly in academics.

**Conclusion:** The creative ability of the brain laid less importance at school levels which hinders new inventions and innovative thinking among school students. This may be attributed to rigid curricula-based teaching-learning methods which need a major renovation including structural and functional changes in the curricular framework.

**Key Words:** Academic Performance, Cognition, Left Hemisphere, Right Hemisphere, Style of Learning, Style of Thinking

## INTRODUCTION

The destiny of the nation is being shaped in the classroom - Kothari Commission strongly opined that the progress and prosperity of any county are shaped and moulded employing teaching-learning that takes place in the form of the educational process.<sup>1</sup> Education is not a simple process of filling up of the information and knowledge to the empty vessels/bottles, as it is strongly opposed by the contemporary educational psychologists to prove that the whole purpose of education is to modify the behaviour of the learner to the expected lines and aspiration of the society subsequently prepare him to be the responsible individual. The broader aim and objective of the educational system is to prepare the learner depending upon the social condition and expectations. Hence, the classroom is the place to tune an individ-

ual towards progressive thoughts and explorative attitudes. India is a progressive nation facing ample such issues and challenges in the field of education in general and teaching-learning in particular. Style of learning-thinking need to be productive and fruitful which mostly takes place in a vacuum or four walls of the classroom, However, the constructivist (Psychological perspectives) strongly opined that the classroom knowledge dissemination must be practical, intuitive, explorative and every learner has the unique potentiality to construct the knowledge on his own with minimum support by the teacher, which also equally depends on what drives him to acquire knowledge and the intellectual ability. Neuro-cognitive theories proved that cognition is fully functioning based on the nervous system that controls and operates the brain cells and also based on the dominance of the brain. Hence, Man is the most evolved animal on the earth in terms

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of brain development, evolutionary cognitive dominance and the well-developed organ system and very well structurally, Co-ordinate organ system, Brain is the basic organ of managing all the organ systems of the human body. The brain as an organ functions like a Central Processing Unit of a computer that controls the body organ system. The brain as an organ has its parts and function in a unique way which also determines the dominance of the left or right brain and its contribution to academic performance has always been an intriguing area and became more interesting for researchers after Sperry's finding on the split-brain model of intelligence.<sup>2</sup> It is after this study there has been some focus on the issue of left or right brain dominance and its effect on academic performance. Ned Hermann who is considered a pioneer in brain dominance study developed from Sperry's work and came out with the theory wherein a left dominant brain is more analytical and sequential whereas the right dominant brain is more interpersonal and imaginative Literature says right-brain dominance is different from left-brain dominance and it has a role in the context of academic performance.<sup>3</sup> A person who is dominated by his or her left brain is said to be better in logical, analytical and linear processing of information whereas the one with right-brain dominance is said to be better in visual, auditory, holistic and nonlinear processing of information.<sup>4</sup> Particularly in developing countries like India Educators or the System, do not give any importance or priority to brain dominance while educating or framing the policies. Better learning and expertise can be achieved if the children's interests, aptitude and brain dominance are taken into consideration before educating or framing educational policies. Teachers at all levels have issues with grabbing or retaining the attention of the children and keeping them focused during a session. On the other hand, children also have issues grasping or understanding what is been taught in the class, mostly due to the way it is taught. This is mainly because of the pattern of brain dominance of each individual.<sup>5</sup>

The human brain has two hemispheres and they have been naturally/involuntarily functioning the body equally in a crossed manner.<sup>6,7</sup> The right side of the body is controlled by the left side of the brain and the left side is controlled by the right side of the brain. There cannot be two masters or two bosses on the same line one part of the brain tries to dominate most of the time or all the time.<sup>8</sup> The fact that the left brainchildren are more logical analytical, mathematical and rules-based, they understand through logical analysis, numerical ability and have less trouble in expressing with precise words.<sup>9</sup> But right-brainers are creative, imaginative, and relatively good at linguistic abilities and more visual learners who like to see feel and touch. They are more efficient in processing holistic, integrated and emotional information. They often lack focus and move from one thought to another; they use more feelings to understand and are holistic learners. They want to know the whole picture and not parts to

understand. They are more into singing, music, arts and have trouble finding the right words to express even though they are clear in thoughts. There are children with whole-brain dominance which is a combination of left and right brain dominance, they use most of the above-discussed techniques separate or in combination to understand and learn.<sup>10</sup>

## REVIEW OF LITERATURE

In the present scenario and society in which we live, particularly in India, left-brain dominance is more preferred and respected than right-brain dominance. The system of education is memory and rote learning and the assessment or grading is done only focusing on the memory faculty of the brain and the system is also designed on the same lines where creativity and imagination are given less importance over memory. Children as they grow are taught and encouraged to work more from the left brain than right by enforcing memory and rote learning whereby the right side that controls emotions and relationships become discordant. Creativity takes a huge beating and is seldom preferred in schools.<sup>11</sup> It is better to focus on developing the whole brain and the education system should emphasize it rather than what is happening as of today.

Research studies have found that brain dominance is linked to the selection of occupations in life and academic majors in colleges and universities.<sup>12,13</sup> It is based on the analogy between learning styles and rules that govern the majors and the level of attunement between the majors and brain dominance.<sup>14,15</sup> Majors like Humanities and Art are the choice of right-brainers, whereas left-brainers prefer Science and Engineering opined that humanities students are right-brainers and natural science students are left-brainers.<sup>16-19</sup>

Koju, B et.al. examined the hemisphere brain preference and academic parameters among medial students and reported that 58.3% of students were left-brained, 16% were whole-brained and 23.6% were right-brained.<sup>20</sup> Mansour et.al. analyzed the hemispherical brain dominance and academic achievement among nursing students and the findings revealed that 61.6% of students were right-brain dominant and demonstrated that there is a significant relationship between brain dominance and academic achievement.<sup>21</sup>

The left side of the brain is the place of information processing, memory, logic, analysis, computation, classification and intellect.<sup>22</sup> Whereas right is more for controlling, intuition, emotion, attitude, music, songs and physical activities.<sup>8</sup> Researchers had come to a conclusion that brain dominance is of two types, left or right dominance but recent studies had suggested that this may not be so. It is more of 'operate on a continuum' therefore it is not advisable to classify dominance as left or right and make it look very objective rather it should be more of balanced or whole dominance.<sup>23,24</sup> But

left-brain dominance is preferred and is more acceptable in schools and classrooms because the system only focuses and stresses on analyzing and memorizing which is the job of the left brain.<sup>10</sup> Due to this practice often right-brain dominant students feel suffocated in classes because the creative part which they are good at is never welcomed or entertained.<sup>11</sup>

Research demonstrated that when students are taught according to their brain dominance they perform better and high scores are achieved when compared to the random teaching methods which do not take into account the brain dominance of the children.<sup>25,26,27</sup> When it comes to teaching and learning left-brain dominated students are more interested in deductive teaching and learn faster through that method. Whereas right brain dominated students prefer inductive teaching.<sup>28</sup> Right brainers are more into free writing whereas left-brainers are more into research paper writing.<sup>29</sup>

From the above review, it is evident that there is a need to emphasize the importance of brain dominance and academic performance and how the current system of education is looking at this issue in South India (Tamil Nadu), which is considered as the hub of academics in India. The present study tried to relate brain dominance and academic performance and also understand how brain dominance is looked at in different types of schools, in different areas of residence and is there any difference in brain dominance between genders.

## METHODS

The purpose of the paper is to analyse the influence of brain dominance on Academic performance among High school students and to assess their profiling effect if any. The participants of the study were high school students of class 8<sup>th</sup> and 9<sup>th</sup> from selected Metropolitan schools in Tamil Nadu and the Pondicherry region. All types of schools were included in the study, Government, Aided and Private schools. The sampling technique is multi-staged, a list of Government, Aided and Private schools in Chennai and Pondicherry city were made from which 5 schools at Random were selected under each category, in the first stage. In the second stage, a master list of students whose academic performance information is available and the school is willing to share and the student is also willing to participate in the study without any limitation or pressure was made. From this list, 25 students were selected at random from each school. Therefore 375 Questionnaires were administered and out of which 332 were found to be complete and fully usable therefore the final sample size was fixed at 332. The tool used for data collection was a structured questionnaire which consists of profiling questions in the first part and the part brain dominance measure was quantified through a five-point Likert's scale SOLAT (Styles of Learning and Thinking) developed

by Venkataraman was the second<sup>30</sup> Academic performance is the mean score of the students in their subjects on the continuous assessment system, which is a test for every month in an academic year.

**This research study was conducted as partial fulfilment of coursework of the Master of Education (M.Ed.) dissertation report. Pondicherry University reserves the rights of the publication.**

## FINDINGS

Brain dominance was largely classified into three categories which are as follows; Right brain dominance, Left brain dominance and Whole-brain dominance. A student whose relative score is considered as high on the right brain assessment or performance is treated as right-brain dominance and any student whose relative score is considered as a high score on the left brain is termed as left-brain dominance and a balanced score is termed as whole-brain dominance.

From Table-1, it can seem from the first 5 rows that there is no effect or gender difference in the Right or Left-brain dominance as the significance values for the F tests are above 0.05. But there is a significant difference (F significance is less than 0.05) between boys and girls in whole-brain dominance with Girls having more of a whole-brain dominance than boys. Among residence differences (second set of 5 rows) there is a significant (5%) influence on Right and Left-brain dominance but not on the Whole-brain. As the common understanding Urban students have more Right and Left brain dominance than rural students. Among the type of schools (third set of 5 rows), there is a significant (5%) difference in Right, Left and Whole-brain dominance between the types of schools they are studying. Aided school students seem to have more Right Brain and Whole Brain dominance whereas Government school students seem to have more of Left-Brain dominance, which is interesting. From all this, it can be concluded that Type of school has a major influence on Right and Left and Whole-brain dominance. Type of Residence influences Right and Left-brain dominance and Gender only influences Whole-brain dominance.

The profile variable differences on academic performance are provided in Table-2. There is a significant difference between boys and girls in the Academic performance totally and individually as the F significance for all are below 0.05. Girls seem to outperform boys in all the components of academic performance, with a better mean score. Area of Residence does not seem to influence much on academic performance except English where urban students are better than rural students, which has a significant (5%) F statistics. Type of school like gender has a major effect on Academic performance individually and totally. Private school students seem to perform much better than aided and government school

students in all aspects of academic performance with all the F significance below 0.05 and considerable higher mean scores. It can be concluded that Gender and Type of school have a major influence on Academic performance.

The relationship between brain dominance and Academic performance is provided in Table-3. It can be seen that there is a significant negative relationship between age and academic performance among high school students, as they grow old, they seem to perform badly in academics. Moving to the important findings of the study there is no relationship between right-brain dominance and academic performance, totally or individually. The most intriguing finding is there is a significant (5%) negative relationship between left-brain dominance and academic performance. A student with a dominant left brain seems to perform badly in academics. This could be due to brain functioning where the Left brain is more for creative aspects and less for memory and the Indian system of education is purely memory-based and focuses only on the memory faculty of the brain. Therefore, a left dominant student is likely to perform badly in academics. It is the whole brain dominance that is ideal for students, whole-brain dominant students perform much better in academics and there is a significant (5%) positive relationship between whole-brain dominance and academic performance, individually and totally. This could be cliché but a balanced brain or whole-brain dominance is ideal for a kid as the creative and memory faculty need to function well for a good performance in academics and life.

## CONCLUSION

Neuroscientists believed that two sides of the brain collaborate to perform a broad variety of tasks and two hemispheres communicate through corpus callosum no matter how lateralized the brain can get, though, the two sides still work together.<sup>31</sup> Theory of Brain Dominance says that there is always an inclination on the part of the individuals in using one hemisphere over the other. The analytical and rational qualities are with the left hemisphere while the right is more about intuition and visualization. This research work may help in identifying the dominant side of the brain and how one can use it effectively to optimize the learning experience. Brain dominance is a pattern where different hemispheres of the brain are used for learning and listening activates and most often one side of the brain is consistently used over the other. 'Brain dominance was expressed in terms of how we prefer to learn, understand and express something'.<sup>32</sup> The term brain is often associated with thinking. However, many functions are associated with a particular hemisphere of the brain like Motor control and Language ability. But to conclude that one hemisphere is dominant over the other is not fair for most activates and many individuals possess the quality of double dominance where both the hemispheres are used

equally, this is made possible by their preferential mode of thinking.<sup>33</sup> Individuals who possess or display double dominance will be able to use both hemispheres equally for logistical thought processing and intrinsic creativity. This quality is termed whole-brain dominance or integrated dominance. Koju, B et.al. analyzed the hemisphere brain preference and academic parameters and found that 58.3% of students were left-brained, 16% were whole-brained and 23.6% were right brained.<sup>20</sup>

Students do learn better when the learning preference characteristics are being attended properly by their teachers, hence, it is imperative the educators must be aware of student's strengths including multiple intelligences, learning preferences, emotions, logical ability, language proficiency, numerical ability, imagination etc., Mansour et.al. study revealed that the hemispherical brain dominance and academic achievement and found that 61.6% students were right-brain dominant and established that there is a significant relationship between brain dominance and academic achievement.<sup>21</sup>

The study aimed to comprehend the pattern of brain dominance and how they relate to academic performance in the Indian context and system of education. The results are interesting as right-brain dominance is bad and left-brain dominance is good for academics but the ideal one is whole-brain dominance. This finding does not give a good signal as the more important ability of the brain, the creative ability is given less importance and its dominance is not encouraged.

In the given scenario, how can the young and future generations be creative and innovative? The Indian education system is in the process of making robots or machines that are expected to execute and not be creative or innovative. This is one of the reasons for Brain Drain especially talent of higher-order and many moving to the western world for higher education and preferring to stay back there thereby creating a vacuum for innovation and creativity in India. It is time the Government and the policymakers understand this and take a relook at the system of education including curriculum, instructional strategy, so that desirable educational goals among the students may be set thereby national goals shall be attained through educational means.

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All work of the research study was carried out by the first author including conceptualization, analysis and interpretation and the data collection responsibility essentially carried out by the second author.

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**Table 1: Influence of profiling variables on the Brain (Independent variable)**

	Right Brain			Left brain			Whole Brain		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
N	179	153	332	179	153	332	115	88	203
Mean	27.06	26.35	26.73	19.94	19.99	19.97	4.64	6.34	5.38
F		1.78			0.01			5.82	
Sig.		0.18			0.93			0.02	
Residence	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total

Table 1: (Continued)

	Right Brain				Left brain				Whole Brain			
N	157	175	332	157	175	332	124	79	203			
Mean	26.15	<b>27.25</b>	26.73	19.34	<b>20.53</b>	19.97	5.69	4.89	5.38			
F		4.269			4.089			1.247				
Sig.		<b>0.04</b>			<b>0.04</b>			0.27				
School	Private	Govt	Aided	Total	Private	Govt	Aided	Total	Private	Govt	Aided	Total
N	124	108	100	332	124	108	100	332	95	71	37	203
Mean	27.35	24.79	<b>28.05</b>	26.73	18.08	<b>22.61</b>	19.45	19.97	5.92	3.96	<b>6.73</b>	5.38
F		14.586				24.477				4.9		
Sig.		<b>0</b>				<b>0</b>				<b>0</b>		

Table 2: Influence of profiling variables on the Academic Performance (Dependent variable)

	Gender	N	Mean	F	Sig.	Residence	N	Mean	F	Sig.	School	N	Mean	F	Sig.
Tamil	Male	179	65.74	32.35	<b>0</b>	Rural	157	26.15	4.51	0.04	Private	124	<b>80.44</b>	56.17	<b>0</b>
	Female	153	<b>76.41</b>			Urban	175	27.25			Govt	108	58.93		
	Total	332	70.65			Total	332	26.73			Aided	100	71.18		
											Total	332	70.65		
English	Male	179	65.49	11.62	<b>0</b>	Rural	157	19.34	11.10	0	Private	124	<b>78.93</b>	80.10	<b>0</b>
	Female	153	<b>71.85</b>			Urban	175	20.53			Govt	108	55.38		
	Total	332	68.42			Total	332	19.97			Aided	100	69.47		
											Total	332	68.42		
Maths	Male	179	64.68	11.03	<b>0</b>	Rural	124	5.69	0.27	0.61	Private	124	<b>79.77</b>	98.14	<b>0</b>
	Female	153	<b>70.90</b>			Urban	79	4.89			Govt	108	54.53		
	Total	332	67.55			Total	203	5.38			Aided	100	66.45		
											Total	332	67.55		
Science	Male	179	65.18	14.39	<b>0</b>	Rural	157	72.83	1.91	0.17	Private	124	<b>80.81</b>	105.78	<b>0</b>
	Female	153	<b>72.40</b>			Urban	175	68.70			Govt	108	54.43		
	Total	332	68.51			Total	332	70.65			Aided	100	68.46		
											Total	332	68.51		
Social	Male	179	68.13	13.02	<b>0</b>	Rural	157	71.69	0.01	0.91	Private	124	<b>80.56</b>	83.62	<b>0</b>
	Female	153	<b>74.52</b>			Urban	175	65.48			Govt	108	58.08		
	Total	332	71.07			Total	332	68.42			Aided	100	73.34		
											Total	332	71.07		
Total	Male	179	329.51	18.98	<b>0</b>	Rural	157	67.03	1.71	0.19	Private	124	<b>401.04</b>	108.16	<b>0</b>
	Female	153	<b>366.44</b>			Urban	175	68.01			Govt	108	281.85		
	Total	332	346.53			Total	332	67.55			Aided	100	348.80		
											Total	332	346.53		

**Table 3: Relationship between Brain Dominance and Academic Performance**

		Age	Right Brain	Left brain	Whole Brain	Tamil	English	Maths	Science	Social	Total
Age	Correlation	1	-.041	.112	-.095	-.203	-.216	-.093	-.134	-.216	-.191
	Sig.		.459	.041	.177	.000	.000	.091	.014	.000	.000
	N	332	332	332	203	332	332	332	332	332	332
Right Brain	Correlation	-.041	1	-.569	-.401	.045	.085	.093	.084	.120	.096
	Sig.	.459		.000	.000	.418	.123	.089	.125	.029	.081
	N	332	332	332	203	332	332	332	332	332	332
Left Brain	Correlation	.112	-.569	1	-.601	-.314	-.358	-.330	-.301	-.303	-.352
	Sig.	.041	.000		.000	.000	.000	.000	.000	.000	.000
	N	332	332	332	203	332	332	332	332	332	332
Whole Brain	Correlation	-.095	-.401	-.601	1	.310	.268	.266	.252	.237	.292
	Sig.	.177	.000	.000		.000	.000	.000	.000	.001	.000
	N	203	203	203	203	203	203	203	203	203	203
Tamil	Correlation	-.203	.045	-.314	.310	1	.872	.782	.806	.816	.927
	Sig.	.000	.418	.000	.000		.000	.000	.000	.000	.000
	N	332	332	332	203	332	332	332	332	332	332
English	Correlation	-.216	.085	-.358	.268	.872	1	.793	.849	.838	.932
	Sig.	.000	.123	.000	.000	.000		.000	.000	.000	.000
	N	332	332	332	203	332	332	332	332	332	332
Maths	Correlation	-.093	.093	-.330	.266	.782	.793	1	.791	.724	.879
	Sig.	.091	.089	.000	.000	.000	.000		.000	.000	.000
	N	332	332	332	203	332	332	332	332	332	332
Science	Correlation	-.134	.084	-.301	.252	.806	.849	.791	1	.847	.925
	Sig.	.014	.125	.000	.000	.000	.000	.000		.000	.000
	N	332	332	332	203	332	332	332	332	332	332
Social	Correlation	-.216	.120	-.303	.237	.816	.838	.724	.847	1	.907
	Sig.	.000	.029	.000	.001	.000	.000	.000	.000		.000
	N	332	332	332	203	332	332	332	332	332	332
Total	Correlation	-.191	.096	-.352	.292	.927	.932	.879	.925	.907	1
	Sig.	.000	.081	.000	.000	.000	.000	.000	.000	.000	
	N	332	332	332	203	332	332	332	332	332	332