

Putting Cognitive Learning Theories to Work to Make Learning Stick

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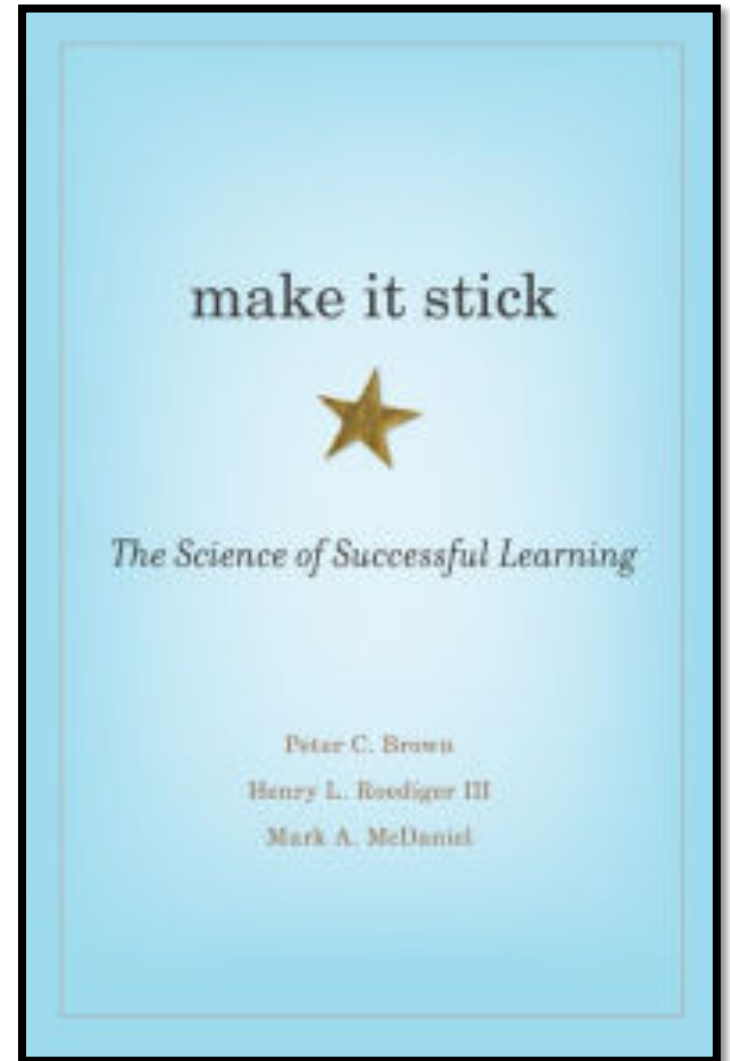
Tufts Medical School

Workshop Facilitators: Ariel Winn MD; Lori Newman MEd; Diane Stafford MD; Carolyn Marcus MD; Eli Freiman MD; Laura Chiel MD

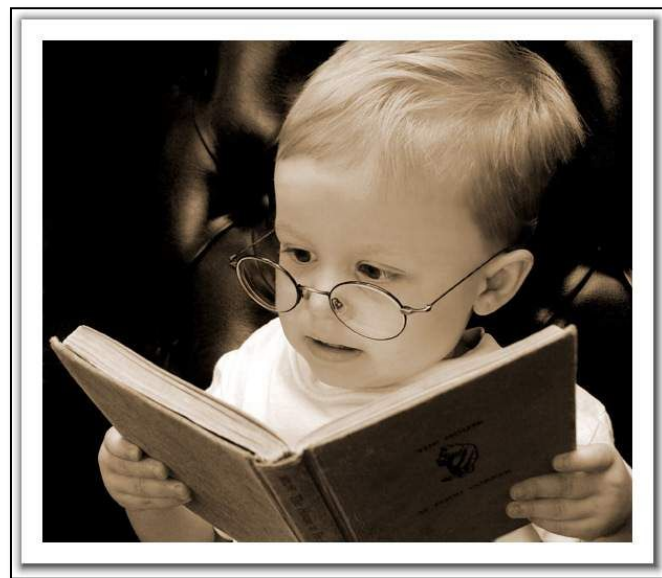
Learning is HARD WORK!

“Learning is deeper and more durable when it is effortful.”

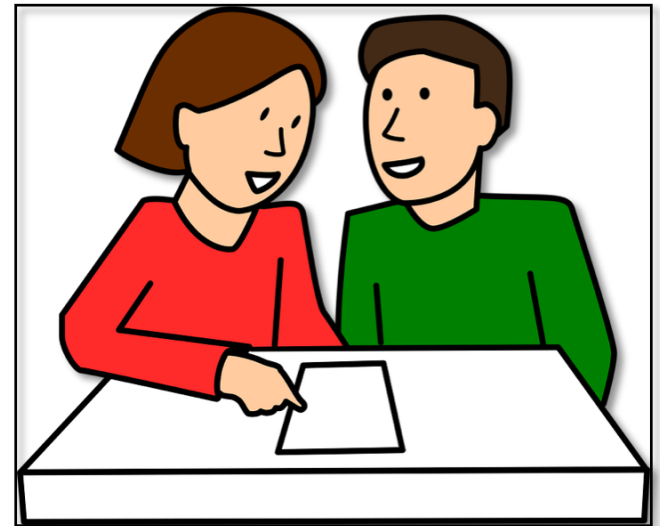
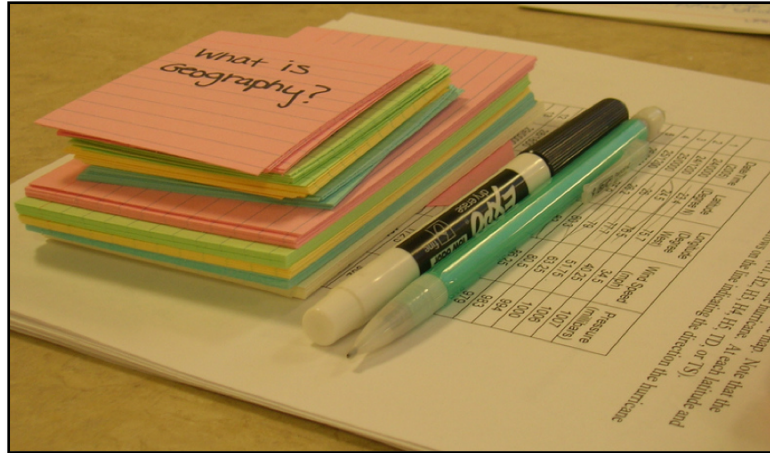
Brown PC, Roediger HL, McDaniel MA. *Make it Stick*. Belknap Press, April 2014.



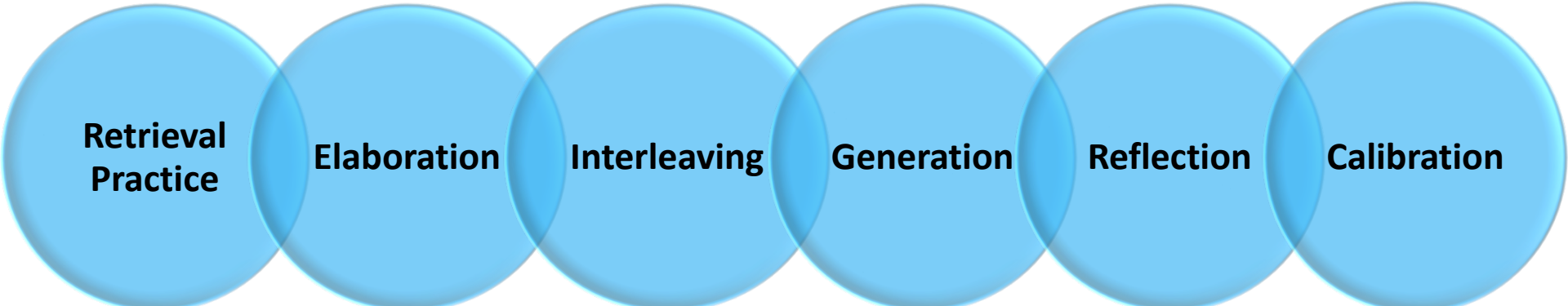
Examples of Least Productive Learning Strategies



Active Learning for Mastery



Learning for Mastery: 6 Key Activities



**Retrieval
Practice**

Elaboration

Interleaving

Generation

Reflection

Calibration

Baer, Drake. "7 Memory Skills That Will Make You Way Smarter." *Business Insider*, 18 June 2014, www.businessinsider.com/learning-hacks-that-will-maximize-your-memory. Accessed 9 Oct 2014.



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)



(l)



(m)



(n)



(o)

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Desirable Difficulties

- Use of cognitive learning strategies can be uncomfortable and difficult
- Avoid evolution to undesirable difficulties if learners lack underlying knowledge
- Feedback: Praise learner's efforts over knowledge

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Small Group Activities

- 5 small groups practicing interactive examples of each cognitive learning theory
- Facilitators will rotate to each table with a new activity
 - Brief discussion of theory
 - Interactive example to practice using theory
 - Brainstorm application use in own teaching practice

Retrieval Practice

- Learning or studying information more than once, but leaving considerable time between intervals (e.g. days, weeks, months)
- Embedding new learning requires long term memory
 - Cognitive pathways are strengthened via consolidation, which requires mental rehearsal to “retrieve learning” after a little forgetting
- Example: Flashcards

Retrieval Practice

Without speaking to anyone, write out what these acronyms stand for:

DOB	SSN
OTC	SUV
RAM	RACE
EST	AARP

Interleaving

- **Mass Practice:**
 - repeatedly studying the same skill
 - AAABBBCCC
- **Interleaving:**
 - mixing skills in studying to enhance memory
 - ABCBACACB
- Varying the content as we learn improves our ability to remember and also our ability to learn larger concepts and make associations

Interleaving in Art

Group 1: studied multiple examples of one painter's works before moving on to study examples of another painter's works, learning the style of each. Focuses on commonalities among one painter's work.

Group 2: studied the works of multiple painters at the same time, learning the styles of each by reviewing the differences between the works.

Discerning contextual and functional differences allows a higher level of comprehension



African Elephant



Asian Elephant

Forest Elephant



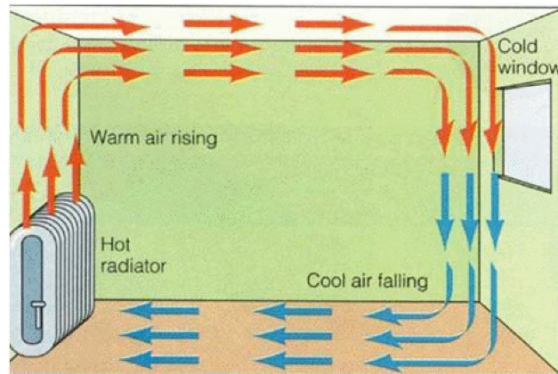
Elaboration

Giving new material meaning by expressing it in your own words and connecting it with what you already know

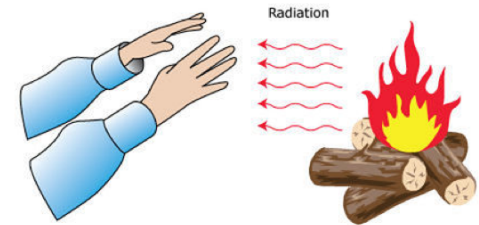
Conduction



Convection



Radiation



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Putting new knowledge into a larger context helps learning

Successful learners extract key ideas from new material and organize them into mental models

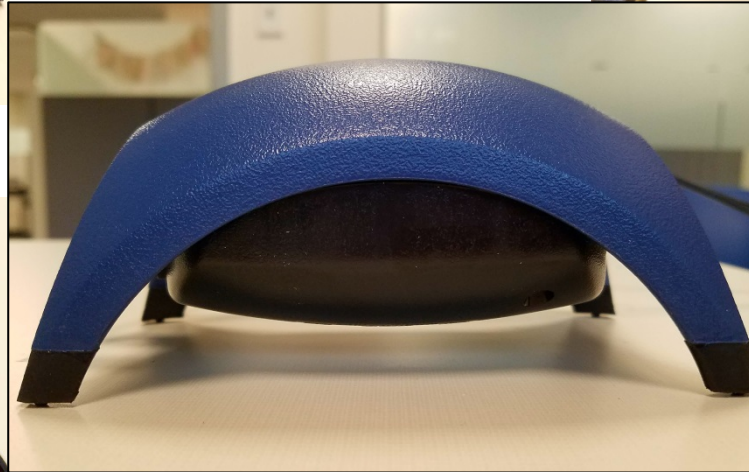
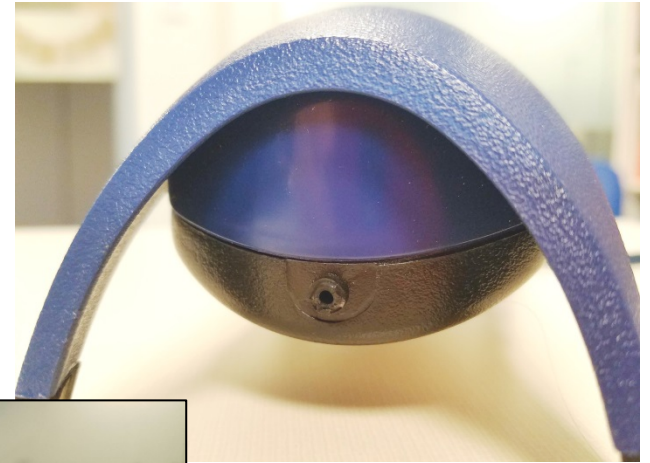
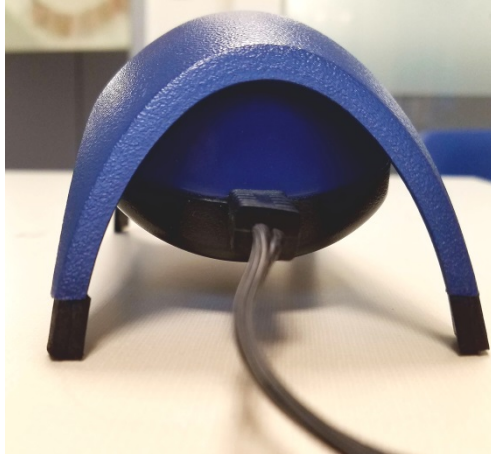
Generation

- Act of trying to answer a question or solve a problem before being presented any cues, information, or solutions.
- Why does it work:
 - By puzzling through a problem, trainees are far more likely to learn and remember the solution than if somebody simply supplied it to them.

Generation

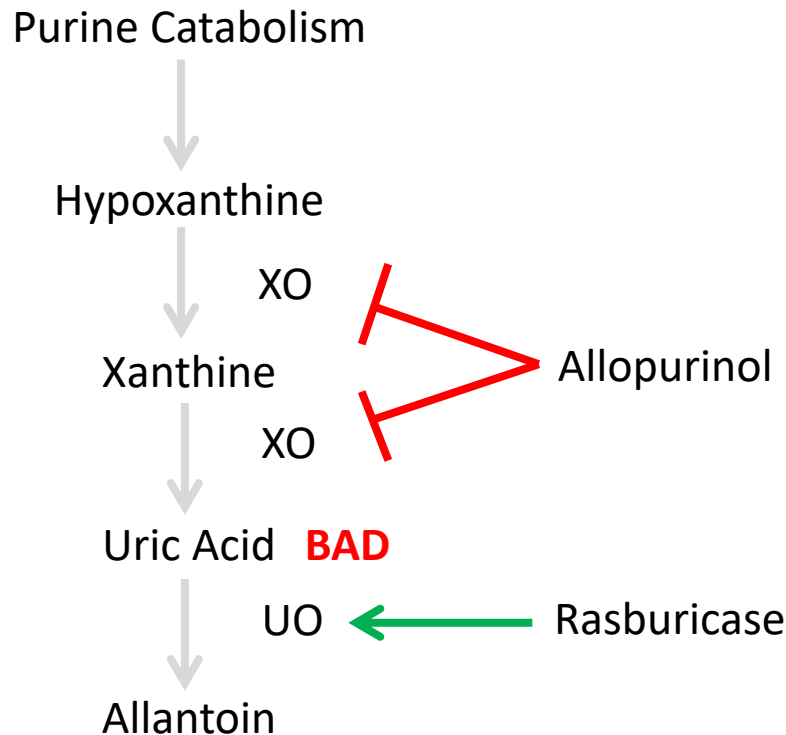
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What is this Object and What is it Used For?



Generation

- Design a therapy for tumor lysis syndrome



Reflection

1. Identify 1-2 important concept, research finding, theory, or idea that you learned while at this Spring Meeting so far. (analyzing)
2. Why do you believe that this concept, research finding, theory, or idea is important? (reflecting)
3. Apply what you have learned from this activity to some aspect of your life. (relating)
4. What question(s) has the activity raised for you? What are you still wondering about? (questioning)