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Creativity – the biology of learning – repeat after me

<https://academicbantersite.wordpress.com/2019/05/30/creativity-the-biology-of-learning-repeat-after-me/>

I was intrigued by a comment I read recently in Lucy Crehan's excellent book 'Cleverlands' where she is appraising educational achievement in key countries worldwide. Lucy observes that Chinese culture is influenced by the teaching of Confucius, a 6th century BC philosopher, who felt that the path to virtue included self-improvement through knowledge and that 'learning is a goal to be achieved by personal striving to perfect oneself'. Hard work to improve one's knowledge is thereby viewed as a virtuous and moral activity and is celebrated. Many of the stories that Chinese children listen to are of characters who work hard, overcome challenges and achieve great things. In Western culture we are more likely to believe that intelligence is fixed; for example, you're either good at maths or you're not. In China the response is invariably that this can be dealt with through hard work (1)

One of the ways in which Chinese students work hard is through repeating learning. They experience a lot of practice, both in school and through homework. This consistent and expected repetition of learning steps leads to an intuitive feel for the subject and a deeper understanding of the subject content (1). Dragan Trninic suggests that practice does indeed make perfect as patterns then become evident and relevant to the student (7). Both authors are quick to point out that practice by itself is insufficient; having a guide to highlight inaccuracies and celebrate success is essential.

Knowing that China does rather well on the educational world stage – the 4 Chinese regions (Hong Kong, Taipei, Macao, BSJG) all sit in the top 10 in the PISA results (6) – I did wonder if this success in maths, science and reading was attributed to hard work and repetition or what the brain is doing in the meantime.

Is it down to brain power?

“Learning is defined as the process by which new information is acquired. Memory is the process by which that info is retained and retrieved” (2)

I am becoming increasingly fond of my hippocampus. It plays an integral role in the consolidation of declarative memory and is one of two areas in my brain where neurogenesis or new synapse connections occur throughout my adult years (2).

So, what is going on in my head if I choose to repeat? I have to say, that whilst not a neuroscientist or even remotely near in my understanding of the complexity of brain chemistry, I got quite excited when I read Joana Gil-Mohapel's work on the hippocampus and learning. Ok, so the study was on rodents, but she explained things in a way that I felt I could grasp!

She highlighted that repeated activation of a neural synapse in the hippocampus releases various chemicals in the brain which, ultimately, if the repetition is maintained, results in genetic change and subsequent increase in the size of the synapse (2). This process is called long term potentiation (LTP). You get a bigger cell which offers a stronger neural responses

with increasingly limited exposure (3). Effectively this means you need less of a reminder each time to recall previous learning. This doesn't always happen with every learning event; the brain's circuitry is a little more complex than I am explaining. However, in general, learning and LTP can remodel existing neural connections and are responsible for new synapses and stronger synaptic connections (2). In other words, new and stronger memories

These are the mechanics that underpin the observations in my last blog (5) about the ability to be reminded of previous memories and that these can then be amended by similar learning experiences. We can learn things well if we are encouraged to recall existing knowledge and then repeat the learning in order to build on and consolidate it. The intention overall is to pass the learning into that place of intuition referred to by the Chinese (1). This "knowingness" is down to repetition which is suggested is the fixative (3)

Theory into practice then?

With all of that in mind I set myself a task – to learn the Shim Sham. This was developed in the 1920s and consists of a particular sequence of individual jazz steps. These are performed as a line dance and can be found, with minor variations, on any jazz dance floor worldwide.

https://www.youtube.com/watch?v=g_k_BIA_unI

I attend a weekly dance class where the Shim Sham is the current learning focus with the added pressure of having to perform it at a local festival in a few weeks. I don't find it easy mainly because there are a variety of steps to learn and they come in a particular order. Brain study and Chinese example in front of me, I decided that I needed to rehearse – a lot!

So far, we have had 2 sessions at dance class where our teachers Richard and Helen have demonstrated the moves and we have copied. But, as I know from experience and the likely way the brain works, I need to keep revisiting this otherwise I forget. Since the sessions, I have practiced the steps each day in my kitchen. It has been a tad frustrating at times but to prevent boredom I've mixed up the learning approach:

- a) used a variety of YouTube videos where I follow expert dancers. The best ones are when the dancers are being filmed from behind as it is much easier to follow! This clip shows one of the original Grand Masters, Frank Skinner, who reintroduced the dance 60 years later and added a few new moves:
<https://www.youtube.com/watch?v=g2FyvoAi2ew>
- b) used the pause and repeat facility to practice and polish each step.
- c) written down the order of the moves
- d) visualised each move and the sequence in my head.

To date, I'm about 80% through and now able to follow without stumbling but I'm looking forward to the next class practice when I can get some feedback!

Repeat after me

How does all of this relate to the primary classroom and the overall blog theme of creativity?

If repetition is the fixative for learning, then children need to meet a concept regularly and be given time to practice. How often is still under discussion (3) but, as with the Shim Sham example, having an expert guide is key (1, 7) alongside providing a 'story' (4) that helps with memory recall. The various approaches listed above to support my practice of the steps has provided a variety of 'stories' and an 'expert guide' or two; this is where my creativity has come in.

I watched a trainee teacher work with a Y5 child recently where the lad was practicing division. He had ten questions on a worksheet to complete. At the time it looked uninspiring, repetitive even, but that was the point. He needed to keep going through the technique. In our follow up discussion, the trainee said that he still needed more practice, but she would find an alternative activity that would be interesting and include the necessary repetition.

Our current curriculum, whilst reduced from its previous incarnation, still feels a little content heavy. A creative teacher who understands that practice is likely to make perfect will weave interest and intrigue into his/her lessons where concepts are continually revisited and children are inspired to try hard to master them. Who knows, maybe learning a few Shim Sham steps may help?!

<https://www.youtube.com/watch?v=IJGpg7wuEh4>

It is a lot of fun!

References

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