1.0.0 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 leads to the newer approach of teaching and learning, which is Brain-based learning 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.

1.2.0 BRAIN-BASED LEARNING

In the era/decade of 1990’s, the educators all over the world have come to recognize that there is a rapidly increasing knowledge base about Human brain. Though numerous articles, books, videos and other presentations, they have also become aware that some of this knowledge could inform educational practice. What many educators may not realise, however, is that researchers and practicing educators have worked diligently to establish a legitimate scientific area of study that overlaps psychology, neuroscience and pedagogy. The result is Educational Neuroscience, which has provided a new framework for rethinking about learning and teaching. It has the interrelationship 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 interrelatedness 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 *Mind, Brain and Education or Brainbased Learning* (Sousa, 2003).

### 1.3.0 SCIENTIFIC DEVELOPMENT AND GLOBAL EFFORTS IN BRAIN-BASED LEARNING

Deacon,(1997), has remarked that *knowing how something originated often is the best clue to how it works.* Humans are a complicated species, and exact records of many aspects of our common development are not so well known. Starting in the 10th century, humanity gained a fundamental understanding about how sensorimotor perceptions are interpreted in the brain and translated into thought.(Becker, 2006)*The first half of the seventeenth century saw the emergence of scientific groups whose members gathered to promote discussion and to disseminate the ‘new’ philosophy, which include study of learning and the human brain.* Discoveries related to specific domain functions, such as language by Broca (1862) and Wernicke (1874), a general charting of the brain areas by Brodmann (1909), and findings about the role of individual synapses or links between neurons in the brain by Cajal (1911) generated a new and lasting excitement in the whole education system. Each of these discoveries contributed to new definitions of the physical nature of learning and the brain. The turn of the 19th century brought a flood of new scientific theories of learning. Piaget, (1940), also made profound contributions to the conceptualisation of the new science of teaching and learning.

Rosenzweig et al. (1958) published results of an experiment conducted on rat that opened a new field of discussion related to the neurobiological basis for behaviour and the influence of enriched environment. Diamond (1960) based on a comparison of impoverished versus enriched environments, it came in front of all that how enriched learning environments could enhance neuronal growth in humans, which translated into better learning. *The National Education Association, USA,* began to take interest in the application of neuroscience findings to the classroom in the late 1970’s. This was to be the beginning of a general popularization of information on neuroscientific researches for teachers and a general marriage of neuroscience, education, and psychology, and it came at a time when policy makers began to focus on reaching all students in a more equitable way. Later on in 1980’s the development of brain imaging techniques enabled observation of the learning brain, providing insights into the brain’s perceptual, cognitive and emotional functions, with clear relevance for education. Computerized Axial Tomography or (CAT/ CT Scans), Magnetic Resonance Imaging (MRI), and Positron Emission Tomography or (PET), really prove helpful in studying the functions of various parts of the Brain. Functional Magnetic Resonance or (fMRI) was developed in the early 1990’s and declared the “Decade of the Brain”. Hart (1983) was one of the first to call attention to the lack of attention given to the brain in educational practice. His work has greatly influenced marked the interest in the brain-learning connection in the teaching profession. In the interconnectedness’ of education and Brain, he emphatically observed that *designing educational experiences without an understanding of the brain was like designing a glove without an understanding of the human hand.*
The Brain, Neurosciences, and Educational Special Interest Group of the American Educational Research Association (AERA2008) is the oldest organizational entity specifically dedicated to linking research in the neurosciences and education, which have the primary aim to promote neuroscience research that has implications for educational practice. Various Cognitive neuroscientists such as McCandliss (1994), Shaywitz (1996), and other researchers began doing experiments in neuroscience labs that had more direct applications to education based on global theories of how the brain worked in terms of teaching and learning experiences. There was a boom in pedagogical rethinking at the end of the 1990’s, including attempts to unite teachers around a set of accepted best practice teaching elements and curriculum/lesson planning. There were various academic programme launched in Mind, Brain and Education Science or Brain-based learning. Belgian Society for Neuroscience (1998) showed that the interest in the brain and learning was, indeed an international phenomenon. Harvard University launched its Master’s programme in Mind, Brain, and Education in 2001-2002. The Japan research Institute of Science and Technology (2001) emphasized flexible, interdisciplinary research about the brain and learning. The Dutch Science Council (2010) set up Brain and Learning Committee, to make it integral part of their education policy. In (2004) the formation of the International Mind, Brain, and Education Society was announced at the Conference in Harvard University. In 2005 the Mexican Society for the Neurosciences was founded, demonstrating the spread of MBE values in places other than Europe, Japan, and U.S. The Joint International Neuroscience Ph.D. Programme united various world perspectives on the emerging discipline. In (2007), First issue of International Mind, Brain, and Educational Journal was launched, which proves to be another milestone in this emerging discipline.

Since 2007, there were many concerted efforts to further integrate teachers in the research process through conferences and society meetings and many advancements are going on/continuously in the field of Educational Neuroscience and the concept of Brain-based learning gaining its popularity. The emphasis is no longer placed on what the teacher’s lecture is about but rather on what each learner in the classroom is doing or learning (Erlauer, 2009). The educator creates the environment and coordinates the events in that setting in order to meet the learner’s emotional, social and academic needs.

1.4.0 FUNCTIONAL ANATOMY OF HUMAN BRAIN & ITS ASSOCIATION WITH LEARNING

If we look into the anatomical structure of the Brain then there are different parts which have different functions. All these functions should be kept in mind by the teacher during class room to optimize learning. Integration of all these parts during learning can bring effective results. On the next page is a figure which shows the essential parts of the Brain. These have been studied with the help of various brain imaging techniques by Neurologists to relate them to the function which they perform.
To summarize vividly, the table exhibiting the major areas of human brain, along with their crucial functions (Supporting fig.1.2).

Table 1.1: Part of the Human Brain with their Function

<table>
<thead>
<tr>
<th>S.No</th>
<th>PART OF 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 (Wernicke’s Area)</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>

Brain-based learning is generally defined as the understanding of the relationship between the educational environment and the complexities of the human brain. Brain based learning 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)

The greatest challenge of Brain research for education does not lie in understanding the anatomical intricacies of brain functioning but in comprehending the vastness, complexity, and potential of the human brain.
As neurological research has begun to discover about the role of emotions, stress, and threat in learning and about memory system and motivation is challenging basic assumptions about traditional education. Fully understood, this information requires a major shift in the definitions of testing and grading and in the organizational structure of classroom and schools.

1.5.0 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 help 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 perceives enter the brain without our awareness and interact at unconscious levels, 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 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 lose 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.

1.6.0 EDUCATIONAL IMPLICATIONS OF THE BRAIN-BASED LEARNING

The objective of Brain-based learning is to move from memorizing information to meaningful learning. For this there is no one method or technique which can by itself adequately encompass the variations of the human brain. Brain-based teaching must fully incorporate stress management, nutrition, exercise and other facets of health into the learning process. Brain-based education must furnish a learning environment that provides stability and familiarity.

For teaching to be really effective, a learner must be able to create meaningful and personally relevant patterns. Teacher must understand that students’ feelings and attitudes should be involved in learning and it will determine future learning. Good teaching builds understanding and skills over time because it recognizes that learning is cumulative and developmental. The teacher can and should organize the materials that will be outside the focus of learner’s attention. In addition to traditional concerns with noise, temperature, and so on, peripherals include visuals, illustrations, set designs etc. A great deal and effort put into teaching and studying is wasted because students do not adequately process their experiences. Active Processing allows students to review how and what they learned so that they can begin to take charge of their learning and development of their own personal meanings. Educators are adept at focusing on memorization of facts. However an overemphasis on such procedures, leaves the learner impoverished, and does not facilitate transfer of learning and interferes in the development of understanding.

It is an established fact that ignoring the personal world of the learner, educators actually inhibit the effective functioning of the brain. Teacher and administrators should strive to create a state of relaxed alertness in students. This means that they need to provide an atmosphere that is low in threat and high in challenge. Teacher should understand that each brain is unique and teaching should be multifaceted in order to allow students express themselves in the best possible manner. In sum, education needs optimal functioning.

The genesis of Brain/ Mind learning principles constitutes a strong connection between the neuroscience and the human learning process. The roots of brain-based learning principles are in neurological research, particularly during the 1990s. These 12 Brain/Mind learning principles were first published in Educational Leadership in 1989 to explain how people learn naturally. Based on their research and experience, Caine and others (2005) argued that great teaching involves three fundamental elements, are as follows:

a) Relaxed Alertness: Creating the optimal emotional climate for learning.

b) Orchestrated Immersion in complex experiences: Creating optimal opportunities for learning.

c) Active Processing of experience: Creating optimal ways to consolidate learning.
The Fig.1.3 summarized the twelve Brain-based Learning Principles in terms of educational implications (Pedagogical Sciences).

![Brain/Mind Learning Principle](image)

**Fig.1.3: Brain/Mind Capacity Wheel (2001)**
*Source: Caine & Caine Brain Mind Learning Principles in action.*

### 2.0.0 CONCEPTUALISATION OF STRUGGLING LEARNERS

Many students struggle with school at some point in their academic careers. Some struggling students may be experiencing a lack of motivation, social problems at school, time management challenges, poor self-esteem, or lack of organization and study skills. Other struggling students may need to build the cognitive skills of memory, attention, processing speed, and sequencing in order to be able to keep up with the pace of instruction in school and to comprehend that instruction.

When students are significantly lagging behind their peers, schools have too often guided these students into special education services, even if they do not actually have a disability (Countinho & Oswald, 2004). Adopting more targeted, instructional strategies earlier within the general education setting would, in many cases, be more appropriate and effective in meeting the needs of many struggling learners. Heidi (2007) “Struggling learner” is basically a term used to describe a student who has the ability to learn necessary academic skills, but at a rate and depth below average same age peers. A struggling learner needs more time, more repetition, and often more resources from teachers to be successful. Reasoning skills are typically delayed, which make new concepts difficult to learn.

Barton (2003) a struggling learner has difficulty with higher order thinking or reasoning skills. This suggests that it will be more challenging to learn new concepts. New skills need to be based upon already mastered concepts. This can be difficult when the majority of the class has
already mastered a concept and is moving on, while the struggling learners needs more time. This can lead to gaps in Knowledge and basic skills. The more gaps in a content area, the more challenging it is for anyone to learn new concepts. It is also important to recognize that these students are typically keenly aware they are struggling and self-confidence can be an issue. Hartmann (2004) Struggling Learners are prone to anxiety, low self-image, and eventually may be quick to give up. They often feel ‘dejected’ and start hating school. They spend all day doing something that is difficult for them, it can be very draining. Finding other activities that the student can be successful in is very important. There should be emphasis on strengths as well.

Buck et al.(2003) Special education services are provided for students who have a disability. Jeffery (2007) Struggling learners typically do not have a disability, even though they need extra support. Cognitive abilities are too high for these learners to be considered for an Intellectual disability. However, the abilities are usually too low to be considered as learning disability. Consider that a learning disability consists of discrepancies between average abilities and below average academics, coupled with a processing deficit. Fernandez (2006) Schools often look for a discrepancy between a student’s ability and where they are performing. Struggling learners tend to perform at their ability level, which is below average. To the disappointment of many struggling learners often do not receive special education services.

3.0.0 ACADEMIC STRESS AMONG PRE ADOLESCENTS

Along with the improvements during the scientific era and the rapid development of information, competitiveness among people has become increasingly intense, as a consequence, people have become busier and, therefore, stress is a natural consequence. Stress is a necessary and unavoidable concomitant of daily living--necessary because without some stress we would be listless and apathetic creatures, and unavoidable because it relates to any external event, be it pleasurable or anxiety producing. A person's response towards stress depends on whether an event is appraised as a challenge or a threat (Lazarus & Folkman, 1984). However, overstress causes problems and discomfort, and can have serious effects on people. Specifically, student faces the stress when they enter a completely new world of professional education. Stress has become an important topic in academic circles. Many scholars in the field of behavioural science have carried out extensive research on stress and its outcomes and concluded that the topic needed more attention (Agolla, 2009). Stress in academic institutions can have both positive and negative consequences if not well managed Harper & Stevenson, (2006). Academic institutions have different work settings compared to non-academic and therefore one would expect the difference in symptoms, causes, and consequences of stress (Chang & Lu, 2007). It is important to the society that students should learn and acquire the necessary knowledge and skills that will in turn make them contribute positively to the development of the general economy of any nation. It is important for the institutions to maintain well balanced academic environment conducive for better learning, with the focus on the students’ personal needs. Students have different expectations, goals, and values that they want to fulfill, which is only possible if the students’ expectations, goals, and values are integrated with that of the institution (Goodman, 1993). Academic stress among students have long been researched on, and researchers have identified stressors as too many assignments, competitions with other students, failures and poor relationships with other students or lecturers (Fairbrother & Warn, 2003).
Academic stressors include the student's perception of the extensive knowledge base required and the perception of an inadequate time to develop it (Carveth et al., 1996). Students report experiencing academic stress at predictable times each semester with the greatest sources of academic stress resulting from taking and studying for exams, grade competition, and the large amount of content to master in a small amount of time (Abouserie, 1994). When stress is perceived negatively or becomes excessive, students experience physical and psychological impairment. Methods to reduce stress by students often include effective time management, social support, positive reappraisal, and engagement in leisure pursuits (Pfeiffer, 2001). The only scientific research that specifically related leisure satisfaction to academic stress was that of McKinney (1993) who established a negative association between academic stress and leisure satisfaction. Institutional level stressors are overcrowded lecture halls, semester system, and inadequate resources to perform academic work (Awin & Agolla, 2008). The pressure to perform well in the examination or test and time allocated makes academic environment very stressful (Erkutlu & Chafia, 2006). This is likely to affect the social relations both within the institution and outside which affects the individual person’s life in terms of commitment to achieving the goals (Fairbrother & Warn, 2003). Knowing the causes of students stress will make the educational administrator know how to monitor and control the stress factors that are responsible for the students’ stress. Thus, stressors affecting students can be categorized as academic, financial, time or health related, and self-imposed (Goodman, 1993). Academic stressors include the student’s perception of the extensive knowledge base required and the perception of an inadequate time to develop it ((Carveth et al., 1996). Students report experiencing academic stress at predictable times each semester with the greatest sources of academic stress resulting from taking and studying for exams, grade competition, and the large amount of content to master in a small amount of time (Abouserie, 1994).

4.0.0 NATURE OF TEST ANXIETY

Test anxiety is a combination of perceived physiological over arousal, feelings of worry and dread, self-depreciating thoughts, tension, and somatic symptoms that occur during test situations. It is a physiological condition in which people experience extreme stress, anxiety, and discomfort during and/or before taking a test. These responses can drastically hinder an individual's ability to perform well and negatively affects their social emotional and behavioural development and feelings about themselves and school. Test anxiety is prevalent amongst the student populations of the world, and has been studied formally since the early 1950s beginning with researchers Mandler and Sarason (1955), Sarason (1958), then contributed to early investigation of test anxiety, clarifying the relationship between the focused effects of test anxiety, other focused forms of anxiety, and generalized anxiety. Test anxiety can also be labelled as anticipatory anxiety, situational anxiety or evaluation anxiety. Some anxiety is normal and often helpful to stay mentally and physically alert. Although, when one experiences too much anxiety it can result in emotional or physical distress, difficulty concentrating, and emotional worry. Test anxiety has been shown to have a consistently negative relationship with test performance, and test-anxious students are found to perform about 12 per cent below their non-anxious peers. Inferior performance arises not because of intellectual problems or poor academic preparation, but because testing situations create a sense of threat for those experiencing test anxiety; anxiety resulting from the sense of threat then disrupts attention and memory function.
Epub (2010) suggest that between 25 to 40 percent of students experience test anxiety. Students with disabilities and students in gifted education classes tend to experience high rates of test anxiety. Students who experience test anxiety tend to be easily distracted during a test, experience difficulty with comprehending relatively simple instructions, and have trouble organizing or recalling relevant information. Parents are often perceived by students as being a source of pressure, especially when they place a strong emphasis on obtaining high achievement scores on examinations and assessments instead of on the effort made. Parental pressure is associated with greater worry, test irrelevant thoughts, and stronger bodily symptoms relating to anxiety during a test.

Other causes of test anxiety may include fear of failure, procrastination, and previous poor test performance. As well, characteristics of the test environment such as: nature of the task, difficulty, atmosphere, time constraints, examiner characteristics, mode of administration and physical setting can affect the level of anxiousness felt by the student. Putwain & Best, (2011), examined test performance among elementary children when the teacher put pressure on the students in an attempt to create a more high stress environment. Their findings showed that students performed worse in high threat situations and experienced more test anxiety and worrisome thoughts than when in a low threat environment.

Test anxiety is known to develop into a vicious cycle. After experiencing test anxiety on one test, the student may become so fearful of it happening again they become more anxious and upset than they would normally, or even than they experienced on the previous test. If the cycle continues without acknowledgement, or the student seeking help, the student may begin to feel helpless in the situation.

5.0.0 ACADEMIC PERFORMANCE

Academic performance is the outcome of education, the extent to which a student, teacher or institution has achieved their educational goals. Academic performance is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are most important, procedural knowledge such as skills or declarative knowledge such as facts. In California, the achievement of schools is measured by the Academic Performance Index. Individual differences in academic performance have been linked to differences in intelligence and personality. Students with higher mental ability as demonstrated by IQ tests (quick learners) and those who are higher in consciousness (linked to effort and achievement motivation) tend to achieve highly in academic settings. A recent meta-analysis suggested that mental curiosity (as measured by typical intellectual engagement) has an important influence on academic achievement in addition to intelligence and consciousness. Children’s semi-structured home learning environment gets transformed into a more structured learning environment when children start first grade. Early academic performances enhances later academic performance.

Reid (2008) Parent’s academic socialization is a term describing the way parents influence students’ academic performance by shaping students’ skills, behaviours and attitudes towards school. Parent influence students through the environment and discourse parents have with their children. Academic socialization can be influenced by parents’ socio-economic status. Highly educate parents tend to have more stimulating learning environments. Children’s’ first few years of life are crucial to the development of language and social skills. School preparedness in these areas help students adjust to academic expectancies.
Another very important enhancer of academic performance is the presence of physical activity. Yen (2002) studies have shown that physical activity can increase neurotic activity in the brain. Exercise specifically increases executive brain functions such as attention span and working memory and thus can improve the academic performance.

6.0.0 EMERGENCE & JUSTIFICATION OF THE PROBLEM
Neuropsychology has been studying the way, students respond for decades and while educators and scientists alike are still defining and shifting through the implication of this research, educators can use much of this science and its practical applications in the classroom. This integration could transform the classroom into a pedagogically correct vehicle of learning, exploration, and expression for all children from the minute they walk into the building (Caine & Caine, 1995; Jensen, 1998; Nunley’2003; Slavkin, 2002; Sousa, 2006). Jensen (2008) has aptly remarked on Brain-based learning, it is a synergy between the sciences of biology, neurology, cognitive psychology and educational science that actually make up effective teaching. As educators acquire a better understanding of this delivery system and modify educational practices in light of brain research, instruction could become more pedagogically and developmentally appropriate, and therefore, more valuable.

Our current educational system as defined by the Right to Education Act (2009), and Universal Declaration of Human Rights (Article 26), which suggests that all people (rich, poor, intelligent and challenged) are equally entitled to a place in our classrooms. Not only do students come with a far greater spectrum of abilities, but also there are more children than ever before in our classrooms begging for the attention and guidance they need to help them reach their own potential. This wealth of difference provides with the dynamics never before seen in the history of education and promise of richer learning experiences. In this context educators believing in the theory behind these rights, they often feel frustrated, even stymied by the process. Teachers understand children should be instructed and evaluated at their cognitive level rather than their chronological age level, and yet, countless hours of teaching to the test is not only encouraged, it is often enforced by many school districts. This has eroded quality instruction forcing teachers to create lessons that are developmentally and pedagogically inappropriate (Jardine, 2002).

If we look in the context of classroom situation, then we will find out that there is quite a large section of the students, who face lot of difficulties in learning and understanding new concepts or skills, difficulty in organizing their work and work environment around them and have weak social and emotional skills. They often feel difficulty in matching their standards with the other portion of the students of the same class, who are average or above average achievers. Such large section of every class is known as Struggling learners, which every class has and remain neglected, as teachers in the era of hard core competition, is involved only with completing the syllabus and therefore this group of struggling learners become a great problem not only for the class, but for their peers and teachers as they get involved in different kind of distracting activities, which in turn negatively affect the institution. At the same time struggling learners faces a great problem of stress, which can totally ruin the mental health condition of them and can even result in the dropout.

Johnson and Becker (2010), examined the motivating factor of money verses the motivating factor of learning for the sake of Knowledge. They found out that both types of motivation activated the area of the brain called Putamen but when the subjects felt interested in learning, these regions were more active than when the subjects were motivated to learn through
monetary gain, this proves that brain get activated to a larger extent, when it is really motivated for learning, rather than motivating by any other fancies, and in this regard Brain based Learning is the answer to all questions.

In order for Brain-based learning to become the tool that it can be, in order for students to have learning experiences which lead them to achieve higher goals and standards, and in order for school systems to reach their missions for improved student performance, an investment in developing the capacity of teachers to cultivate teaching strategies which align instructional goals with brain-based learning is essential. According to Jensen & Wolfe (2001), incorporating emotion associated with competition or celebration can stimulate the release of Adrenaline (Hormone secreted in the body by the brain), which enhances learning. This relaxed state of awareness increases the episodic, semantic and procedural memory. Brain research shows that when a student’s need are met, retention of what is taught increases. Much of this gain is attributed to the positive interaction between the student and his or her environment (Caine & Caine, 1991; Sprenger, 2002, Jensen, 1998)

Research reveals how important it is for teachers to adapt their classrooms to meet both the emotional and academic needs of students (Caine & Caine, 1991; Erlauer, 2003, Wolfe, 2001). Several researches in the field of learning and memory who specify that negative stress appear to be the most harmful factor that interferes with learning. Maintaining an emotionally safe classroom appears to improve student learning through stress reduction. Understanding the concept of emotional wellness may assist educators in understanding how emotions in the environment can both negatively & positively impact learning (Erlauer, 2003; Tileston, 2004). It also appears essential that teachers possess the necessary skills to create a learning environment that provide safe harbour, trust, and the appropriate level of challenge to eradicate or at best minimize the deleterious effects of negative stress as perceived by students (Sprenger, 2002). Self-confidence may also be negatively impacted by stress. One researcher specifically suggests that teachers can meet stressed students’ need on a daily basis when brain-based techniques are frequently and consistently implemented (Sprenger, 2002). Researcher suggests that brain-based classroom positively affect students, learning (Caine & Caine, 1991; Jensen, 2005).Having students learn early in their educational journey about their brain and brain-based concepts, such as how to have positive social, stress management, and coping skills, might help produce young citizens who can better contribute to our communities and who will be prepared for the stressful economic global community they will find themselves competing in as they reach adulthood.

Looking into this situation, when Brain-based learning is really helpful in considering the needs of every student, then the struggling learners who falls in the cracks and crevices of the educational system can prove to be really benefitted by this newer approach of Brain-based learning. It will help in dealing the weak emotional skill of struggling learners, their stress level, which arises due to various academic reasons, the fear or threat of the tests or examination, which collectively hampers the academic performance of the struggling learners in the most deteriorating manner. Struggling learners need the instructions in the way when their needs and every problem can be considered and Brain-based learning can be the solution to every arise question and can positively affect their academic performance and if once their needs and problems are solved then with this whole classroom and in turn the whole educational system will surely be positively benefitted.
7.0.0 STATEMENT OF THE PROBLEM
In context with the above justification, the problem in hand can be stated as below

*Brain-based Learning as a Determinant of Academic Stress, Test anxiety and Academic Performance in Struggling Learners*

8.0.0 OPERATIONAL DEFINITIONS OF THE TERMS EMPLOYED
The present research proposal has the following key terms which require specific explanations in order to communicate their precise definitions in the present context. The terms which need detailed contextual definitions are as following:

8.1.0 BRAIN-BASED LEARNING
The field of Brain-based learning encourages the educators to capitalize on the associations, the brain must make to create synaptic connections and anchor learning through contextual experience (Chipongian, 2003). The theoretical foundation of Brain-based learning can be summarized into a set of 12 Brain/Mind learning principles (Caine & Caine, 2005), these principles are then applied into a particular format for classroom instructions and activities by Hardiman (2001).

In the context of the present study, Brain-based learning is operationally defined 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). As mentioned in preceding pages, these have the base of knowledge and skills that is applied to teaching process and material leading to improved 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.

8.2.0 ACADEMIC STRESS
Wilks, (2008) defines Academic stress as the product of a combination of academic related demands that exceed the adaptive resources available to an individual and academic stress adversely affects the overall adjustment of the students. In the present context of the study Academic stress is defined as stress among students due to various academic reasons. The academic stress among the students which arise due to pressure from study, work load, competition with other students, and poor grades. One of the major reasons for academic stress among students is expectations. It may be at the level of teacher and parents, which arises due to the expectation of better performance. It may also rises due to the self-expectation which a student has from himself/herself for better performance. All the above mentioned criterions are considered for assessing the students as academically stressed students.
8.3.0 TEST ANXIETY
Test anxiety is a psychological state of mind where an individual experience extreme distress and anxiety in testing situations (Hancock, 2001). Test anxiety is a type of performance anxiety, where the pressure is on and a good performance counts, and students generally become so anxious that they are actually unable to do their best. According to (Epub, 2010), test anxiety can be labelled as *anticipatory anxiety* if student feel distress while studying and when thinking about what might happen when they take a test. Test anxiety can also be labelled as *situational anxiety* if it occurs while taking a test.

In present context test anxiety is defined as the anxiety arising in the student’s mind before or during exam due to the worrisome thoughts, which leads to the physiological or somatic changes in the body and various distracted or disengaged behaviour also appear among the test anxious students.

8.4.0 STRUGGLING LEARNERS
Struggling students are those for whom traditional educational practices do not meet their needs and abilities. Students who are diagnosed with conditions that may impair the ability to access or benefit from educational opportunities, comes under struggling students (Heidi, 2010). When students are significantly lagging behind their schools have too often guided these students into special education services, even if they do not academically have a disability (Countinho & Oswald, 2004).

In the present context of the study, a struggling learner is a student who has difficulty in keeping up with classmate of the same age in a developmentally appropriate learning environment. Those who have difficulty in organizing themselves and their work environment, who have difficulty in taking up the instructions given at the first time, who face difficulty in keeping up the pace with the given work task and need chunked work for themselves and those students who have weak social and emotional skills will fall under the category of the struggling learners. These struggling learners fall between the cracks of the educational system unless we provide them with the assistance they need.

8.5.0 ACADEMIC PERFORMANCE
Academic performance is performance of students in different subjects in a standardized series of educational tests (International Dictionary of Education, 1999). Academic performance can also be defined as excellence in all academic disciplines, in class as well as extracurricular activities. In present study academic performance involves performance of students in Biology subject as indicated by their test scores.
9.0.0 OBJECTIVES OF THE STUDY
The aim of the research is to study that how Brain based learning affects the academic performance, academic stress and test anxiety of the struggling learners. In order to achieve this aim, the researcher has laid down the following objectives:

1. To identify the struggling learners from a CBSE School Population.
2. To develop the Brain-based Lesson plans for Struggling learners selected from CBSE School Population.
3. To test the effectiveness of developed Brain-based Lesson Plans on Struggling learners.
4. To examine the effect of developed Brain-based Lesson Plans on Struggling learners in managing the level of Academic Stress.
5. To examine the effect of developed Brain-based Lesson Plans on Struggling learners on Test Anxiety.

10.0.0 HYPOTHESES OF THE STUDY
In order to realise the above-mentioned objectives, the following hypotheses have been formulated:

1. There exists no significant effect of the instructions of the Brain-based Lesson plans on the academic performance of the struggling learners of the experimental group.
2. There exists no significant difference of the instructions of the Brain-based Lesson plans and traditional Lesson plans on the academic performance of the struggling learners of the experimental and control group respectively.
3. There exists no significant difference of the instructions of the Brain-based Lesson plans on the level of academic stress among the struggling learners of the experimental group.
4. There exists no significant difference of the instructions of the Brain-based Lesson plans and traditional Lesson plans on the level of academic stress of the struggling learners of the experimental group and control group respectively.
5. There exists no significant difference of the instructions of the Brain-based Lesson plans and traditional Lesson plans on the level of test anxiety of the struggling learners of the experimental group.
6. There exists no significant difference of the instructions of the Brain-based Lesson plans on the level of test anxiety of the struggling learners of the experimental group and the control group respectively.

11.0.0 VARIABLES IN THE STUDY
The operational variables of the present study are as follows:

1. Independent Variable: Brain-based learning (Lesson Plans).
3. Control Variable: Age, School Environment, Grade, subject, Duration of the study, Teacher.

12.0.0 DESIGN OF THE STUDY
The researcher has keenly prepared the Plan of Action for fulfilling the objectives of the study. The sample selection, methodology, tools and techniques to be used and statistical techniques to be employed in the research work have been laid down on the next page.
12.1.0 SAMPLE SELECTION
The Sample selection in the present study will be done in two distinct stages as given below:

Stage 1: Sampling of School:
The researcher will use Purposive method of sampling, for the selection of schools in the present study from Agra city. The researcher will select private school having large number of sections of secondary classes, offering English as a medium of instruction and affiliated to CBSE Boards of Examination, Delhi. It will be widely popular and reputed and will have a base of good teaching & learning process. The large number of sections and medium of instructions is specifically considered here as to collect the large number of struggling learners for the experimental try out and also the lesson plans and tools which will be employed in the present study are in English language.

Stage 2: Selection of Struggling Learners:
In this stage of sampling, researcher will select at least 120 struggling learners of class VIII, from all the sections, and after diagnosis of struggling learners, they will be randomly distributed into control and experimental group, aged between 13-14 years.

12.2.0. METHOD OF THE STUDY
The researcher will employ Quasi Experimental method in order to test the effectiveness of the instructions developed on the Brain-based learning on the academic performance, academic stress and test anxiety among the struggling learners.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 will be followed in the present study.

Given below is the table showing the method employed in the present study.

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</th>
<th>TREATMENT</th>
<th>POST TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental Group</td>
<td>60</td>
<td>• Achievement Test • Academic Stress • Test Anxiety</td>
<td>• Brain-based Lesson Plans</td>
<td>• Achievement Test • Academic Stress • Test Anxiety</td>
</tr>
<tr>
<td>2.</td>
<td>Control Group</td>
<td>60</td>
<td></td>
<td>• Traditional Lesson Plans</td>
<td></td>
</tr>
</tbody>
</table>

12.3.0 PROCEDURE OF THE STUDY
The present study will be carried out in the following phases, which has subsequent stages, which are as follows:

PHASE 1: Tool Construction Phase:
The foremost phase in the method of the present study is construction phase, which involve the construction of the tools involved in the present study. It can be carried out in the subsequent stages, which are as follows:

Stage 1: Construction of the tool for diagnosing struggling learners.
Stage 2: Construction of Pre achievement test of the selected syllabus from the Science text Book of class VIII.
Stage 3: Construction of the tool of Academic stress.
Stage 4: Construction of the tool of Test Anxiety.
Stage 5: Construction of the Lesson plans of Brain-based learning approach as well as
PHASE 2: Diagnosis of Struggling Learners and Planning of the Experiment
This will be the second stage of the research method of the present study, which involves diagnosing the Struggling learners and then distributing them into Control and Experimental group for carrying out the study. This phase involves following subsequent stages.

Stage 1: Applying the Struggling learner tool on the students of VIII class the CBSE Boards.
Stage 2: Applying Pre achievement test on all the sections of class VIII of CBSE Board School.
Stage 2: Applying the Academic stress and Test anxiety tools on all the student of Class VIII.
Stage 3: Diagnosed struggling learners will be randomly distributed in control group and experimental group for carrying out the study.

PHASE 3: Implication of Brain-based Lesson Plans and Traditional Lesson Plans
This phase will involve the implication of Brain-based lesson plans on the Experimental group and Traditional lesson plans on the Control group, and then results will be analysed according to the objectives formulated for the present study.

PHASE 4: Evaluation and Testing of Objectives
This Phase comprises of the evaluation of the struggling learners of the experimental group and control group to whom instructions will be given on the Brain-based learning approach and Traditional approach respectively, which is followed by testing of the objectives on the basis of obtained scores.

12.4.0. TOOLS AND TECHNIQUES TO BE EMPLOYED IN THE STUDY
In order to collect relevant data for the fulfilment of the proposed objectives, the following tools will be constructed by the researcher in the present study

12.4.1 Construction of Struggling Learners Identifying Tool
With best of the researcher’s knowledge and exploration, there is no tool available for identifying the struggling learners; therefore a self-constructed tool for identifying the struggling learners at secondary level will be used. The basic criterion or domains which are focused in the construction of the tool will be, social and emotional skills, organization of the work environment, collecting and organizing the given information and response towards any given instructions.

12.4.2 Construction of Achievement Test for Pre & Post Assessment
In order to measure Academic performance of the struggling learners self-constructed achievement tests will be used having its Pre and post versions separately.

12.4.3 Construction of Academic Stress Scale
A number of tool are available to measure academic stress (e.g. Academic stress scale, Kohn & Frazer 1985; Lakaev Academic Stress response scale 2009, Sinha & Sinha Scale for measuring academic stress 2003 etc), but some of them are not available and some are not fulfilling the basic criterion for the present study, therefore a self-constructed tool will be employed for measuring academic stress. The domains will be considered for constructing the tool are Pressure from study, workload, worry about grades and self-expectation.
12.4.4 Construction of Test Anxiety Tool
There are various tools which are present for measuring test anxiety, as Test anxiety scale (Kumar, 1989, Sharma, 2000), children test anxiety inventory (Spielberger, 2003), but all of them are not catering the need of the present study. Therefore it is decided to prepare a self-constructed tool for fulfilling the need of the present study. The tool will be constructed, considering the following domains as worrisome thoughts, physiological or somatic changes and distracted or disengaged behaviour during or before test.

12.4.5 Brain-based Learning
For assessing the newer approach of teaching and learning i.e. Brain based learning, self-constructed lesson plans will be developed. There is a format available for the same, in the form of Brain-Targeted teaching Unit, which is copyright protected (John Hopkins University, 2001). This Brain-targeted teaching unit was developed by Hardiman(2001), later on this format has been adopted by many educationists in the field of Brain-based learning. The format for the same is given in the appendices.

The Lesson plan of Brain-based learning, which is in the form of Brain-targeted teaching unit, has six steps which are as follows:

1. Emotional Climate
2. Physical Environment
3. Learning Design (Concept maps/ Advanced Organizer)
4. Teaching for Mastery (Declarative/ Procedural knowledge)
5. Teaching for Application (Extension, Integration and Application)
6. Evaluating learning

12.5.0 STATISTICAL TECHNIQUES TO BE EMPLOYED IN THE STUDY
The statistical techniques which will be employed in the present study, for achieving the formulated objectives in the present research problem are as follows:

1. Plotting of Raw scores to identify the nature of raw scores and to estimate the skewness and Kurtosis, which will work as a guiding principle for implementing the further statistical techniques.
2. Measures of Central tendency viz. Mean, Median, Mode to deal with raw scores.
4. Statistic t-test will be used to determine the significant difference among mean of various dependent variables in relation to independent variables.
5. Graphical representation to summarize the intricacies of data into visual form in order to make it vivid and clear to comprehend it easily.

12.6.0 DELIMITATIONS OF THE STUDY
The present study will be conducted assuming the following delimitations:

1. The study will be delimited to specific school affiliated to CBSE Board of examination in Agra city.
2. The study will be delimited to English as a medium of instruction
3. The study will be conducted on VIII class students comprising of boys and girls.

13.0.0 SIGNIFICANCE OF THE STUDY
During the past decade the neurological and cognitive sciences have produced a vast frontier of knowledge on how the brain processes, stores, and retrieves information. As educators have increasingly recognized their role as consumers of this emerging knowledge, translating brain research into classroom instruction often becomes a challenge for the typical educational practitioner. In an era of high-stakes accountability for student performance, many teachers feel pressured to prepare students to meet proficiency levels on standardized tests. At the same time, they are often required to implement a plethora of ever-changing educational initiatives and reforms handed to them by well-meaning school district supervisors. In such a scenario where struggling learners who fall in the cracks of the whole educational system, whose needs are almost neglected and due to various reasons, they feel highly stressed, which can even lead to high drop outs. In this climate, it would not be surprising for new teachers to feel overwhelmed and seasoned teachers to view any educational initiative, including research in the neurosciences, as merely a fad that soon will be replaced by yet another new initiative. Perhaps this thinking accounts for the fact that educational research is largely ignored by practitioners. In order for any research, especially current brain research, to become readily accessible to teachers, fragmented initiatives must be integrated into a cohesive model of instruction. Brain-based learning will help in achieving the same. It provides teachers with a format for using research in the neurosciences as well as research-based effective instructional practices to guide them in planning, implementing, and assessing a sound program for all the learners. Teachers who utilize Brain-based strategies in the classroom to enhance their students’ performance are seemingly better able to positively impact learners on social, emotional and cognitive levels. What the research on Brain-based educational techniques seems to indicate is that teachers should continue to learn how to implement classroom techniques that support student’s growth both socially and academically. In the light of Brain-based learning, if the struggling learners and their problems will be considered who fall in the crevices of whole education system, then they surely will be benefitted. This Brain-based learning will not only turn fruitful for the normal learners, but also for the struggling learners and will give the whole education system a transition.