

---

Title	Brain research: Implications for classroom practices
Author(s)	Ang Wai Hoong and Agnes Chang Shook Cheong
Source	<i>MERA-ERA Joint Conference, Malacca, Malaysia, 1-3 December 1999</i>

---

This document may be used for private study or research purpose only. This document or any part of it may not be duplicated and/or distributed without permission of the copyright owner.

The Singapore Copyright Act applies to the use of this document.

## BRAIN RESEARCH: IMPLICATIONS FOR CLASSROOM PRACTICES

Ang Wai Hoong & Agnes Chang Shook Cheong  
*Nanyang Technological University, Singapore*

Abstract: Teachers are always trying to improve their teaching to enhance students' learning. Recent studies in brain research provide educators with very useful insight into pupils' learning. Findings such as the emotional brain, memory space, various types of memories and retrieval processes have implications for classroom practices. This paper discusses such classroom practices.

### Introduction

During the last decade, findings on brain research have become significant. Such findings provide teachers with a better understanding of how the brain learns. So far social and behavioural sciences have great influence on classroom practices. This paper attempts to look at some of these findings on brain research and its implications for classroom practices. This paper will discuss on two areas emotion and memories.

### Emotions

Students do not learn when they do not pay attention. Emotion drives attention that in turn drives learning and memory (Sylwester 1995). There are practices which teachers are already using to catch students' attention. Similarly highly emotionally charged classroom is not conducive to learning. Very often it becomes disruptive. Some of the main emotions are anger, sadness, fear, enjoyment, love, surprise, disgust and shame. Some of these emotions like enjoyment, love and surprise enhance learning while others inhibit or slow down learning learning.

#### *Positive emotions*

Positive emotion is prerequisite to learning. Some of the common classroom practices are described below.

1. Teachers spend time to establish rapport with students either inside or outside the classroom. Students often pay more attention to teachers who like them. There are many things that teachers do that convey positive emotions. Much of Madeline Hunter's (1969, 1976, 1982) work on teachers' behaviour elicits positive emotions, such as:
  - Making eye contact with each student periodically.
  - Addressing them by their names.
  - Moving among them during teaching.
  - Saying something personal to individuals whenever possible.
  - Dignifying students' mistakes.
2. Activities that emphasize social interaction and engage the whole body provide emotional support. Such activities include games, field trips, discussions, cooperative learning strategies, art, project work. Students when working with other students create a sense of camaraderie and belonging.

3. The cleanliness of the classroom, the comfort of the furniture, even temperature and appropriate music help to create a conducive environment for learning. If possible allow the students to decide on the arrangement of the furniture. Very often furniture is arranged to suit the teacher.
4. Order in the class is important. Rules and procedures provide the students a safe environment to work in. Clarity in tasks is also important. When students are clear about their task they can do them with a sense of purpose and achievement.

### *Negative emotions*

Some emotions caused disruption in the classroom and make teaching and learning impossible. There are ways to diffuse these negative emotions in the classroom. Students involved in a situation very often cannot control their emotions. Emotions just exist and not easy to change them. In fact feeling takes place before any rational thought.. Students need to learn how to overcome these negative emotions by using rational processes. After a quarrel or a fight has taken place, a teacher may organise a physical activity (e.g. circle the tag) for the class. When the students have expended their energy than the teacher may embark on solving the problem. Singing a song also helps to soothe the simmering emotion before rational discussion can take place. Shouting and screaming at the students do not help to alleviate the tension and only escalate it.

1. Students are aware of the complexity of emotions through their own experience and observation. Unfortunately they do not know how to express. A useful way is to provide for more metacognitive activities that encourage students to talk about their emotions. For example, using *why* in asking questions allows students to listen and appreciate other students' motivations and emotions. For example: Why are there so many illegal workers in the country?
2. Schools that over stress evaluation and discipline are not conducive to learning. Of course, no stress also means little learning takes place. Stressful situation takes up so much energy that less energy is left for productive work.

### **Memories**

Memories are knowledge. Teachers deal with knowledge. Hence it is important to find out how the brain learns in order to help students to remember. Classroom knowledge can be divided into two main types. Declarative knowledge includes facts, concepts and events. Procedural knowledge includes mainly skills and processes.

After incoming information has been attended to, it is kept as short-term memory. When this information is processed and elaborated then it is stored as long-term memory. Declarative and procedural knowledge are acquired, processed and stored differently.

### *Short-Term Memory*

#### Learning declarative knowledge

Information received from the senses and caught the brain attention is held for a short period of time for the brain to decide its importance. The amount of information that can be kept in the short – term memory depends on the age of the learner. By the age of 15 years, there are about seven plus or minus two memory space.

The unimportant information would be deleted to make space for more incoming information. The important ones must be combined or chunked into larger units or patterns to make available memory space for more information. The unprocessed information is deleted to make space for the incoming information.

There are implications for teaching:

- To provide time for processing information after teachers have talk on five to seven points. It is useful to abide by the 10-2 principle. That is to provide two minutes processing time for every 10 minutes of talk. Another way to look at it is to take note that the concentration span of most brains is about 10-15 minutes. After every 10 to 15 minutes of teacher talk it is time for students to do an activity to process information.
- To provide learning structures for students to chunk information. It is easier to remember a face than individual feature. Large amount of information is often remembered in terms of main points rather than specifics. Using structures such as mind-mapping, compare and contrast, classification, etc. will help students to remember in a better and more meaningful way.

#### Learning procedural knowledge

Procedural knowledge is learned differently. One of the more effective way is the think aloud model (Hunter, 1976). Teachers first demonstrate a step by step model accompanied by saying aloud her own thinking process and then allow students to have opportunities to try out the model to ensure understanding of the concepts. Using flow charts (Lewis and Green 1982) is another effective method to help students to learn the procedural knowledge. Students are then provided with guided practice to ensure that they carry out the process correctly.

#### *Long-Term Memory*

#### Elaborating and retrieval of declarative knowledge

After the brain has processed the information in the short-term memory, it must be stored in the long-term memory. This process is often termed as elaboration. That is learning the same information in different ways. Elaboration is different from rehearsal that is repeating the same action again and again. Elaboration activities help students to understand and remember the content better. Elaboration involves making many and varied linkages between new information and old. The more integrated the new knowledge to the old the easier to remember.

- Teachers can provide activities to elaborate on their learning such as writing, debates, discussion/teaching fellow students, songs or raps, games, role-play, learning with all senses, project work, etc.
- Imagery is an effective elaboration tool. The commonly used ones are rhyming pegword system (Miller, Galanter, and Pribram 1960) and the method of loci (Ross and Lawrance 1968). The link technique is popular. Students create a mental image of each piece of information and link them together in a interesting story form.

#### Internalizing procedural knowledge

The final stage of learning a skill is to practise it until students can do it automatically (Kolars, 1976). Adhering to the principle of massed practice at the beginning of learning and distributed practice help students to maintain the skill at a higher level of proficiency.

**Conclusion**

One of the main tasks of teachers is to foster the love of learning among their students. When students have positive emotions in learning and successful in their learning, they will like learning. The brain research findings provide teachers with more knowledge to increase students learning and to nurture students to become life-long learners.

**References**

- Sylwester, R. (1995). *A Celebration of Neurons*. ASCD, VA.
- Hunter, M. (1976). *Improved Instruction*. El Segundo, Calif.: TIP Publications.
- Lewis, D., and J. Green. (1982). *Thinking better*. New York: Holt, Rinehart and Winston.
- Miller, G., E. Galanter, and K. Pribram. (1960). *Plans and the Structure of Behavior*. New York: Holt, Reinhart and Winston.
- Ross, J., and K. Lawerance, (1968). "Some Observations on Memory Artiface." *Psychomatic Science*, 13, 107 – 108.
- Kolers, P. (1976). "Reading a Year Later." *Journal of Experimental Psychology: Human Learning and Memory*, 2, 554-565