

Insights from A Mind for Numbers by Barbara Oakley

3 Steps to Higher Learning

Create Mental Scaffolds

"One important key to learning swiftly in math and science is to realize that virtually every concept you learn has an analogy—a comparison—with something you already know. Sometimes the analogy or metaphor is rough—such as the idea that blood vessels are like highways, or that a nuclear reaction is like falling dominoes. But these simple analogies and metaphors can be powerful tools to help you use an existing neural structure as a scaffold to help you more rapidly build a new, more complex neural structure." - Barbara Oakley

As you learn and develop analogies (strong imagery) related to the topic you're trying to master, abstract concepts are made concrete and tangible. The more analogies you learn, the easier it is to learn complex material.

Focus & Diffuse

Switch between focus mode (conscious thinking) and diffuse mode (unconscious processing), to expedite the learning process.

"One mode (focus mode) will process the information it receives and then send the result back to the other mode (diffuse mode). This volleying of information back and forth as the brain works its way toward a conscious solution appears essential for understanding and solving all but trivial problems and concepts." - Barbara Oakley

When learning something, engage in mental interval training: a short period of intense focus followed by a period of subconscious mental processing (force yourself to step away and stop thinking about the problem/concept). Extended periods of conscious learning and problem solving are counter-productive. Instead, think-don't think-think-don't think...solve-daydream-solve-daydream...focus-diffuse-focus-diffuse...

Recall & Retell

"Simple recall—trying to remember the key points without looking at the page—is one of the best ways to help the chunking process along... Attempting to recall the material you are trying to learn—retrieval practice—is far more effective than simply rereading the material." - Barbara Oakley

When attempting to retrieve information, your brain automatically reshapes the information to understand it, thus making it unique and more likely to stick. A 2007 study by Dr. Karpicke at Purdue University found that "retrieving knowledge improves one's ability to retrieve it again in the future. Practicing retrieval does not merely produce rote, transient learning; it produces meaningful, long-term learning."

You can take recall one step further and explain what you've learned to other people: "Retelling whatever you are learning about not only helps fuel and share your own enthusiasm, but also clarifies and cements the ideas in your mind, so you'll remember them better in the weeks and months to come. Even if what you are studying is very advanced, simplifying so you can explain to others who do not share your educational background can be surprisingly helpful in building your understanding." – Barbara Oakley

To supercharge your learning, recall and retell what you're learning by stepping away and asking yourself: "What was the most important thing?" --> Recite whatever that may be without looking at the material.