EFFECTIVENESS OF TEACHING BASED ON BRAIN RESEARCH WITH REFERENCE TO ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS

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Abstract

Leslie Hart (1983) argues that teaching without an awareness of how the brain learns is like designing a glove with no sense of what a hand looks like. If classrooms are to be ‘places of learning’, than Brain ‘the organ of learning’ must be understood and accommodated. From this perspective the Brain will be increasingly relevant for thinking about educational practices. Owing to this, continuous efforts give rise to Brain based learning. It is nothing, but teaching based on brain research, which depends on the 12 core Brain/mind learning principles (Caine & Caine, 2002), derived by various neurological researches.

The present study has employed Quasi Experimental design with comparison groups following pre-test/ post-test method. The main objective of the study was to apply Brain/mind learning principles in developing Brain targeted teaching Module in Biology for secondary school students and to test their effectiveness in classroom through experimental try out. Sample for this study will consists of 65 8th grade students from a CBSE affiliated school in Agra city. The school was selected purposively and the students are distributed in two comparable matched groups on their previous academic achievement. Further Mann Whitney U test, (Non Parametric Statistics) was used for analysing and interpreting the data. On the basis of the literature survey the result of the present study in Indian context is expected to be highly significant and beneficial for students as well as teachers, as this is a Neurological approach of learning catering effectively each dimensions of it, which suits most to the designing of human brain at work in classrooms.

Keywords: Brain based learning, Neurology, Brain-Mind Learning Principles

I. INTRODUCTION

Education is now seen as the natural outgrowth of the human thirst to know oneself better combined with new technology that allows the confirmation of many hypotheses about good teaching practices. Past models of learning, many of which came from psychology and neuroscience, lay the path for current research problems being addressed today to devise better teaching tools. How do we learn best? What is individual human potential? How do we ensure that children live up to their promise as learners? These
questions have been posed by philosophers as well as neuroscientists, psychologists, and educators for as long as humans have pondered their own existence. Teachers have taught for centuries without knowing much, if anything about how the Brain works. That was mainly because there was little scientific understanding or credible evidence about the biology of the Brain. Teaching, like early medicine, was essentially an art form, but due to the advancement or development of imaging techniques that look at the living Brain at work better understanding of its mechanism and network can be acquired. Surely the Brain remains an enormously complex wonder that still guards many secrets. But in the context of Education, due to the great array of development, a large amount of insight has been gained that have implications for teaching and learning. All these developments lead to the newer approach of teaching and learning, which is Brain-based learning / Teaching based on Brain Research that can have the capability of bringing phenomenal transition in the whole education system. Research on how the brain perceives, processes, stores, and retrieves information is important to guide pedagogy. Brain-based teaching practices promote a more holistic approach to teaching that acknowledges the interconnectedness of the brain and how it naturally learns best.

A. Brain-Based Learning

Teaching based on Brain research or Brain based learning are the two phrases that can be used synonymously, which came into existence due to the interconnectedness of the Education and the field of Neuroscience, ultimately developing Educational Neuroscience, which has provided a new framework for rethinking about learning and teaching. It has the inter-relationship between Psychology which is the study of mental processes responsible for cognition and behaviour, Pedagogy which is the study of the art and science of teaching education and Neuroscience which is the study of the Brain’s development, structure and function. The inter-relatedness of all these disciplines leads to the emergence of this new discipline of Educational Neuroscience. This linkage of education and neuroscience is an attempt to bridge the gap between our understandings of brain through the study of neurobehavioral integration. From this perspective the brain will be increasingly relevant for thinking about educational practices and conversely, that the experience of educators are relevant for better understanding the brain, which proves to be the milestone and leads to the development of Brain based Learning (Sousa, 2003).

The anatomical structure of the Brain consists of different parts with different functions. All these functions should be kept in mind by the teacher during class room teaching to optimize learning. Integration of all these parts during learning can bring effective results. A Summary table of the parts of Human Brain with their specific functions, studied by Neurologists has been given in order to rationalize the significance of Brain-based Pedagogy in present context.
Table 1.1: Part of the Human Brain with their Function

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>PART OF HUMAN BRAIN</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Frontal lobe</td>
<td>• Creativity, Judgment, Optimism, Planning, Problem solving, Patterning</td>
</tr>
<tr>
<td>2.</td>
<td>Lower Frontal Lobe</td>
<td>• Speaking Language</td>
</tr>
<tr>
<td>3.</td>
<td>Upper temporal lobe</td>
<td>• Comprehension, Relevancy, Link to past experience, Hearing, Memory &amp; Meaning</td>
</tr>
<tr>
<td>4.</td>
<td>Occipital lobe</td>
<td>• Visual Processing, Patterns &amp; Discovery</td>
</tr>
<tr>
<td>5.</td>
<td>Parietal lobe</td>
<td>• Motor, Primary Sensory Area, Insights &amp; Language functions</td>
</tr>
<tr>
<td>6.</td>
<td>Cerebellum</td>
<td>• Motor/motion, Novelty learning, cognition balances posture</td>
</tr>
</tbody>
</table>

Generally Brain-based learning is defined as the understanding of the relationship between the educational environment and the complexities of the human brain. It requires basic knowledge of the specific areas of the brain that are impacted and then manipulating the classroom and explains to the teacher to provide a positive learning environment to increase academic growth and to support the students with their social needs. (Erlauer, 2003; Jones, 2003; Sprenger, 2002).

B. Brain/Mind Learning Principles

Brain/ Mind Learning Principles are the general theoretical foundation for Brain-based Learning. These principles are simple and neurologically sound. Applied to education, it helps in reconceptualising teaching by taking all of the education system out of the traditional frames. Brain-based instruction is the process of focusing primarily on the learner’s learning by understanding how the brain functions and incorporates new information into its schema.


1. *The Brain is a parallel processor*: The brain ceaselessly performs many functions simultaneously like thoughts; emotions, imagination, and predisposition operate concurrently.

2. *Learning engages the entire Physiology*: Neuron growth and synaptic interactions are integrally related to the perception and interpretation of experiences. Stress and threat affect the brain. Anything that affects physiological functioning affects capacity to learn.
3. The Search for Meaning is Innate: The brain needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli. The people are “meaning makers”. The search for meaning cannot be stopped, only channelled and focussed.

4. The Search for meaning occurs through “Patterning”: The Brain is designed to perceive and generate patterns. The brain resists having meaningless patterns imposed on it i.e. isolated information that are unrelated.

5. Emotions are Critical to Patterning: What we learn is influenced and organized by emotions and mind-sets involving expectancy, prejudices, self-esteem, and the need for social interaction. Thus, emotions and cognitions cannot be separated. Emotions facilitate the storage and recall of information.

6. Brain simultaneously perceives and creates Parts and Wholes: Although there is evidence of brain laterality, explaining that there are differences between the left and the right hemisphere of the brain. The value of the “two-brain” doctrine is that it requires educators to acknowledge the brain’s separate but simultaneous tendencies for organizing information.

7. Learning involves both focused and Peripheral Attention: The brain absorbs the information of which it is directly aware and to which it is paying attention. It also directly absorbs information and signals that lie beyond the immediate focus of attention.

8. Learning involves Conscious and Unconscious Processes: Most of the signals that we peripherally perceive enter the brain without our awareness and interact at unconscious level, which emerges in the consciousness with some delay, it influences motives. Thus, we remember what we experience, not just what we are told.

9. Brain has two types of Memory- A Spatial Memory System & Rote Learning System: Remembering what we had done does not require the use of memorization technique, as there is one memory system actually designed for registering our experiences in ordinary three-dimensional space, which is engaged and inexhaustible. It is enriched over time. The counterpart of the spatial memory system is a set of system specifically designed for storing relatively unrelated information.

10. The Brain Understands and Remembers Best when facts and skills are embedded in Natural Spatial Memory: Specific items are given meaning when embedded in ordinary experiences. Education is enhanced when this type of embedding is adopted.
11. *Learning is enhanced by challenge and inhibited by threats:* The brain learns optimally when appropriately challenged, but “downshifts” under perceived threat. Under perceived threat, we literally loose access to portions of our brain.

12. *Each Brain is Unique:* Although, we all have the same set of systems, including our senses and basic emotions, they are integrated differently in each and every brain.

Based on these researches and experiences, Caine et al, (2005) have suggested three fundamental elements, for effective teaching in classroom;

(i) *Relaxed Alertness:* Creating the optimal emotional climate for learning.

(ii) *Orchestrated Immersion in complex experiences:* Creating optimal opportunities for learning.

(iii) *Active Processing of experience:* Creating optimal ways to consolidate learning.

All learning is undoubtedly brain based, but all the teaching is not brain based, and this is the only point which precisely differentiates brain-based learning from the conventional teaching and learning process. The brain-based learning is based on the firm pillars of the Brain/Mind learning principles, which acquaint the teachers to provide the instructions to the students in such a manner that the students can process, stores and retain all the information given to them in best possible manner and thus not only learning, but also teaching become brain based. Therefore teaching will be done keeping the Brain/Mind learning principles in the Mind, which eventually accelerated the pace of learning. In the Present study Brain-based learning / Teaching based on Brain Research can be defined operationally as a neurological approach towards learning, which implied set of twelve learning principles; all of them are the result of various neurological researches, synthesized and collected by Caine & Caine (2005). These set of principles have a base of Knowledge and skills may be applied to teaching processes and material leading to improved learning.

Keeping in mind these principles, Brain targeted teaching module for 8th standard students were developed which can be applied for seeing the results.
The Fig. 1.1 summarized the twelve Brain-based Learning Principles in terms of educational implications (Pedagogical Sciences). All these principles are incorporated or have been kept in mind, while constructing all the Six steps of the Brain targeted teaching module.

II. OBJECTIVES OF THE STUDY

The objectives of the present study are laid down as follows;

1. To apply the Brain/ Mind learning principles in developing Brain targeted Teaching Modules in Biology for the 8th standard students.

2. To Test the effectiveness of the Brain-targeted teaching modules in Biology for the 8th standard students.

III. HYPOTHESES OF THE STUDY

In order to test the aforesaid objectives of the study the following null hypotheses have been formulated:
1. There will be no significant effect of the Brain targeted teaching Module on the academic achievement of the 8th standard students
2. There will be no gender difference in relation to the effect of Brain targeted teaching Module on 8th Standard students.

IV. VARIABLES OF THE STUDY

The Variables of the study can be categorized as following:

**Independent Variable**- Teaching based on Brain research (Brain-based Learning)

**Dependent Variable**- Academic achievement of the 8th standard students

**Control Variables**- Age, class, School, Environment, and Duration of study, Teacher and Previous Academic achievement of the 8th standard students.

V. DESIGN OF THE STUDY

The researcher has adopted Quasi Experimental design with comparable matched groups categorized as Pre and Post groups for testing the efficacy of the Brain targeted teaching Modules.

A. Sample of the Study

The Sample selection in the present study has been done in two distinct stages mentioned as under:

*Stage 1: Sampling of School:*

The researcher has selected an English medium Public school, offering English as a medium of instruction and affiliated to CBSE Board, Delhi. It is reputed school and imparting quality teaching & learning. The school has given the consent for carrying out the experimental try out on students of 8th standard student, without imposing any restriction.

*Stage 2: Selection of Students:*

The researcher has randomly selected one section of 8th standard and divides the whole strength of 65 students of the class into two separate groups after equating them. On their academic achievement finally two groups of 32 and 33 students had been formed out of which one group is treated as control group and the other one as experimental group respectively.

B. Method of the Study

The researcher has employed Quasi Experimental method in order to test the effectiveness of the Brain targeted teaching modules in Biology on the academic achievement of the 8th standard students. In a quasi-experimental design, the research substitutes statistical "controls" for the absence of physical
control of the experimental situation. The most common quasi-experimental design i.e. Comparison Group Pre-test/Post-test Design has been mentioned in the table 1.2.

**Table 1.2: Exhibiting the Method of the Study**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>GROUPS</th>
<th>SAMPLE SIZE</th>
<th>PRE TEST (P-1)</th>
<th>TREATMENT</th>
<th>POST TEST (P-2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental Group</td>
<td>33</td>
<td>Achievement Test</td>
<td>Brain-based Teaching Modules</td>
<td>Achievement Test</td>
</tr>
<tr>
<td>2.</td>
<td>Control Group</td>
<td>32</td>
<td></td>
<td>Traditional Lesson Plans</td>
<td></td>
</tr>
</tbody>
</table>

C. **Tools employed in the study**

For the present study, following set of tools has been formulated.

1. Self- constructed Achievement test (Pre-test and a Post-test) for measuring Academic Achievement before and after experimentation.
2. Self-constructed Brain based Teaching modules in Biology for 8th standard students.

D. **Procedure of the Study**

The present study has been carried out in the following phases;

1. Planning & Construction Phase
2. Implementation Phase

These phases are vividly depicted through the following figurative representation:
Fig 1.2: Exhibiting the Phases of the study, showing Construction & Implementation of the tools used in the study

Below is the detailed explanation of the different phases applied in the present study:

**Phase- I: Planning & Construction Phase**

a) The study is conducted with the units dealing with Biology content in the Science text book of 8th standard. Five topics are selected with due consideration to the applicability of the Brain targeted teaching module.

b) Ten Lesson Plans are made on traditional approach and three Brain targeted teaching units are developed on the selected topic, and are divided into 10 days activities. The drafted teaching units are given to the five experts for their comments and suggestions. After evaluation by the experts the revised and reconstructed Brain targeted teaching module (units) are taught in the class. (A Sample of the Brain targeted teaching Unit is attached in the appendix).

c) The Self-made Achievement tests, which include Pre-test in Phase-I is constructed which consists of 15 multiple choice questions and five other short objective questions. The test items are prepared on the basis of objective of study, emphasizing on both cognitive as well as psychomotor domain and are arranged in simple to complex order. The first draft of the test has been given to 5 experts including, subject teachers for improvements and suggestions. Out of total items, 4 items are arranged according to expert’s feedback and suggestion and then the second draft is prepared and initially it is tried out on the small group of 10 students of 8th standard of different schools and feedback was received regarding time taken, clarity & ambiguity of test items and final draft consisting of total 20 items, taking into consideration the feedback, has been prepared for implementing on both the groups i.e. Control & Experimental group.

Reliability of the test is calculated by the test –retest method. The Coefficient of correlation is calculated using Product Moment Correlation is 0.78, which proves that the test is reliable. The Achievement test prepared, consist of content validity as the test has been given to the subject teacher and teacher educators and with their feedback and opinion the test measures a content for which it was prepared.

**Phase – II: Implementation Phase**

a) This Phase includes implementing traditional lesson plans on control group, which includes 10 lectures of 40 minutes each spread over 10 working days has been implemented.
b) Three Brain targeted teaching units formulated are divided into 10 days activities of 40 minutes each, has been implemented on experimental group.

c) After completion of 10 Traditional lesson plans in control group and Brain targeted teaching units on Experimental group, a Post achievement test is administered. The Reliability and Validity of the test is calculated similarly as that of pre-test was done.

E. Statistical Techniques

Measure of Central tendency, Measure of Variability and Non parametric statistics (Mann Whitney U Test) have been applied to see the significance difference between Brain targeted teaching modules and Lesson Plans based on Traditional teaching.

VI. DATA ANALYSIS

Pre Academic achievement test is conducted on the two groups formed i.e. Control group and experimental group. On the pre-test scores, when descriptive statistics Mean, Standard deviation, Skewness and Kurtosis) are applied then the difference in the means of the two groups is 0.29, which is negligible and thus two groups formulated are almost similar, but skewness and kurtosis values are showing that the population is not normally distributed and thus for better generalisation, Non parametric test i.e. Mann Whitney U test is applied for hypotheses testing and better generalisation. Here is the table, showing the descriptive statistics of the groups in the Pre-test scores.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Groups</th>
<th>Sample Size (N)</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental Group</td>
<td>33</td>
<td>8.75</td>
<td>4.33</td>
<td>-0.464</td>
<td>-2.013</td>
</tr>
<tr>
<td>2.</td>
<td>Control Group</td>
<td>32</td>
<td>8.46</td>
<td>4.34</td>
<td>-0.453</td>
<td>-3.911</td>
</tr>
</tbody>
</table>

When Post-test is administered on both the groups then there found a significant difference between the Mean scores of both control and experimental group which lead to testing of hypothesis. For testing of hypothesis Mann Whitney U Test is applied on the Pre-test & Post-test scores of the control group & experimental group respectively to see the difference.

Given below is the table exhibiting Z value of the Pre-test & Post-test scores of the control and experimental group respectively.
Table 1.4: Exhibiting Z value of the Pre-test & Post-test Scores of Control & Experimental group

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Groups</th>
<th>Sample Size (N)</th>
<th>Pre –test</th>
<th>Post-test</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental</td>
<td>33</td>
<td>563</td>
<td>1648</td>
<td>6.957*</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Control</td>
<td>32</td>
<td>8.46</td>
<td>645.5</td>
<td>2.297*</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.05, P < 0.01

From the table, it is clear that Z value for the Pre-test and Post-test scores of the control group come to be 2.297, which is significant at 0.05 level.

Similarly, in the Pre-test scores and Post-test scores of the experimental group, when Z value is calculated which come 6.957 which is highly significant at 0.01 level of significance.

In order to test the formulated null hypothesis that there will be no significant effect of the developed Brain targeted teaching module on the academic achievement of secondary school students, comparison of the post test scores of the control and experimental group has been done.

The given table is exhibiting the U & Z Values for the Post-test scores of the experimental and control group.

Table 1.5: Exhibiting U & Z Value for the Post-test Scores of the Control & Experimental group

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Groups</th>
<th>Sample Size (N)</th>
<th>∑ R</th>
<th>U obt</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental</td>
<td>33</td>
<td>1615</td>
<td>1054</td>
<td>6.90*</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Control</td>
<td>32</td>
<td>530</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P < 0.01

Mann Whitney U Test is applied & Z Value comes to be 6.90 which is highly significant at 0.05 as well as 0.01 levels. It clearly proves that the result is highly significant.

For testing the other formulated null hypotheses that there exists no gender difference in relation to the effect of Brain Targeted Teaching Module of students of 8th standard, comparison for the Pre-test and Post-test scores of the boys and girls in control and experimental group has been done. Table 1.6 is showing the Z Value for the Pre-test and the Post-test scores of the Male students in both the groups.

Table 1.6: Exhibiting Z value of the Pre-test & Post-test Scores of Male students in Control & Experimental group

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Groups</th>
<th>Sample Size (N)</th>
<th>Pre –test</th>
<th>Post-test</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Control</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P < 0.05, P < 0.01
From the table, it is clear that Z value for the Pre-test and Post-test scores of the control group comes to be 2.282, which is significant only at 0.05 level.

Similarly, in the Pre-test scores and Post-test scores of the experimental group, when Z value is calculated which come 5.981. This value is highly significant at 0.01 level of significance.

After computing the Z Value of the Pre-test and the Post-test for the Male students in Experimental and Control group , the Z value of the Pre-test and the Post-test for the female students in the Experimental and Control group was computed.

Here is the table given below, exhibiting the Z value of the Pre-test and the Post-test scores for the Female students in both the groups.

**Table 1.7: Exhibiting Z value of the Pre-test & Post-test Scores of Female students in Control & Experimental group**

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Groups</th>
<th>No. of Girls</th>
<th>Pre –test</th>
<th>Post-test</th>
<th>Z Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental</td>
<td>14</td>
<td>768</td>
<td>1898</td>
<td>7.895*</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Control</td>
<td>12</td>
<td>932</td>
<td>687.4</td>
<td>2.981*</td>
</tr>
<tr>
<td></td>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.05, P < 0.01

From the table, it is clear that Z value for the Pre-test and Post-test scores of the control group come to be 2.981, which is significant only at 0.05 level.

Similarly, in the Pre-test scores and Post-test scores of the experimental group, when Z value is calculated, it comes 7.895 which is highly significant at 0.01 level of significance.

This Z value for the Pre-test and the Post-test scores of the Female students are much higher and much more significant in comparison to the Z Value of the Male students.
VII. DISCUSSION OF THE FINDINGS

The findings of the present study supported by adequate discussion have been furnished in the following lines.

1. After comparison of Pre-test and Post-test scores of the control group has been done, then Z Value is found significant at 0.05 that means there is a little gain in the academic scores of the students of the control group, which has been taught by traditional method, comprising lecture method followed by simple explanations.

2. Comparing the Pre-test and Post-test scores of the Experimental group, it comes that the Z Value is highly significant at both the level, as here gain in the achievement score is much more in comparison to the control group as the learning process in this group comprised of 6 steps in the lesson planning, which is based on new approach i.e. Brain-based Learning or Teaching based on Brain research.

3. Comparing the Post-test scores of the Control and Experimental groups, highly significant results have been found. It proves that the six steps, Emotional Climate, Physical Environment, Learning Design, Teaching for Mastery, Teaching for Application, Evaluation, which are present in the Brain targeted teaching modules based on the Neurological approach. Due to the process of learning in this group, students connect themselves to the content emotionally, they engaged in active discussion among themselves and with the teacher as well and are able to create stress free zone, enjoy & learn the benefits of working in the cooperative environment the students are able to systematize their knowledge with the help of learning designs and are able to do mastery over the content as well as apply their learning to various other higher applicative situations.

4. The computed Z Value for the Pre-test and the Post-test in the Experimental and Control groups for Male and Female students are found to be significant at different levels. The value is much higher in case of the Female students in comparison to the Male students. It proves that the Female students got more affected leading to higher academic achievement by the Brain targeted teaching Modules in comparison to their counterparts. This may be due to the reason that the Brain of the Females absorb and assimilate the content more effectively than the Brain of the Male during the teaching of the Brain targeted teaching modules.

VIII. CONCLUSION OF THE STUDY

It can be concluded that the Neurological approach, which is based on Brain research really proves to be highly beneficial in increasing the academic achievement of the students. The main aspects which seems to have contributed in increasing the academic achievement were the six major steps, which were involved in formulating the Brain targeted teaching units, viz., It include
creating emotional environment which connect students emotionally to the content, creating physical environment which form stress free zone and facilitates learning, creating learning designs with the help of advanced organizers which formulate cognitive maps and in turn facilitates learning, doing mastery of the content with the help of various sources like internet, encyclopaedias etc. By applying the knowledge of the Neurological approach to the day to day life activities and other higher cognitive levels as well as performing continuous evaluation so that it can be known, how much the learners have assimilated effectively. Teaching based on Brain research brings the notion that learning is the expansion of natural knowledge. We wanted to make the point that we are always expanding from what we know. Natural knowledge is what we use to make sense of our lives. It is what we know deeply and meaningfully. Learning as the expansion of natural knowledge means not just information that we memorize; it means something we can use. Academic achievement of the control group was also increased, but not to such an extent as it happened in case of the experimental group. It proves that teaching based on Brain research is really beneficial for the learners. It is totally based on those principles which increase the working efficiency of the brain and thus facilitates learning and Brain is the only organ, which is involved in learning and during teaching it should be kept in mind.

IX. REFERENCES


