Learning to Learn

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How did you do it?


Solid body of practice used by STEM practitioners. Not commonly shared.

Upcoming MOOC from Coursera!

Tarcher-Penguin
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Brain activity: Hearing a single word
It takes time

Focusing intently in ONE session to figure something out can be the worst approach possible
It takes time

Focusing intently in ONE session to figure something out can be the worst approach possible.
Take home message for your students

- Learning new knowledge is like mastering a sport.
- When you get stuck, you need to take a break, alternate your mode of thinking.

But wait!
Procrastination – A Habit


• Do NOT focus on finishing a task
• Set finish time
• Eat your frogs first
• Beware following your passion

Tests are the best!

- Flashcards are friends.

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Students fool themselves.

All the time.

Testing early and often allows you to do early “surgical” intervention.

Offer pointed encouragement—not a crutch.


Key Points

- Recall is critical in learning!
- Avoid highlighting
- Avoid passive rereading
- A critical problem—students’ erroneous belief that understanding is enough.

Interleaving

- Don’t just do the same types of problems over and over again.

Sleep is the *ultimate* diffuse mode


Without sleep, focused mode connections stop working!
Attention!

Working memory
Focused mode
Working memory and chunking

Memorization without understanding

Raw information

Information is chunked and understood

Explain so a 10-year-old can understand

- Use metaphors and analogies.
Focused thinking

Diffuse thinking

A library of chunks

Thought
Summing it up

- Alternate focused attention with diffuse relaxation
- Use the Pomodoro to tackle procrastination
- Problems are like songs—practice makes permanent!
- Sleep is critical to learning.
- Techniques that help students learn most efficiently
  - Recall
  - Self-testing
  - Interleaving and spaced repetition
  - Metaphor and analogy
- Avoid illusions of learning
  - Highlighting
  - Passive rereading
  - Glancing at solutions and thinking you can solve a problem
  - Repeatedly solving the same type of problem
  - Multitasking during learning
  - Last minute cramming
Paradoxes of learning

- Illusions of teaching
  - Occur when you only grasp one side of the paradox
- The importance of NOT focusing
  - Persistence
  - Procrastination
- Understanding is NOT enough.
  - Chunking
  - Recall
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# References