ABSTRACT

During the past three decades education has been stepping into an exciting age i.e. there is a transformation from knowledge era to information era. As a consequence the aims of education have changed from gain of knowledge to application of knowledge. Brain compatible learning offers a solution for these changing requirements. Brain-based learning is an instructional-design model based on the idea that learning activities are more effective if they occur in an atmosphere that is compatible with the way the brain learns. Brain based education centers around the principle that learning is more productive if the learner is in a natural, challenging, yet non-threatening environment. Since its inception, brain-based learning has provided a window into which educators can approach learning with insight of how the brain affects what happens in the classroom. In order to gain an appreciation of the well-managed classroom we must take a look at the gamut of classroom models available to the educator.

The present paper is an attempt to find the components of a brain-compatible classroom environment in the light of some previous researches. For this purpose in the first phase the learning process of brain is explained, then brain-compatible learning and finally the components of brain-compatible classroom.

INTRODUCTION

“If we get too comfortable we stop growing”. Herb Thelen.
Education is a lifelong continuous, dynamic and ever changing process. Most important aim of teaching is to provide meaningful and permanent learning. Education, its aims, curriculum, teaching methodology and its administration always need an overhaul reconstruction and meliorations as per the changes in the society to meet the changing requirements of the society. An independent study commissioned by the HRD ministry shows that more time (45% - 55%) is spent by the students in a passive activity like listening to teacher or taking dictation whereas 20% - 32% time is spent in active learning that includes studying on their own, peer learning, answering, seeking clarifications and doing assignments. Change has become the need of the hour. The aim of education should be to reorient the minds of young ones and inflame their intellect. With the passage of time educators, researchers and teachers have become conscious to incorporate such techniques / strategies to the teaching-learning process so as to get the best learning outcomes in the form of students’ achievement. No longer are the good teachers conveying information, facts and principles, they are in tune with how the brain function. They are teaching using brain-compatible instruction to increase students’ achievement.

During the late 1990’s, there was a burst of enthusiasm for “brain based education” triggered in part by the explosive growth of neuroscience, and by President George H. Bush’s declaration of 1990’s as the ‘Decade of the Brain’. Teachers, educators, cognitive psychologists and neuroscientists have joined their hands to apply the findings of the brain to classroom practices so that the natural abilities of the brain can be capitalized. Learning the best way to learn has become as important as learning the subject matter. (Sprenger, 1999). It is the time for a move to ‘teaching as a science’ from teaching as an art. Looking to the future, we should attempt to develop an interaction, recursive relationship among research programmes in education cognitive psychology and system neuroscience.……..John T. Bruer.

The paper attempts to suggest a model classroom environment for brain compatible learning considering the researches by eminent psychologists and educationists. For this purpose first we will focus on the learning process of brain, then on the theoretical orientation to brain compatible learning and finally the components of an enriched classroom environment.

LEARNING PROCESS OF BRAIN

Learning is the process of building neural networks (Wolfe 2001), Neuron is the learning unit of the brain. Each neuron is composed of a cell body, axon, axon terminal and dendrites. Perry & Gregery have compared a neuron with an old fashioned floor mop with a wooden handle and a head made from twisted cotton fibers. The handle is split. The dense part represents the cell body, the handle is the axon and split end the stick represent the axon terminal. Individual strands of the mop are the dendrites. The axon terminals of one neuron are connected to the dendrites of the other. The axon terminals pass the message through the cell body to the dendrites of the other neuron. The message is transmitted from one neuron to the other through an electric chemical process by crossing the synaptic gap and thus a connection is formed. The dendrite receives the message if information is stimulating enough. If the connection so formed is used repeatedly it became stronger and if they are not used or practiced neuron pruning takes place. The more the number of neural connection more is the learning, connections are formed if the
information reaches the brain logically and related to real life and past experiences or previous knowledge of the learner. So for information to be learnt it must be presented logically with active involvement of brain.

BRAIN COMPATIBLE LEARNING

The concept of brain-compatible learning is supported by various researchers, psychologists and educationists through their theories. With the development of various brain imaging techniques and other researches, the neuroscience is now able to explain how the brain processes, interprets and stores the information. The researches encouraged the educationists to apply the researches on the learning process of the brain in the field of education and thus giving birth to the concept of brain-compatible learning. Brain compatible learning means applying the learning system of brain to the field of education. It is learning with brain in mind (Eric Jensen 2000). The nature of cognition, the functioning of the human brain, and the construction of knowledge are tied to one another. It is a concept which tells how fusion of the common sense, human experiences and brain researches produce useful tools and principles for classroom environment. It does not give us a map to follow. But it provides us to think the structure of our brain at the stage of making decision. In conclusion, understanding how the brain learns – by actually capturing, sorting, and holding on to information enables teachers to implement the kinds of instruction and develop the kinds of classrooms that capitalize on the brain’s natural abilities and thus promote student learning (Parry & Gregory 2003).

These are not the strategies alone which are required for brain-compatible learning but for the brain to capitalize its potential / classroom environment is a must. Brain requires stimulation for proper dendritic growth which is possible with a brain-friendly classroom only. So, in the present paper the components of a brain compatible classroom are being analysed in the light of previous studies.

BRAIN COMPATIBLE CLASSROOM

According to the brain based trainers in a brain based classroom the teachers should teach for meaning and understanding. They claim that in order to do this, teachers should create learning environment which are low at threat and high at encouragement and students must actively participate in and with immense comprehensive experiences. Teachers must know the short and long term memories, how our past learning affect the new learning and the differences of progressive, explanatory and episodic memories (Bruer 1999). For the learning as well as retention an interactive stimulating and challenging environment is required. An environment that has mostly predictable or repetitive stimuli fosters boredom in the brain, making in turn inward for new and novel stimuli (Sousa, 2001). Creating an enriched environment through new learning experiences and challenges is vital to brain growth.

Caine & Caine, have explained three phases of teaching-learning process: orchestrated immersion, relaxed alertness and active processing orchestrated immersion means students focusing on the context with wholeness and connections. Relaxed alertness has two components a) general relaxity b) internal motivation required to increase the learning to its highest level. Active processing is the theoretical
organization and internalization of the meaningful information by learners and should be regarded as a focus on meaningful learning rather than memorization.

Ryan & Grolnick (1986) conducted a study and examined the significance of children's perceptions of their classroom environment along autonomy versus external control dimensions. The study related to self-report measure of the perceived classroom climate to other self-related constructs. It was found that the more "origin" the children perceived in their classroom the higher was their perceived control by unknown sources. It further indicated that, within children's fantasy, origin – like behaviour of students was associated with autonomy – oriented teachers and low aggression.

In another study Deci, Schwartz, Schienman, and Ryan (1981) assessed elementary school teachers' orientations toward either being controlling or supportive of autonomy in children using the "Problems in School" questionnaire. These investigations found that in classroom where teachers' styles were controlling versus autonomy oriented, children reported significantly lower intrinsic motivation to learn as well as lower feelings of self worth and perceived competence. These findings suggest that the experience of autonomy is an important aspect of children's school-related adjustment and self-perceptions.

Joy Raboli, the administrator at Abiqua School in Salem gave the following steps that are needed to establish brain-based classroom environment.

- Absence of threat
- Nurturing reflective thinking
- Meaningful curriculum content
- Physical movement, to enhance learning
- Choices for students – how they learn and how they demonstrate their learning
- Adequate time to thoroughly explore and use information and skills
- Enriched class environment and use of the outside world as an adjunct
- Collaboration, rather than strictly individualized learning
- Immediate feedback
- Mastery and application – using what they learn in real-life situations to cement learning into long-term memory.

According to Marian Diamonds, "No two children are alike. An enriched environment for one is not necessarily enriched for another."

- No two children learn in the identical way.
- In the classroom we should teach children to think for themselves.
- One way is to group children so they are talking to each other, they are asking questions to each other, they are learning to be teachers. One of the most important concepts for a 5 year old to know is that he or she can teach because you have to understand something to teach it.
“So our environment, including the classroom environment, is not a neutral place. We educators are either growing dendrites or letting them wither and die. The trick is to determine what constitutes an enriched environment.

Marian Diamonds and her team of researchers at the University of California at Berkeley have been studying the impact of enriched environments on the brains of rats. Diamonds believes that enriched environments unmistakably influence the brain’s growth and learning. An enriched environment for children Diamonds says:

- Includes a steady source of positive support;
- Provides a nutritious diet with enough protein, vitamins, minerals and calories;
- Stimulates all the senses (not necessarily at once)
- Has an atmosphere free of undue pressure and stress but suffused with a degree of pleasurable intensity;
- Presents a series of novel challenges that are neither too easy nor too difficult for the child at his or her stage of development;
- Allows social interaction for a significant percentage of activities;
- Promotes the development of a broad range of skills and interests: mental, physical, aesthetical, social and emotional;
- Gives the child an opportunity to choose many of his or her efforts and to modify them;
- Provides an enjoyable atmosphere that promotes exploration and the fun of learning;
- Allows the child to be an active participant rather than a passive observer.

Radin (2005) conducted a study and gave a model to illustrate the overarching concept of an enriched environment and included the following components in it

- Physical systems / physical arrangements which include clean, well-lighted classrooms that are pleasant smelling, aesthetically pleasing and containing multiple resources for topics currently under study.
- Encouraging, caring and emotionally healthy.
- Free from stress and threats.
- Authentic work, challenge and inquiry based work.

The brain-compatible classroom is a brain-friendly classroom, whose activities are complementary to what we know about brain functioning, “There must be features of classroom practice that exploit aspects of the brain that cognitive science and neuroscience have not yet properly documented; but that teachers know all about......”

Colin Blakemore
“Three principles from brain research: emotional safety, appropriate challenges, and self constructed meaning suggest that a one-size fits all approach to classroom instruction teaching is ineffective for most students and harmful to some”.

Carol Ann Tomlinson 1998

On the basis of the analysis of work done by various researchers the following are the components of a model brain compatible classroom.

1. **Absence of threat**: If the brain feels threat, the emotional center of the brain i.e. limbic system will short-circuit learning. Such an environment should be created in which the feel safe and secure. Such an environment will work best which can engage the emotions of the students as ‘Emotions focus our attention and attention sets the stage for learning. (Parry & Gayle 2003)’. The students should be encouraged to take risk and give answers without fear of ridicule. They should be helped to feel accepted, not put-down.

2. **To minimize the stress by presenting appropriate challenges** – Psychiatrist Arnold Scheibel (1994) maintained that lessons learned under stress are remembered better than those learned in a stress free environment. Certain amount of stress is beneficial, whereas acute or prolonged stress may have negative effects on learning. If the students are to learn efficiently, stress needs to be kept within optimum levels so that their self-esteem and personal efficacy remain intact. ‘Adjustable assignment’ that creates challenge at individual level of ability without imposing a threat should be given to the students.

3. **Meaningful curriculum content** – To make the curriculum content meaningful the students should be helped to relate it to real world and other subject areas. Content should have a theme and it should be specific to their age and the design of content should be creative, useful and emotional. Students can learn by teaching each other and using an interdisciplinary model (Radin 2005).

4. **Physical activity** – The psychomotor aspect of the domain of a child’s personality is equally important. No doubt, a classroom is dominated by cognitive and conative domain but still we cannot avoid the psychomotor domain for the brain to develop to its full capacity. Physical activity is indeed good for brain development but the effect is general rather than specific. General physical activity stimulates brain development because it supplies the brain with glucose, its main energy source say Carl Gabbard, Professor of Motor development at Texas A&M University. Raboli also supports the view and says physical movement is required to enhance learning.

5. **Providing appropriate and timely feedback**: The students should get appropriate feedback of their responses and progress and the feedback should be immediate because at that time emotional arousal is at its peak and students can develop logics very easily.

6. **Providing sufficient time** – The students should get enough time and encouragement to respond. They can be motivated to think creatively by guiding them if required, cooperative groups can be formed instead of individualistic approach and by giving enough time to the group the mental abilities can be nurtured.
7. Physical arrangement – An environment with attractive surroundings, with decorative walls and surroundings, proper lighting & ventilation should be there in a brain compatible classroom. It should be well laid out for multiple uses, aesthetically pleasing, uncluttered, exhibiting students’ work, a comfortable temperature and should contain multiple sources for topic currently under study (Hoge 2002; Jenson 1998). Sitting arrangement should be interactive either ‘U’ shaped or round table. A chair can be left for the teacher in each group so that the teacher can be a member of the group whenever required. Other than the above mentioned components an enriched environment should also include various teaching and learning styles, using multiple intelligence, keeping in mind individual differences.

CONCLUSION

Brain-compatible instruction is not a program, a formula or a package for teachers or schools to follow. But making teaching “applied science of brain” is required which can be done through brain compatible learning. Providing enriched environment is the first step in orchestrating successful student learning and achievement. In this era of high accountability educators need to continue to better understand what conditions, environment and instructional practices can improve learning for all students (Radin, 2008).

REFERENCES

• http://www.members.shaw.ca/priscillatheroux/brain.html
• http://www.alternativesmagazine.com