Myths and Facts about Successful Learning

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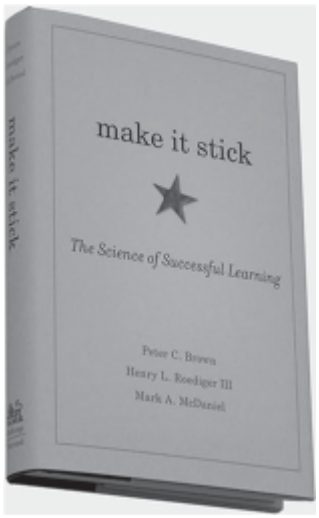

Brown, P.C., Roediger III, H.L., & McDaniel, M. A. (2014). Make it stick: The Science of Successful Learning. Massachusetts: The Belknap Press of Harvard University Press. (xi + 313 pages; USD 27.95).

Repeated practice is a good learning strategy.

Creativity not knowledge is important.

We learn better when we practice and master one kind of problem before moving to next.

We learn better when the material is easier, well organized, and poses no difficulty.

Being able to read a text fluently is an indication of the mastery of the text.

We learn better when instruction matches our learning style.

Our level of intelligence is pre-determined and our ability to learn decreases with our age.

There is no point in asking students to solve problems before they are taught how to solve them.

Right? Wrong! Say Peter C. Brown, Henry L. Roedinger III, and Mark A. McDaniel, the authors of the book *make it stick: The Science of Successful Learning*. The book brings the nectar of research in cognitive psychology and neuroscience out of the lab, making it readily available for students, teachers, lifelong learners, and trainers. Divided into eight chapters, the book refutes intuition-based claims (some of them outlined at the beginning of this review) and presents research-based evidence about learning.

No one, I suppose, denies that "If you are good at learning, you have an advantage in life" (Brown, Roediger, & McDaniel, 2014, p.2). However, according to the authors, how meaningful learning takes place is largely misunderstood. The first chapter (*Learning is misunderstood)* presents and refutes some commonly held intuition-based misunderstandings about learning. Some of those misunderstandings are

placing importance on massed practice or cramming (i.e. repeatedly reading a material until we feel like we have mastered it) and rereading. These strategies, according to authors, not only waste time but can also be counterproductive. Some good learning strategies that are elaborated in the following chapters are introduced briefly in the first chapter.

The second chapter (*To learn, retrieve)* emphasizes the importance of retrieval practice in learning. Reflection and testing are presented as useful retrieval tools. Personal reflection helps in making sense of what we have learnt, relating it to our experience, creating more connections with previous knowledge and experience, and making knowledge reflexive (i.e. readily and subconsciously available when required). In the same way, testing helps in learning by interrupting forgetting, that is, 'the testing effect'. The authors caution that emphasis on creativity at the expense of knowledge is plainly wrong; knowledge is the foundation for creativity. Therefore, both knowledge and creativity need to be cultivated. Effortful retrieval through reflection and testing make learning meaningful and knowledge durable. Low-stake or no-stake tests can be used as tools for retrieval practice. As effortful retrieval is beneficial for learning, the tests that require more efforts are certainly beneficial; therefore, open-ended questions are better than closed-ended ones. However, any (self) test is better than no test at all.

Underscoring how practicing one kind of problem before moving to the next (i.e. blocked-practice) is a BAD LEARNING STRATEGY, the third chapter (*Mix up your practice)* presents spacing (i.e. leaving enough time for forgetting in between practices), interleaving (i.e. switching before each practice is complete), and varied practices (i.e. mixing different types exercises together instead blocked practice) as good learning strategies because they consolidate our long-term memory and develop discrimination skills.

The fourth chapter (*Embrace difficulties*) is the one that I like the most as it talks about developing positive attitude towards and valuing difficulties that arise during our learning. The difficulties that we can handle with significant efforts are desirable because they consolidate our memory, help us in building mental models of what we are learning by relating them to our personal experience and background knowledge, make us better understand the concepts, make learning more versatile and transferrable, and prime our brain for learning (priming effect). Similarly trying to solve problems before we are presented with solutions requires us to put in more effort, makes our brain active for learning, leads us to deep processing, and makes it easy for encoding the material when the answer is supplied. Making blunders (leaping-before-looking!), that is, not avoiding errors serves learning better! However, the book cautions that making blunders may not be a good strategy for learning in every situation (e.g. para-jumping!).

In the fifth chapter (*Avoid illusions of knowing*), the authors remind us that "[w]e

are all hardwired to make errors in judgement" (p. 104). However, the good news is that good judgement (i.e. metacognition) can be developed through giving more emphasis to slow and controlled thinking and relying less on our intuition. Our intuitive knowledge, which is subjective and biased, may give us an *illusion of knowing* something when in reality we do not know it. One such illusion is the *feeling of knowing* when we can read a text fluently. Sometimes we feel like "I knew this thing very well but could not write about it in an exam." Has it ever happened to you? It has happened to me many times. The authors say that this is just the feeling of knowing or an illusion of knowing. The bad news is that those who are unskilled are unaware of what they do not know, tend to overestimate their performance, and attribute their failure to their inability rather than lack of effort. However, the good news is that calibration in judgement (i.e. match between prediction and reality) can be developed.

In the sixth chapter (*Get beyond learning styles*), the authors highlight that the claim that *we learn better when instruction matches our learning style* is NOT supported by research. Different styles of presentation may be suitable for different subject matters (e.g. visual style for geometry and explanation for poetry). Rather than learning styles, other differences like attitude, intelligence, level of language fluency, and reading ability do matter. However, we do not need to worry about our level of intelligence because it is dynamic (not fixed) and can be developed. How do we learn better going beyond learning styles? The authors suggest: be in charge of your own learning, embrace the notion of successful learning (strive for learning), adopt active learning strategies, distill the underlying principles, and build structures. Read the book for captivating and practical success stories.

In the seventh chapter (*Increase your abilities*), the authors make the evidence-based claim that our level of intelligence is NOT pre-determined and our ability to learn DOES NOT decrease with our age! Both intelligence and ability to learn can be increased through focus, self-discipline, effortful retrieval practices, and brain training activities. Equally important are growth mindset (*Yes I can* attitude) and priority to *learning goals* over *performance goals (or grades)*. The brain retains its plasticity even in our fifties, sixties and more! No worries of being old, at least mentally. Experts are not born but made. Read the book to find your own role model. Sustained, solitary, and deliberate practice does pay off, though it is not enjoyable in the beginning.

So what? Who is this book for? For everyone, indeed. For students, for lifelong learners, for teachers, and for trainers. All of us belong to at least one of these categories. The last chapter (*Make it stick*) is full of tips (and real examples!) that are plausible, evidence-based, and practical. Students can boost their performance, and lifelong learners can benefit from good learning strategies (e.g. retrieval, spacing, interleaving, and generation, to name but four presented in the book). Teachers can best serve their students by making them

understand how learning takes place, warding off intuition-based misunderstandings about learning and creating conducive environments. Trainers (and conference organizes) should realize that trainings (and conferences, of course) structured around meals and Power Points without practice for retrieval, spacing, and interleaving do not make much sense as participants do not retain much of what they learn. Quizzes and follow-up email might be useful. What about including a quiz at the NELTA conference? I think it would be a cool idea.

What do I like most of this book? Almost everything, actually. I appreciate the positive tone it carries, evidence-based claims it makes, engaging real-life examples from different walks of life it presents (e.g. a neurosurgeon in an operation theater and a teacher in a class), plain language (to describe research studies) it uses, and, most of all, wider practical significance it has. Reading this book made me feel like the authors were talking to me. *The takeaway* at the end of each chapter (except chapters five and eight) that boils down everything discussed might be the useful place to start for readers who do not have enough time to read the whole book.

I strongly recommend this book for students, teachers, lifelong learners, and trainers as I think the book has the potential to change the course of their lives by making their learning stick, that is, solid and durable.

What could have been done better? Hmm. Nothing is perfect and this applies to this book as well. One of the quibbles is that the book seems to overemphasize the disadvantage of massed practice. Some examples and explanation could also have been shorter in the interest of readers.