The neuroscience of making learning stick

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With rapid change and innovation cycles, tight timelines, limited resources, more to learn than ever and reduced training budgets, organisations across the globe are intent on maximising the returns from their learning programs. However, to increase the effectiveness of learning, some of our instinctive understanding about learning needs reconsideration.

Here I outline a neuroscience model called A.G.E.S. (Attention, Generation, Emotion and Spacing). This model can help learning designers improve their learning initiatives by focusing on, and experimenting with, the key variables to effective learning and memory retention.

As a former leader of L&D within a large multi-national organisation, I was fascinated to learn and embrace this model as a consequence of recently completing studies in the Neuroscience of Leadership through Middlesex University, in conjunction with the NeuroLeadership Institute.

My former experience highlighted the waste and poor return on investment in various highly reputable (and sometimes very expensive) L&D initiatives. This puzzled me and set me off on a journey to discover what the missing pieces were that would result in long-term, sustainable behavioural change. NLP and coaching were my first pathways in assisting and enabling self-directed change. But it was only in recent years when undertaking the neuroscience studies that it all clicked into place.

Attention is the economy of the brain. It must be focused and directed well for memories and learning to last. But there is a challenge in the nature of work itself, where distractions and multi-tasking inhibit the ability to focus sufficiently to learn something new, let alone retain it.

Firstly, we need to focus our focus! There are two types of learning and memory: physical tasks which are embedded through repetition in the deeper motor regions of the brain–known as procedural memory. Much of the learning conducted in workplaces is declarative, or explicit learning, meaning information that needs to be recalled (Davachi & Dobbins, 2008). This kind of learning involves encoding information in the brain sufficiently well for ease of retrieval.

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There are three stages to the formation of declarative memory:

1. Getting it in, otherwise known as encoding; ie. how memories are constructed.
2. Keeping it in, known as retention; ie. how memories are retained.
3. Using it, known as retrieval; ie. how memories are accessed and used.

Memories are like webs of connections between neural data points in the brain. When you think of a word, for example 'communication', you recognise another word more quickly ie 'people' or 'negotiation'–the network relating to 'communication' is activated. Every memory is like a web of connections across the brain and linked or organised in categories. A memory can be hard to find but retrieval is easier when you increase access points across the web (which means there are more connections). This is a primary goal of effective learning strategies for long-term, sustainable memory and behavioural change.

With just the right amount of attention, generation, emotion, and spacing, learners can create deep circuits for easy retrieval.

Attention

To optimise conditions for effective long-term learning to occur, learners need to be paying full attention to the topic being trained. In a world with so many distractions, eg 'always on' devices, this is easier said than done. Dividing attention between two tasks significantly decreases the quality of attention and the likely sustainability of any learning (Kensinger et al., 2003). Every tiny distraction during a learning task takes a big toll on later recall of ideas; for example even having a mobile device 'on' whilst attempting to focus on a primary focus task can reduce IQ by 10–15 points.

Thus one of the foundational ideas for learning is ensuring you have 'undivided attention': that people are focused closely on the learning task at hand. Relevance and a feeling of reward helps the brain to pay close attention, as well as when we are open, curious, in a goal-focused state, or working to gain something.

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Generation

What you do with information once it is attended to has a significant impact on memory. Just listening to information is not generation. Learners need to be doing something with the information; ie a simple exercise that encourages semantic encoding and retention of the information, such as exercises that encourage learners to make the information personally meaningful and relevant.

Insight, otherwise known as the 'aha' moment, is the deepest form of generation. The brain totally changes as a consequence of insight–new neural circuitry and connections are wired, lending to the idea of neuroplasticity in the brain, which is the brain's capacity to change and rewire.

People need to be making their own meaning, literally generating their own links, not just passively listening to ideas. We need our own brain to create rich links to any new concept, linking ideas into many parts of the brain. Using different types of neural circuitry to link an idea is the key, such as listening, speaking, thinking, writing, presenting and other tasks about any important idea.

Structuring learning initiatives with these findings in mind might mean less teaching, or presentation of information, and more time dedicated to the self-generation of learning with the goal of building more personal associations with existing knowledge for easier retrieval.

Emotion

Learning happens in many complex layers, with emotion being one of the more important regulators of learning and memory formation.

The way in which emotion is thought to enhance memory is twofold. First, emotional content is thought to grab the attention of the individual and, hence, help to focus attention (LeDoux, 1994; Damasio, 1994). Second, it is known that emotion leads to the effectiveness of encoding (Ochsner, 2000; Cahill et al., 1994).

While it is easier to invoke negative emotions, positive emotion can also be invoked in a learning experience. Based on the SCARF model (Rock, 2008), there are ways to generate strong rewards by increasing people's sense of status, certainty, autonomy, relatedness or fairness.

Positive social connections and social issues are the experiences we feel strongest about. Incorporating more social activities into learning experiences is vital to enhance encoding, retention and retrieval.

Spacing

Spacing works by changing the context in which the learning occurs. Spacing goes against the pressure of teaching more, in less time, with shrinking budgets. Spacing allows the brain to further digest new content and, over time, build and wire new connections, even when learners are at rest (Spitzer, 2002; Tambini et al., 2010). Any spacing of learning (whether it be minutes, hours, or days) is better than no spacing at all.

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Spacing is like a gift–no extra work for the learners. Spacing learning sessions across time leads to longer retention than cramming. While massed learning is effective for short-term recall, it is not nearly as effective for long-term memory retention.

Summary

Adult learning is complex and multifaceted. How do we ensure people are motivated and interested in learning what is presented, and how do we present the information to ensure that knowledge is sustainable, accessible, and easily applied in adaptive and contextual ways?

Learning designers could focus on these following suggestions:

- Creating maximum 'Attention' with a greater focus on learner motivation, ensuring one focus during learning events.
- Encouraging significant 'Generation' of learning to build learner ownership and relevance.
- Creating a positive 'Emotional' environment with opportunities for learners to gain positive feedback and connect deeply with others.
- Utilising more 'Spacing' of learning instead of massing and repetition, with more dispersed content.

Learning is not a destination to be arrived at, but rather a life-long journey to be savoured and built upon over time.

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