Chapter I
INTRODUCTION

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“The brain is the last and grandest biological frontier, the most complex thing we have yet discovered in our universe. It contains hundreds of billions of cells interlinked through trillions of connections. The brain boggles the mind.”

(James Watson, Director, National Center for Human Genome Research)

1.1 INTRODUCTION

Education is the manifestation of perfection already existing in man. In the light of this philosophical expression of education contributed by Swami Vivekananda, the aim of education must be the ultimate development of the self to the maximum fullest level. Self expression in a complete way is the core of different schools of education, whether it is philosophical, psychological, sociological or theological. The essence of education is in the totality of knowing about oneself. However rich the content is, however effective the methodology is, however perfect the transaction of knowledge from an expert professional is, it has of no use, if the receptor of knowledge is not realizing himself to accommodate the new frontiers of knowledge into his existing schema. Thus, for the systematic absorption, assimilation and reproduction of knowledge, one must find out his own particular and effective methods and means, which is no doubt, heterogeneous to each person. In this context, the educationalists and psychologists of the new era are thinking about a comprehensive strategy for better ways of teaching and learning, so as to obtain the ultimate realm of knowledge absorption. Brain based learning techniques are the resultant methodology of this progressive neurological thought of education.
Brain based educational techniques enables oneself to develop his ultimate potentiality in an easy way so as to get maximum pace and difficulties of knowledge acquisition to the minimum. It will of course, result in a self enjoying ways of knowledge acquisition. This psychological thought of education is of recent origin and is spreading over widely and is gaining attention of educationalists globally. The actual principle behind brain based education is learning to learn ‘how to learn’. Education is the process of natural development of the child into an enjoyable, rational, harmoniously balanced, useful citizen for natural life. So pupil’s nature is an essential factor in the educative process. The function of education is to lead the child nearer to reality and to guide him towards his utmost possible perfection. Most of the researches from neurology, psychology and education suggest that teachers should implement more student-centered, differentiated instructional models for the better and lasting learning outcomes of students.

The scientific and technological revolution brings forth tremendous changes in the educational pattern, which in turn, makes the pupil more competitive and self sufficient. To maintain the standards of education at all levels, the pedagogic vision must emphasize child-centric and activity oriented learning. The National curriculum stresses upon process-oriented teaching-learning strategies for the improvement of quality of instruction.

Teachers are often exhorted to do, is to allow students to construct their own knowledge, to attain higher level cognitive learning outcomes, to work at their own pace and to provide all students with opportunities to engage in learning tasks. However, researches in school performance and learner achievement in different academic subjects indicated that these things seldom occur. This causes disruptive
student learning outcomes and there occurs a discrepancy between what is happening and what education would like to see happening. It is this dilemma that made the researchers to focus on the learner characteristics as the most important factors in the learning process. Identification of learning style dimensions and other specific behavioural, affective, and environmental characteristics of the students go a long way in solving such a crisis.

Educators are intrigued with research in the neurosciences from which to draw implications and applications for teaching and learning. Neuroscience considers human mind like a dynamic kaleidoscope that is energized by genetic background, experiences, and culture.

The brain is an amazing, complex and adaptive neural network consisting of the basic units called as neurons. All brains are unique and the activities of it are the product of the interaction between the neurons and those with different environments. Brain processes different and varied experiences based on these interactions. Plasticity is the term used to denote such generating processes of variety of experiences throughout the changing environment.

Developments in the brain based learning area started as a momentum from 1960’s onwards. From that time, neurosciences seek for the development of apt and advanced strategies to cope up with the evolution of the brain capacity and learning activities based on these strategies. Individualized learning, co-operative learning, interpersonal learning and the like existing strategies can be validated by the findings arrived by the neuroscientists after intensive research activities. Multiple Intelligences theory put forwarded by Gardner, co-operative learning theory,
collaborative learning theory and the like existing theories regarding the processes of learning find its roots directly to Brain Based Learning.

It is the era of educational reforms and it is believed to be individualistic as the exposure of vast knowledge development through computers and other software and instructional technologies. Now, besides formal education, the potentials of the students are being tested for variety and are extremely individualistic based on the dynamic shift in the propagation of knowledge.

More and more educators are becoming familiar with brain based research and recognizing its tremendous application in improving the practice of teaching and learning. The future holds the promise of a deeper understanding of the learning process, in the light of the advancements in neuroscience based education.

1.2 Need and Significance of the Study

How the brain learns has been a matter of puzzling interest to all kinds of teachers of all the times across the world. Educators have been trying to understand the working of the brain so that teaching learning could be made more effective. Teachers try to change the human brain every day indirectly by way of their instructional styles. Increased understanding of how the brain learns paved the way for neuroscience based education. The biological principles of education, of course, brings more instructional options and are helpful in devising strategies that can make the teaching learning process more efficient, effective, and enjoyable.

Neuroscience will reveal the basis of academic skills such as reading, writing and arithmetic and what to do about children at risk of failing to learn these skills. Neuroscience could replenish special need education, by enabling the teacher and
the curriculum administrators to design programmes that optimize learning for satisfying all the needs of different learning community.

Generally, people favour the use of either the right brain or the left brain side over the other. However, some of them equally adept at utilizing both the hemispheres and are known as whole brained. Adult learners tend to adopt the left hemispheric preference of learning which predominantly focusing on logical thinking, rational analysis and memorization rather than right hemispheric preference of learning such as feeling, intuition and creativity.

Prevailing teaching techniques should be revaluated and broadened and innovative teaching techniques should be implemented in the light of new information about how the brain operates. Also, these provide a remedial learning experience to the learners by incorporating their learning style with functional awareness of their hemispheres so that better enhancement of their scholastic achievement can be ensured.

The knowledge of hemispheric preferences provides a way to evaluate the present education system, in terms of teaching, learning and evaluation. At primary level, students naturally think and learn in different ways. Even then, they have the tendency to adhere with the natural learning style. Teachers must encourage their students to develop and use both hemispheric thinking styles to attain greatest possible range of their mental abilities. Teachers must reconstruct the techniques for transaction of knowledge to cope up with the satisfaction of diversified thinking styles of the heterogeneous learners in front of them. For them it is inevitable to practice both right and left hemispheric teaching style to satisfy the students in front of them with “two-mind”.

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Thus it is important to understand the concept of hemispheric preference and preferred styles of learning for a flexible and effective teaching in the classroom. Thus the awareness about the different thinking styles makes learning more natural and teaching more effective. Students naturally think and learn in different ways. Even though there are many methods to instruct the same subject, the problem arises when teachers are not able to match their teaching styles with the heterogeneous learning style of the learners. This mismatch in turn leads to insufficient educational experience among the learners.

More and more educators are becoming familiar with brain based research and recognizing its tremendous application in improving the practice of teaching and learning. The future holds the promise of a deeper understanding of the learning process, in the light of the advancements in neuroscience based education.

The concept of hemisphericity and its differential utilization is presumed to be reflected in the individual’s ‘cognitive styles’, that is a person’s preferences and approaches to various mental labour. Hemisphericity has been claimed by different sources to extend not only to perception but to all kinds of intellectual and personality dimensions.

The brain is a simultaneous processing system, therefore, learning is enhanced by a rich, stimulating environment and the use of a variety of teaching strategies. Since human development follows reasonably predictable patterns, an understanding of the developmental stages helps teachers know what to expect of students at different ages. All brains are equal, and the structure is affected by learning. Using multiple approaches and teaching through multiple modalities will appeal to student’s interest and learning preferences. This knowledge is essential for
planning age appropriate instruction and multi methodology approach for recognizing those students whose development is delayed or disordered.

The strategy based on the hemispheric preference techniques will track the effect of learning in developing the brain on individual children. The hemispheric preference strategies foster in intellectual, social and emotional development of the pupils which in turn, the academic achievement and personal gains.

The hemispheric preference strategy focuses on the brain as an organ of thinking and learning and helps the teachers to adopt an approach, in which more instructional options become available. Increasing the instructional options by teachers will definitely result in the successful learning of children.

It is hoped that the present investigation will enable the parents and teachers to know the neurological style of their young ones and arrange learning environment based on pupil’s nature of preferences. The findings of the study will be of great use to all those concerned with difficulty to find out an appropriate learning style; which will end in a common goal.

The study will help the teachers to identify and equip with suitable neurological style of teaching and to reach all the students who share their same or different neurological style of learning.

1.3 Statement of the Problem

The study was intended to explore the influence of hemispheric preference strategies on the neurological style of learning and teaching among the primary school students and teachers of Kerala state. The fact that student learning outcomes are influenced by an array of variables that are both intrinsic and extrinsic which are
presumably interplaying together; quite often in an intertwined fashion. There is congruency among psychologists, educationists and neuro scientists that the central nervous system-brain is the locus of control of all the activities of the human body-which are muscular and glandular in nature.

The possibility of nerve cells and associated nerve impulses which are harpening upon the cortical cells of the brain are in pinching upon the organism for actions. It is also an approved fact that the nerve cells once dead is dead forever; there is no recapitulation or rejuvanalisation of lost nerve cells. The hemisphericity of brain as two equal halves as right lobe and left lobe has its direct control of all the activities of the human being which are reflected in many ways such as increased capability in one case of failure to function effectively in another situation. It is at this juncture, the investigator thought of a plan for ensuring increased learning outcomes among our primary school students, utilizing neurological teaching styles and neurological learning styles based on the hemispheric structure of the human brain. Thus the problem for the present study is worded as ‘Influence of Hemispheric Preference Strategies for Enhancing Neurological Teaching and Learning Styles of Primary School Teachers and Students of Kerala’.

1.4 Definition of Key terms

Some of the terms that needs clarification that operationally defined below:

**Influence:** - as used in the study, influence stands for the effect of a variable or a set of variables which are capable of altering the outcomes in a specified way; either positively enhancing as result of the interplay of the variables or debilitating the outcomes as a result of the introduction of the variables subjected for interplay.
In the context of the present study influence stands for changes in the learning outcomes of primary school students as a result of neurological teaching adopted by the teachers and neurological learning adopted by the students.

**Hemispheric Preference Strategies:** As contained in the study this stands for activities and techniques adopted by investigator in the instructional process utilizing the preferred mode of cognitive processing based on dominants of right hemisphere or left hemisphere in human behavior and the associated mental operations.

It indicates the profuse usage of either the left brain or the right brain or the whole brain utilization in the learning process; the dominants of which is to be evidenced by hemispheric preference test.

**Neurological Teaching Style:** - as used in the study it is the natural teaching style based on appositional or propositional style of an individual.

Apposional style refers to the left brain preferences and propositional style refers to the right brain preferences of an individual.

**Neurological Learning Style:** - As used in the study, it is the natural learning style of a student based on appositional style or propositional style.

Appositional style refers to the left brain preferences and propositional style refers to the right brain preferences of an individual.

In the present study neurological learning style was measured in terms of the scores obtained on Scholastic Achievements Test developed by the investigator.
Primary School Teachers: teachers teaching from standard I – VII in the schools recognized by the General Education Department, government of Kerala.

In the present study Primary School Teachers hailing from Kannur, Ernakulam and Thiruvananthapuram Districts were considered.

Primary School Students: in the present study students attending Standard VI admitted in Under the General Education Department, Government of Kerala

1.5 Hypotheses set for the Study

1. There exists significant difference between the left and right hemispheric preferences among primary school teachers for the total sample and relevant sub samples based on
   a. gender
   b. type of institution
   c. locale
   d. subject of teaching

2. There exists significant difference between the left and right hemispheric preferences among primary school students for the total sample and the sub samples
   a. gender
   b. type of institution
   c. area

3. The hemispheric preference based teaching strategy has significant effect on neurological teaching styles of primary school teachers.
4. The hemispheric preference based learning strategy has significant effect on neurological learning styles of primary school students.

5. The hemispheric preference learning strategy has significant effect on the scholastic achievement of primary school children.

6. There will be significant difference in the effectiveness of hemispheric preference instructional strategy and hemispheric learning strategy over the prevailing teaching methods.

7. The hemispheric preference teaching strategy is highly effective in transaction of the content.

1.7 Objectives of the Study

The following objectives were formulated for the conduct of the present study:-

1. To find out the hemispheric preference of primary school teachers using Hemispheric Preference Teaching Scale (HPTS) for the total sample and for the relevant sub samples based on
   a) gender
   b) type of institution
   c) locale
   d) subject of teaching

2. To find out the hemispheric preferences of primary school children using Hemispheric Preference Tests (HPT) for the total sample and for sub sample
   a) gender
   b) type of institution
   c) area
3. To examine the effectiveness of hemispheric preference teaching strategy for enhancing neurological teaching styles of primary school teachers for experimental groups and control groups.

4. To examine the effectiveness of hemispheric preference learning strategy for enhancing neurological learning styles of primary school students for experimental groups and control groups.

5. To compare the effectiveness of hemispheric preference instructional strategy with that of the existing activity based learning strategy.

6. To compare the effectiveness of hemispheric preference instructional strategy with that of hemispheric learning strategy on scholastic achievement in science.

Procedure:

The present study was conducted in two phases

Phase I. Survey method

Phase II. Experimental Method.

Phase I: Survey method was employed to find out the hemispheric preference of primary school teachers for neurological teaching; which was measured by administering Hemispheric Preference Teaching Style (HPTS). This was followed by administering hemispheric preference learning style on students.

Phase II: Experimental method was adopted to find out the effectiveness and compare the hemispheric preference teaching strategy and neurological learning strategy of teachers and students on select schools on select samples.

Thus survey cum experimental study was adopted for the study.
1.8 Tools Employed for the Study

1. Hemispheric Preference Activity Oriented Test for Primary School Children
   (Dr. K.P. Suresh & Chaithannya R, 2008)

2. Hemispheric Preference Spot Test for primary school children
   (Dr.K.P.Suresh & Chaithannya R. 2008)

3. Hemisphere Preference Paper Pencil Method for Primary School Students
   (Dr. K.P. Suresh & Chaithannya R, 2008)

4. Hemispheric Preference Learning Style Inventory for Primary School Students (Dr. K.P. Suresh & Chaithannya R. 2008)


11. Achievement Test on Science for VI th grade students
The details of each of the above tools are given in Chapter III Methodology.

1.9 Statistical Techniques Employed

The following statistics and techniques were employed for the conduct of the present study

i. Percentage Analysis

ii. Test of significance of difference between means

iii. Test of significance between percentages

iv. Analysis of Co Variance (ANCOVA)

1.10 Scope and Limitations of the Study

The present study yields vast openings in the pedagogical transactions of curriculum meant for primary school students. Neurological style of teaching and learning is relatively new and is emerging as a powerful technique, supplementing and complementing the learning outcomes of students. Hemispheric preferences, when identified properly, enable the teacher to alter the teaching styles and strategies of the teacher befitting to the learner’s preferential styles. Thus the study seems gaining wider acceptance in the plethora of enhanced learning to be attained by our young generations in the primary class rooms.

Recent developments in the field of neuro-cognitive sciences paved the way for understanding better, how a learner progresses himself, utilizing the preferred learning styles, based on hemispheric teaching styles. That is to say, tapping the preferred learning styles and supplying activities, appropriate to the hemispheric preferences guarantee enhanced learning. The teacher’s strategies find its due
recognition as reflected in the increased learning outcomes. Studies based on neurological teachings support this central idea.

Thus the present study seems to be an ‘eye opener’ to our school teachers; Educationists; Curricular experts and those interested in Education to consider the plausible influence of hemispheric preferences of teachers and neurological learning styles of students. Curricular activities can be so adjusted, according to the hemispheric preferences of our learners. Thus the study seems to be the onset of a platform for considering the left brain- right brain hemispheric preference in the process of learning, apart from the known and being practiced psychological principles applied in the discipline of education.

1.11 Delimitations of the Study

The present study was confined to the learning outcomes of primary school students in science subjects. The effect of hemispheric neurological teaching style and learning style on other school subjects were not attempted in the present study due to lack of time. The neurological teaching styles of the teachers were not measured as such but it was inferred through gain score analysis of the difference in scholastic achievement of students. The pre test - post test difference in the scores on achievement test conveyed the effectiveness of the strategy employed by the researcher which is conceived as neurological learning styles. Only primary school students attending standard VI were considered for the conduct of the study and also to test the effectiveness of neurological teaching styles of teachers and neurological learning styles of students. The developed strategy was applied only for primary school level. The students were not tested for complex, higher order mental
capabilities. The strategy can be applied for Secondary and Higher Education levels so that a meaningful conclusion can be deduced.

The investigator not able to conduct case studies which are innovative part of psycho educational studies. There may be chances for mass effect on the study. The size of the sample is restricted to 460 cases. The investigator feels herself that she couldn’t focus individually every student covered for the hemispheric preference test.

While admitting the above mentioned delimitations, the investigator feels herself that the study yields valid conclusions since she adopted all scientific procedures in the development of tools, selection of samples, in the testing procedures, analysis of data and deducing conclusions from facts and figures.

1.12 Organization of the Report

The study has been reported in six chapters

**Chapter I:** Introduction: deals with need and significance, hypothesis formulated, objectives of the study, procedure and scope and delimitations of the study

**Chapter II:** Theoretical Constructs on Brain Based Education; Hemispheric Preferences in Neurological Teaching and Neurological Learning Styles presents a detailed theoretical description of the various factors involved in neurological teaching and neurological learning.

**Chapter III:** presents a review of related literature and related studies on brain based learning and neurological teaching and neurological learning styles.
Introduction

**Chapter IV:** methodology describes the design of the study, variables of the study, description of tools and statistical techniques employed for the study.

**Chapter V:** describes the analysis of data taken up in the order of objectives of the study followed by interpretation of obtained results followed by a discussion of the validity of the hypothesis set for the study

**Chapter VI:** presents a short resume of the study, major conclusions, educational Implications of the findings, and suggestions for further research in the area.