

Learning and our Brain!

Midlothian Council Educational Psychology Service

A little Neuroscience...

Years ago people thought the human brain was like a machine: fixed, unalterable, unable to change and grow. However, as brain imaging techniques have developed our understanding of how the brain functions has in turn grown considerably. We now know that the brain is much more amazing than previously believed....

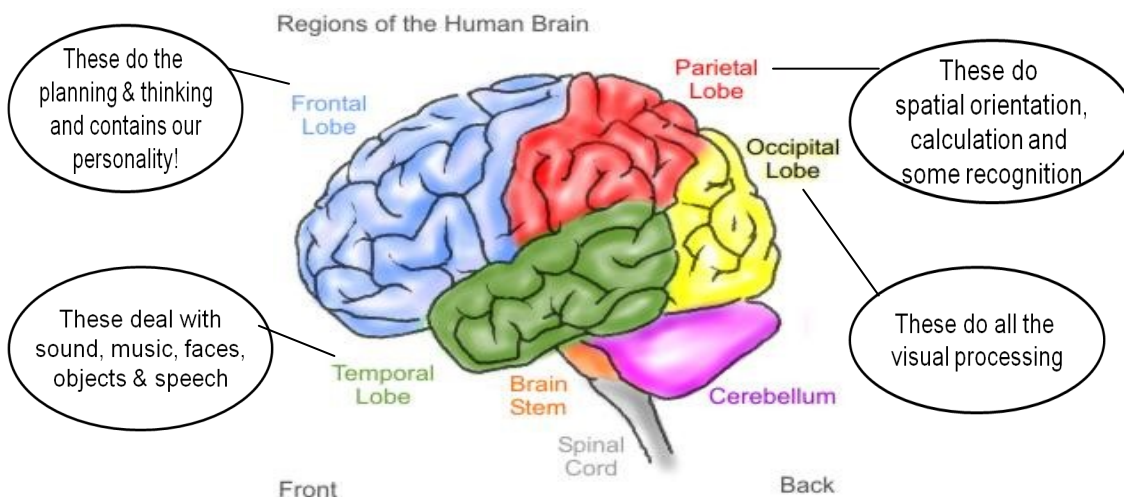
Some 'brainy' facts:

- ◆ From birth to the age of four years old (during which time a baby learns to walk, talk, and learn how to function in society) the brain goes from 25% of adult weight/size to 90%
- ◆ Although the majority of neurons are made within the first year of a child's life, recent research has shown that the brain goes through another rapid growth in synapses and pruning back of unused connections during adolescence – a process which enables the brain to become more effective and efficient moving into adulthood. It doesn't stop there either, new connections can still form in the adult brain too!
- ◆ When we become stressed, it is harder for us to learn things and sometimes impossible to learn at all. Instead of information coming into our neo-cortex (which is the rational, decision-making part of our brain), fear or stress will trigger a response from the 'reptilian brain' which uses the evolutionary instinctive behaviours – i.e. 'fight, flight, freeze'.



Learning to Learn Series
Spotlight 1

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Did you Know?

- In a tiny bit of your brain, the size of a grain of rice, there are 10,000 nerve cells
- Although it is only 2% of our body weight, it uses 20% of the calories we eat
- The more we think the more calories we burn!

Cognitive Abilities

The brain uses a limited number of what researchers, such as Feuerstein, describe as 'cognitive abilities'. These abilities can be seen as a set of skills which are both acquired and used in any kind of learning process. Reflecting on these cognitive abilities can help us understand more about how information is processed by the brain and as a result, develop better teaching and learning methods.

A model for describing these cognitive abilities, or 'domains' is explained overleaf.

Cognitive Domains Model (Luria, Deutsch & Mohammed)

Attention

This ability helps us focus on the task itself (Regulation), helps us filter out distractions (Selection), helps us shift our attention from one stimulus to another (Shifting), helps us sustain our attention in order to complete a task (Sustaining).

Perception

This refers to our ability to gather different types of information in a learning process. These include visual/auditory/kinaesthetic/spatial and temporal relationships. Perception also helps us to consider more than one source of information at a time, an important skill in answering an exam question for example.

Memory

Our memory is so important. More and more research is constantly focusing on how our memory works and how we can improve it. At present we refer to six different 'types' of memory, although these memories are all connected to each other.

- ◆ **Short-term memory** – immediate recall of information
- ◆ **Working memory** – holding information in your head while working with it
- ◆ **Visual memory** – remembering visual information
- ◆ **Auditory memory** – remembering auditory information
- ◆ **Kinaesthetic memory** – remembering kinaesthetic information
- ◆ **Long-term memory** – remembering past experiences, prior learning

Language & Communication

Our ability to communicate helps us develop and extend our learning. Like memory there are different aspects of language which come into play in the process. These include: **Receptive language** (understanding) **Expressive language** (could be verbal, sign or symbols), **Communicating a response** and **Language structure** (using sentences and grammar)

Reasoning & Logic

This controls many small things which we often take for granted in the learning process such as: being able to compare two or more items/concepts, categorisation, conserving constancies, recognising cause and effect relationships, using analogy, and making inferences and predictions.

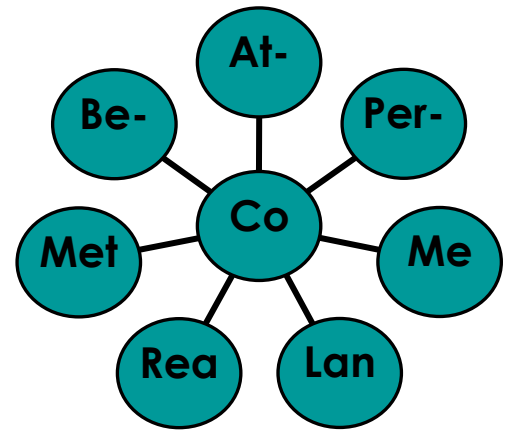
Metacognition

This fancy word refers to the ability to be explicit and systematic in planning our behaviour, for example planning the stages of a task we have been given and being able to control impulsivity or trial and error. Metacognitive skills help us understand what to do when we are given a task by helping us decide what information we have which is relevant and what is not, as well as generalising strategies and information from one situation to another. It also helps us with tasks like creating and testing hypotheses and self-evaluation. This is a complex skill to understand but one which is really good at helping us to understand!

Behaviours affecting Learning

It is important to remember that these cognitive abilities are not separate from our emotional and behavioural brain. We have already mentioned the effect stress can have on the brain and there are other behaviours which affect how we engage with learning. These are:

- ◆ Openness to intervention
- ◆ Self-regulation of emotions (blocking/ frustration) & movement
- ◆ How easily the learner is motivated by a range of learning experiences
- ◆ Curiosity in a range of experiences
- ◆ Response to challenge
- ◆ Persistence & task completion



For reflection...

How could you design and plan lessons that teach

both the necessary knowledge and content and at the same time build these cognitive skills in learners?

