**Chapter 1: Learning is misunderstood**

Most people hold false beliefs about learning that lead them to use ineffective study methods, such as **rereading** and **highlighting** which feels productive but is actually an ineffective way to learn. Rereading particularly gives us the false illusion of remembering something. What we are actually experiencing is ‘recognition’ of the information, this is completely different to being able to ‘recall’ the information in an exam. Further, it is a passive skill and the brain is more efficient at retaining information when it is being actively used (Dunlosky, 2013).

By contrast, the most effective learning strategies are often **counterintuitive**. So if you want to improve your learning, you will need to achieve two main goals of learning a new skill or concept. They are:

* **Comprehension:** to gain a deep understanding of the underlying principle in order to understand how it applies to different situations. If you learn a grammar rule or law in one context, can you apply it to another?
* **Retention:** to remember the information when a problem or situation calls for it, and when you get a chance to build upon it with more advanced knowledge. Research shows that you need to recall at piece of information at least 8 times before you will memorise it.

When reading information for the first time, you’ll gain a more meaningful understanding if you identify the main principles (key points) that will guide you when you call on this knowledge to apply it to a given situation. In order to extract the main principles of a text, you need to be able to remove information that isn't necessary. By practising you will quickly be able to identify common themes and principles across different examples.

Once you recognise the principles, you can connect those principles with prior relevant knowledge. This process—called **structure building**—creates context, which deepens your understanding. Structures help you create mental models, which bring together related concepts or skills into one fluid skillset.

To give an example, when driving a car, you will need to know several concepts; knowledge of traffic laws, motor skills to push the brake pedal and turn the wheel with the right amount of force. These are learned separately but you need to know how they link for the mental model to work. At first, it feels like you’re juggling several skills at once, but experience merges them all into a mental model that enables you to drive without consciously thinking about each individual action.

The more mental models you have, the better prepared you are to navigate any situation. Additionally, **practicing** your mental models in a variety of contexts improves your ability to apply them in different situations. For example, to be skilled at driving a car you need to practice on different surfaces, in different weather etc.

***Chapter 2: To Learn, Retrieve***

Knowing a skill is one thing—**but remembering it when a situation calls for it** is what counts. Many people try to burn information into their memories by rereading, but this approach only commits the information to their short-term memories, making it inefficient in the long run. Instead, the most effective way to improve retention of new information is through **active recall**, which is any exercise that requires you to **recall** what you’ve learned.

The authors suggest following two principles to maximise the benefits of your retrieval practice:

1) **Effortful retrieval leads to better retention.** The harder your brain has to work to retrieve the information, the more firmly it cements it in your memory. Another way is to delay your retrieval practice long enough that your memory has gotten a little fuzzy and your brain has to work harder to retrieve the information.

2) **Repeated testing improves retention.** Regular testing deepens your comprehension, which improves your ability to apply the knowledge in different contexts. And the longer you continue regular testing—even after you feel that you’ve mastered the skill—the longer-lasting your retention will be.

As our long-term memory is vast; in order to quickly locate and recall information we need to practise recalling information regularly to establish retrieval cues and pathways that can reactivate memories. When you recall information from your short-term memory little mental effort is required as you know it quite well already since it is recent. When you try and recall information after some time has passed (and your grasp on the information has become a little rusty) you have to make more of an effort to reconstruct it. This effortful retrieval **strengthens** the memory and reconsolidates it by connecting it to newer memories and makes it more pliable.

**Chapter 3: Mix Up Your Practice**

When learning and instrument or sport, we are taught to practice, practice, practice. When developing batting skills of the New York Yankees Baseball Team, coaches found that their athletes did best when the types of balls thrown at them varied, rather than several of the same kind. The basic idea is that varied practice like hitting varied balls improves your ability to transfer learning from one situation to another by developing a broader understanding of the relationships between different conditions. Hitting the same type of ball 100 times only allows you to make slight adjustments but when you attempt to hit a different type of ball, you will find it very difficult.

**Spacing out** your **retrieval practice** creates **desirable difficulties** that improve your **retention**. Instead of focusing on one skill or topic at a time, spacing them out gives your brain the time it needs to strengthen new knowledge and store it in your long-term memory through a process called consolidation.

Consider this when creating your revision timetable. Look ahead to when your national exams are, work out how many hours you can dedicate to revision in that time (per subject and then per topic) and then mix them up and space them out (interleave and space the learning).

**Chapter 4: Avoid Illusions of ‘Knowing’**

In order to expand your learning, you need to know what you know, what you don’t know, and what you need to work on. But people are poor judges of their own knowledge and abilities, and those miscalculations can inhibit learning. This is something called the fluency effect when you believe that you have mastered a topic but in fact you are only part of the way towards mastery. You’re less likely to spend the extra time practicing the things you need to work on, and when a real-life situation calls for that knowledge, you fall flat. The best way to overcome this is complete all of these activities above **in pairs or groups and share what your answers**. Others may have better knowledge and be able to correct you/give you feedback. However, be disciplined and avoid idle chit chat (factor time in for this instead!).