

‘Make It Stick’ in Emergency Medicine  
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This session is designed to summarize and relay principles of teaching and learning as set forth in the book “Make It Stick: The Science of Successful Learning”

As the book begins, “People generally are going about learning in the wrong way”. Many learners utilize study methods that are inefficient and ineffective

- Rereading and highlighting learning content
- In-depth “massed practice” on singular topics, studied in series
- Cramming

The authors set forth learning principles that promote better knowledge acquisition & retention. Key principles include:

- Retrieval Practice – quizzing one’s self on material learned (through flash cards and/or practice tests), which promotes knowledge retention and ‘arrests forgetting’.
- Spaced Repetition – exposing learners to content on more than one occasion, spaced out over time. This fosters memory consolidation – where new material can be connected to prior knowledge, and new information can be converted from short-term to long-term memory.
- Interleaved Practice – alternating the subject and topic of study within a lesson, though seemingly more difficult for a learner, strengthens retention over time.

*The overriding principle for all learners is that **effortful learning** promotes long-term retention and knowledge proficiency!*

Additional methods to make a learner’s study habits more effective:

- Elaboration – The process of giving new learning content meaning by expressing material in one’s own words – to connect the new content with previous knowledge.
- Generation – The learner’s attempt to answer a question or solve a problem *before* being shown the correct answer.
- Reflection – The act of reviewing recently taught content with a teacher, as a method of both retrieval practice and elaboration to bolster learning.
- Calibration – The necessary task of aligning one’s knowledge alongside objective feedback – the comparison against a gold-standard.

Authors’ tips for learners

- Read/prepare before a lesson.
- Anticipate test/discussion questions – quiz oneself during and immediately after the lesson.
- Review newly learned content – ensure comprehension.

- Take practice tests and review correct answers.
- Reorganize study materials, generating and elaborating during the review process.
- Summarize important concepts – leave notes/queues that force the learner to review this material at different times.
- Commit to return to the material sometime after the original lessons – *ideally at a duration when a little forgetting has occurred!*

#### Authors' tips for teachers

- Learning is most effective when it is effortful! Easy learning is material easily forgotten.
- Effortful learning rewires the brain and learners should strive for the 'growth mindset' approach; to know that all content can be mastered with sufficient time and effort.
- Students learn more when they wrestle with new problems *before* being shown the solution.
- Effective learning will inevitably include challenges and occasional setbacks – the setbacks help calibrate the learner's effort.

#### Suggestions for incorporating this philosophy in EM curricula

- Incorporate practice questions in didactics.
- Reconsider the content structure of your didactics – less 'deep-dives' into a particular heading/topic – more interleaving of topics/content.
- Reinforce the value of small-group-based learning curricula, challenging learners to generate and elaborate on the learning content.

#### CITATION

Brown PC, Roediger, HL III, McDaniel MA. *make it stick: The Science of Successful Learning*. Cambridge, MA: The Belknap Press of Harvard University Press; 2014