Research Paper   **Education**

Influence of Brain Dominance in Activating Multiple Intelligence of the Students at Higher Secondary Level

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ABSTRACT

This study attempts to explore the influence of brain dominance in activating multiple intelligence of the higher secondary students in selected schools of Chennai district. A descriptive survey study in which data was collected from 1000 students of both boys and girls with the help of the standardized SOLAT tool and validated multiple intelligence tool. The collected data were scrutinized and statistical applications were made to elicit the information. The study reveals that students with integrated brain dominance were found to have greater language intelligence, reasoning intelligence, creative intelligence, social intelligence, naturalist intelligence, value oriented intelligence and artistic intelligence. Students with left brain dominance were found to have greater sports intelligence. Students with integrated brain dominance and right brain dominance were found to have greater visual intelligence. Computer intelligence was greater for students with right and left brain dominance. Students with mixed brain dominance were found to have greater emotional intelligence and value oriented intelligence.

KEYWORDS | Brain dominance, SOLAT-Students style of learning and thinking, Multiple Intelligence.

Introduction

The brain governs all human activities like learning, thinking, understanding, seeing, hearing and behavior. But these human activities differ from one person to another due to brain dominance. Students differ in their physical, mental and emotional abilities. They also differ in their way of learning, thinking and the kind of intelligence (Klein 2003), (Posner 2004) and (Rees, 2002).According to Williams (1983) "The brain has two hemispheres but, too often the education system operates as though there was only one". It is believed that the left and right hemispheres of the brain employ different strategies while processing different information (Jensen, 2008; Williams, 1983). In the current education system, the left brain hemisphere receives more training and exercise than the intuitive and creative right brain hemisphere. For the students to excel in today's marketplace, they need certain attributes ("Smarts") beyond academic intelligence like creativity, social skills, reasoning skills, digital literacy and emotional balance. These "Smarts" bring about student's success in life and career.

Significance of the Study

Developing multiple intelligence of the students with regard to brain hemisphericity will help the students to excel in their academic pursuits. According to the theory of multiple intelligence by Howard Gardner (1983), every student in every classroom possesses a collection of 9 intelligences in varying degrees of strength.Every brain is uniquely organized. (Caine and Caine 1997). According to Gazzaniga (1998), each brain hemisphere contributes its special functions to cognitive, affective, and physical activities, neither of the hemispheres is superior to the other; they just have different specialized functions. This research study findings would help the teachers to design the learning experience, curriculum, teaching, and assessment catering to the preferences of the students; which in turn would help to transform the educational system to be an instrument for preparing students to compete in the 21st century competitive world as productive members. Hence the significance and scope of the study is based on this concept of perspective.

Objective of the study

The foremost objective of the study is to analyze the influence of differences in the brain hemispheric preferences in activat-

ing various types of concepts of multiple intelligence.

Operational Definitions

Brain hemisphericity: It refers to the cerebral dominance of an individual in retaining and processing different modes of information in his own style of learning and thinking (Venkataraman 1989).

Multiple Intelligence: Multiple intelligence comprises of both inborn intelligences and developed intelligences. Howard Gardner (1999) defines Multiple Intelligences as "A bio-psychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture".

Methodology of the study

Descriptive study, cross sectional in approach and survey method of research was chosen for the present study. The data was collected by applying systematic random sampling technique. The collected data was scrutinized and was subjected to statistical application.

Sample

The data for the present investigation was collected from 1000 higher secondary school students comprising of 508 boys and 492 girls from 25 schools belonging to government, aided and private type of management .The study is undertaken in and around the places of Chennai district.

Research Tools

The research tool 'Students Style of Learning and Thinking' (SOLAT) prepared and standardized by Venkataraman (1989) and modified in the year 2014 was administered to measure brain dominance. The reliability of the tool is 0.876.The concurrent validity of the tool was found to be 0.863.

The Investigator developed a three point scale multiple intelligence tool (2014) and validated it by adopting systematic process for validation. The reliability of the tool was found to be 0.874 using split half method and 0.946 using test- retest method. The concurrent validity of the tool was found to be 0.834. The multiple intelligence tool was constructed to measure 13 multiple in-

telligence skills based on Howard Gardner's multiple intelligence theory and the intelligences was grouped under cognitive, affective and psycho motor domain of Bloom's Taxonomy.

Data Analysis
The statistical technique employed in this study was F-test. The results are presented in the following tables.

Table 1- Differences among the four brain dominants in the Cognitive domain based multiple intelligences.

cognitive domain multiple intelligences	Right Brain N = 226		Left Brain N = 241		Integrated Brain N = 508		Mixed Brain N = 25		F value	Groups Differ Significantly
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D		
Language	12.75	2.97	12.68	3.03	11.02	2.74	11.04	3.28	6.58**	(1,3) (2,3)
Visual	13.52	3.10	12.48	3.35	13.63	2.77	13.40	3.92	8.30**	(1,2) (2,3)
Reasoning	12.06	3.42	11.79	3.43	12.93	3.01	13.40	2.34	8.97**	(1,3) (2,3)
Creativity	12.68	3.37	13.42	3.30	13.56	3.91	12.92	3.41	9.92**	(1,3)

*** Significant at 1% level*

From the above table it is clear that the calculated F value is more than the table value for language intelligence, visual intelligence, reasoning intelligences and creative intelligences which conclude that there is significant difference in these intelligences with regard to brain dominants. Hence in these cases the above stated hypothesis is accepted.

Hypothesis Testing-2: Brain Hemisphericity influences some types of Affective domain based multiple intelligences.

Table 2: Differences among the four brain dominants in the Affective domain based multiple intelligences.

Affective domain multiple Intelligences	Right Brain N = 226		Left Brain N = 241		Integrated Brain N = 508		Mixed Brain N = 25		F value	Groups Differ Significantly
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D		
Social	14.02	3.30	13.31	3.19	14.48	2.65	14.00	2.06	8.61**	(2,3)
Musical	12.86	2.95	11.40	4.02	11.58	3.62	10.92	3.45	0.83	(1,2) (1,4)
Emotional	13.45	2.99	12.26	3.25	13.87	2.91	14.72	3.96	3.51*	(1,4) (2,4)
Naturalist	14.11	4.08	13.69	3.90	14.96	3.33	15.24	2.93	7.77**	(1,3) (2,3)
Value Oriented	12.61	3.46	12.10	3.52	13.92	3.21	14.20	3.13	19.67**	(1,3) (2,3) (2,4)

*** Significant at 1% level   * Significant at 5% level*

From the above table it is clear that the calculated F value is more than the table value for social intelligences, musical intelligences, emotional intelligences, naturalist intelligences and value oriented intelligences, which concludes that there is significant difference in these intelligences with regard to brain dominants. Hence in these cases, the above stated hypothesis is accepted.

Hypothesis Testing-3: Brain Hemisphericity influences some types of psychomotor domain based multiple intelligences.

Table 3: Brain Hemisphericity influences some types of psychomotor domain based multiple intelligences.

psychomotor domain multiple intelligence	Right Brain N = 226		Left Brain N = 241		Integrated Brain N = 508		Mixed Brain N = 25		F value	Groups Differ Significantly
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D		
Artistic	11.81	4.17	9.40	4.19	10.83	4.31	10.24	3.45	7.24**	(1,3) (2,3)
Mechanical	10.45	3.70	12.88	3.61	12.07	3.75	12.52	4.09	1.06	(1,2)
Sports	12.99	3.96	12.58	3.80	11.44	3.99	11.80	4.51	4.57**	(2,3)
Computer	12.01	4.28	12.00	4.27	10.99	4.59	11.96	4.17	4.36**	(1,3) (2,3)

*** Significant at 1% level   * Significant at 5% level*

From the above table it is clear that the calculated F value is more than the table value for artistic intelligence, sports intelligence, mechanical intelligence and computer intelligence which concludes that there is significant difference in these intelligences with regard to brain dominants. Hence in these cases the above stated hypothesis is accepted.

Findings of the study:
- The cognitive domain based language intelligence is activated in the students with both right and left brain dominance.

Hypothesis Testing-1: Brain Hemisphericity influences some types of cognitive domain based multiple intelligences.

- The cognitive domain based visual intelligence is activated in the students with right, integrated and mixed brain dominance.
- Students with integrated brain dominance are found to be greater in cognitive domain based reasoning intelligence and creativity intelligence.
- The affective domain based musical intelligence is activated by right, integrated and mixed brain dominance.
- Students with integrated brain dominance have greater affective domain based naturalist intelligence, value oriented intelligence and social intelligence.

- The affective domain based value oriented intelligence is activated in the students with mixed brain dominance.
- Students with integrated brain dominance are found to have more psycho motor domain based artistic intelligence.
- Students with left brain dominance are found to have greater psycho-motor domain based sports intelligence and mechanical intelligence.
- Students with right and left brain dominance are found to have greater computer intelligence.

Conclusion
Brain hemisphericity is a cerebral dominance of the individual responsible for activating different types of multiple intelligence in different chambers of the brain. The avalanche of research findings concludes that the brain does the myriad functions, but some of the intelligence function is specialized for the activation in a particular brain hemisphere. The classroom instructional activities can be modified according to the brain's learning - thinking preferences and also taking into account students' various intelligences of varying degrees of strength.

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