

KEYNOTE by Professor Paul Howard-Jones

Neuroscience and Cognition at the University of Bristol

The Science behind feedback and learning

A Review by Paul Tyack

Having recently completed Paul Howard-Jones' MOOC (Massive Open Online Course), 'The Science of Learning' I was really looking forward to hearing more insightful findings from Neuroscience as the conference kicked off.

Paul structured his keynote as an evolutionary narrative on the brain and learning and compressed the story of life on planet earth into 24 hours. He also presented a set of concepts or principles which provide us with a more in-depth understanding of why (or why not!) great learning takes place in classrooms.

After stopping the evolutionary clock briefly at 08.12 to explain that Cyanobacteria must have had a type of memory, Paul whizzed on to 20.27 and the beginning of multi-cellular creatures. The focus here was on the learning capacity of jellyfish. Although they don't have a brain as such (and don't make great students), jellyfish do possess neural networks and can modify behaviour based on previous experience. To avoid bashing into the same



Prof Paul Howard-Jones

obstacle continuously, the jellyfish can modify its actions based on past experience. There we have a central organising principle of the brain that has been there for half a billion years. The idea that we process our senses and turn it into action. That action component is key for us as teachers as sometimes we just expect learners to sit and process information, which is very difficult – it's not what we have evolved to do. Paul referenced research and examples showing the importance of physical action for effective learning. This is the 'enactment effect' and reflects our basic evolutionary principle.

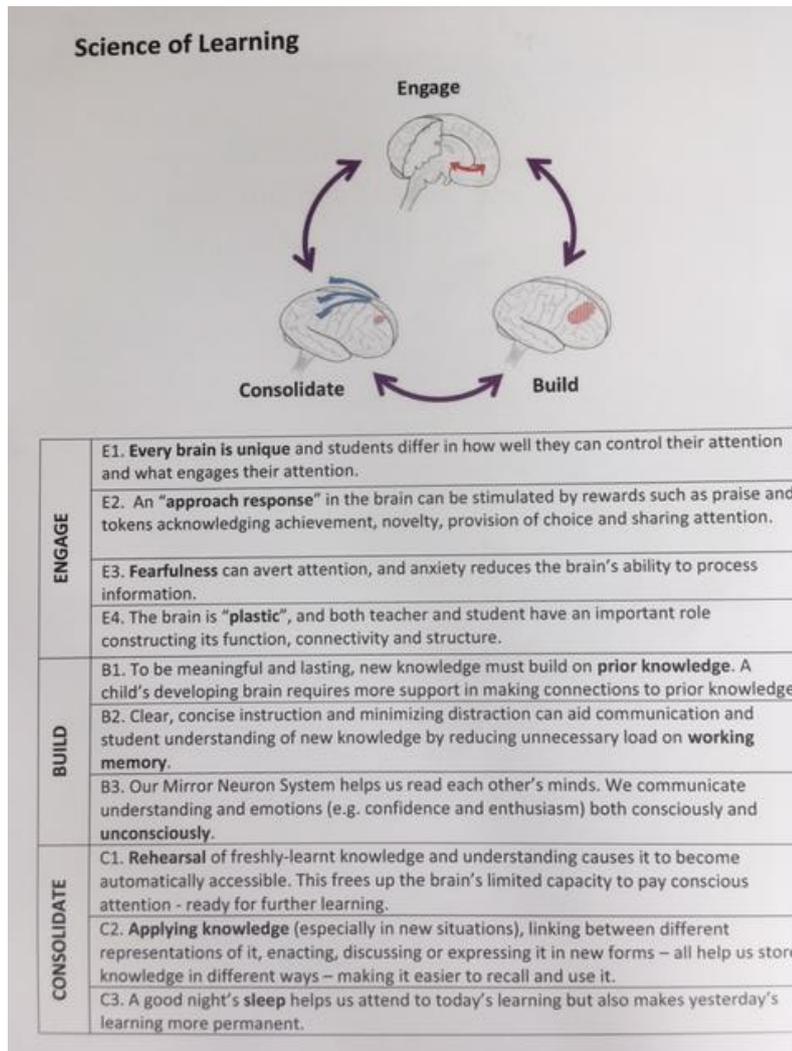


542 million years ago (22.34) saw the first bi-lateral creatures; animals with 2 eyes and a mouth, which move forwards. The neurons collect at the front of the animal, meaning there is a central nervous system. The Triune brain theory includes the reptilian brain. The idea we need to 'suppress' the reptilian brain (and our limbic system) isn't particularly helpful as emotional sensors are here and are important for our reasoning. Incredibly, it was at around 23.35 on our 'Earth clock' that animals developed the ability to be social and collaborate.

Whilst Paul explained different parts of the brain such as the frontal lobes (reasoning, conscious thought and working memory), parietal lobes (unconscious processing, 'automatic' processing, convergence zone for different senses), Visual Cortex & temporal lobes (auditory processing, memory & language), the big message was the deep interconnectedness of the whole brain with all of it being active all the time. For this reason, it does not make sense to categorise people as left or right brained, a particular learning style or even 'boy or girl' brained! Even so, Paul cited research to show that over 90% of all teachers across the world believe this 'learning styles' neuro-myth!

Under the cortex, there are some important sub-cortical structures. The Hippocampus enables us to lay down memory within context. The Amygdala controls our emotional processing and response, which are vital in our ability to make decisions, particularly when it is not a completely rational choice. The Reward system is more significant than originally thought as it isn't only activated by gratification of desires or social praise, but also intrinsic drives such as curiosity.

Paul then went on to discuss the implications of his latest neuroscience research for school classrooms. The EBC cycle (Engage, Build, Consolidate) makes the research easier to understand, but Paul ensured that we understood that all 3 may be active at any time – he was not merely re-branding the three part lesson.



Considering the summary of these principles that Paul explained in detail, we can see the power of the Thinking Matters approach to growing better learners. Pick out for yourself the central TM components of;

- Neuroplasticity
- Deliberate Practice
- Memory
- Motivation
- Brain Operating Modes

There's a bit of homework for you. Being the product of billions of years of evolution with the ability to turn what is concrete into abstract, generalised thought (only evolved at 23.59!) that you are, it should be as simple as 'EBC'.

Written by Paul Tyack, Thinking Matters Consultant