Learning To Learn

Understanding the Brain and Learning

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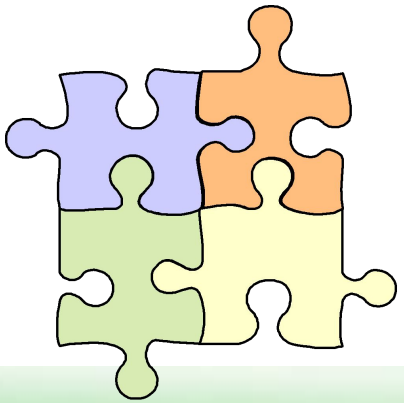
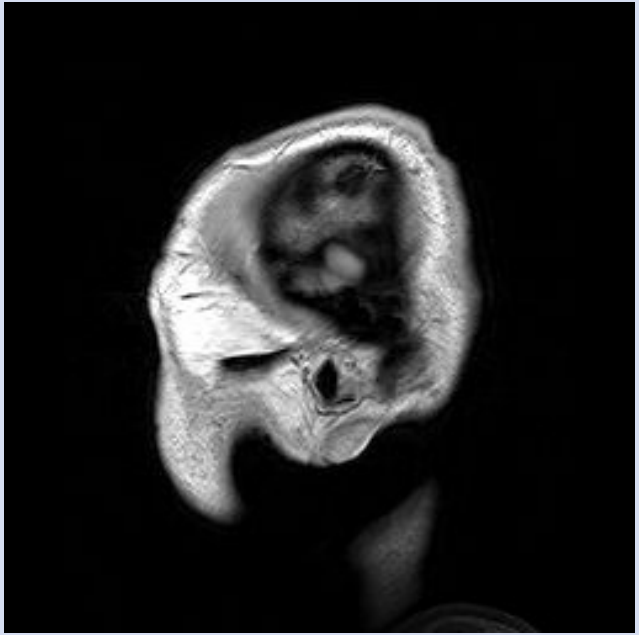


Brains are complicated

If you understand a little about how the brain works, you can learn more easily.



65% of today's grade-school children will end up at jobs that haven't been invented yet.

How will we teach them?

United States Department of Labor -- Futurework -- Trends and Challenges for the 21st Century -- 2014

Learning Theories

Learning to Learn

During the 20th century, multiple theories have been put forward to describe human differences and how to design educational models around these differences.

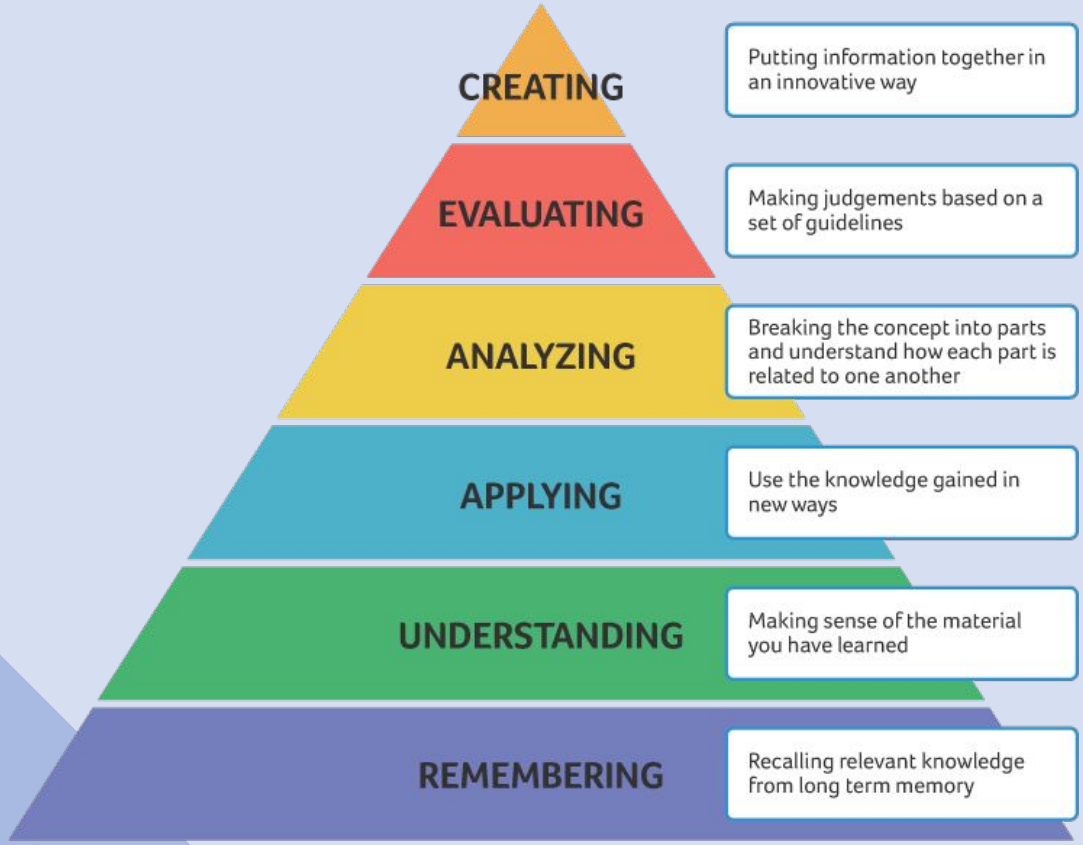
Carl Jung

Learning-style theory has it roots in the psychoanalytic community, describing how people think and feel as they solve problems.

Howard Gardner

The Multiple Intelligences theory is an effort to understand how intelligence styles shape learning.

Bloom's Taxonomy 2001



Recently there have been considerable advances in understanding the brain and learning. These new findings have significant implications for how instructors teach and students learn.

How do we teach students?

They are masters of content – they can *Google* anything.

(almost anything)

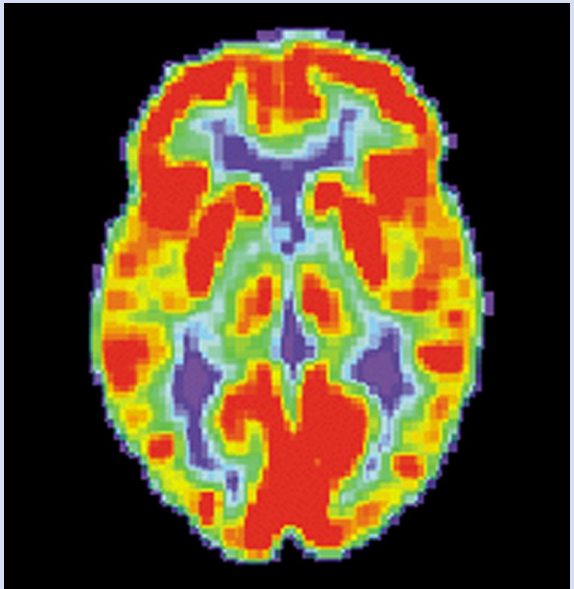
We teach them how to learn.

We make them masters *with* content.

Brain Based Learning

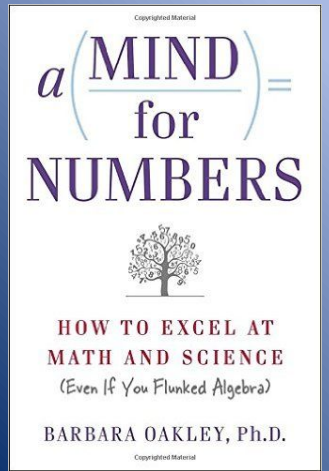
Current research in the field of BBL is being gleaned from the combined work of neurologists, biologists, psychologists, educators, and physicians.

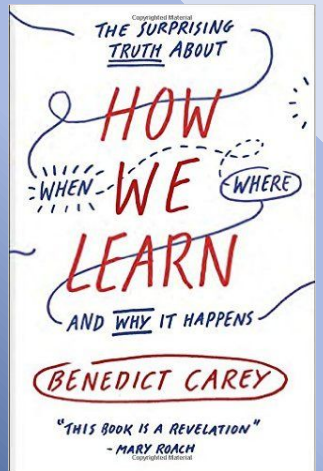
Professionals strive to extrapolate the most current research data on the brain and apply this information to teaching and learning.

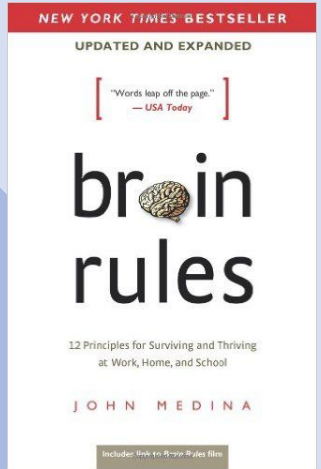


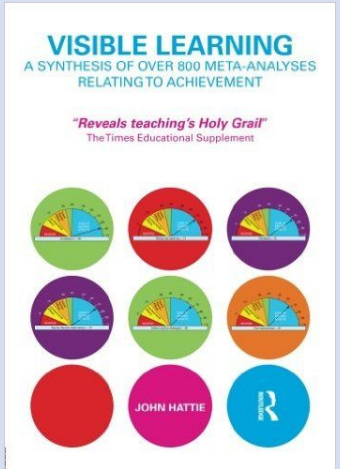
Learning to Learn

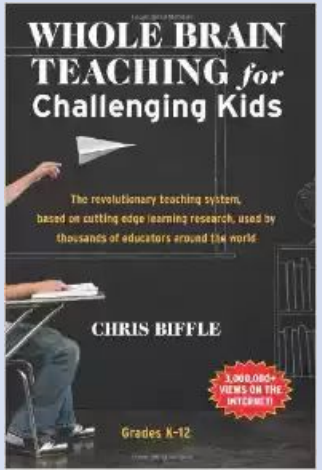
- Learning is not easy, it takes hard work, concentration and significant cognitive effort.
- The following book recommendations about learning are based on scientific research and evidence.











Working Memory

(short term memory)

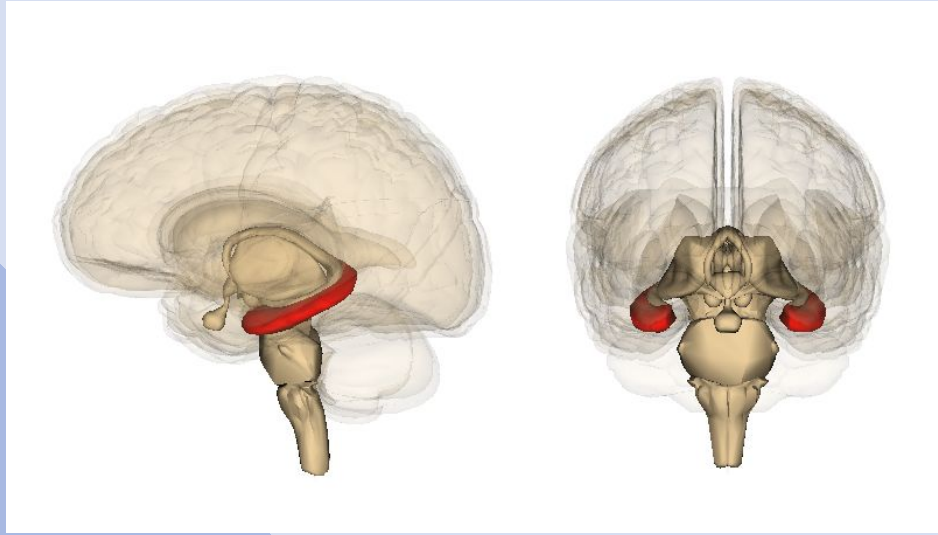
- Working memory is the part of memory that has to do with what you are immediately and consciously processing.
- It is thought that the brain has 4 “slots” for working memory.

Long Term Memory

Long term memory is information stored in the brain.

- Repetition
- Association
- Time

Memory and the Hippocampus
John Medina

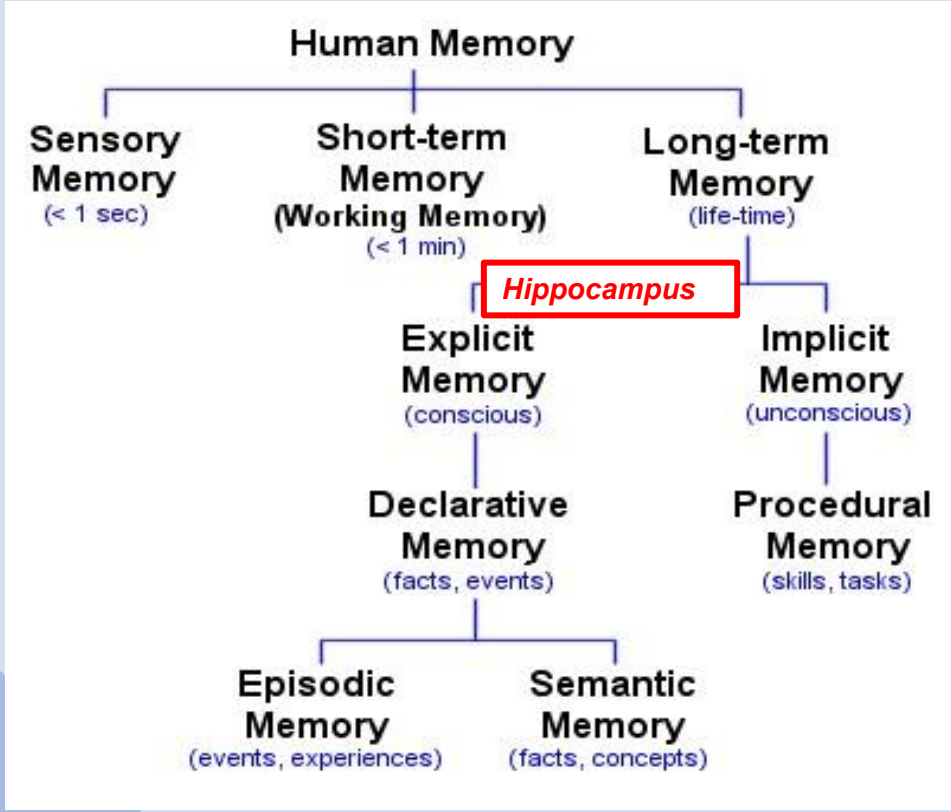


HM- Memory Loss -- Amnesia

Types of Memory and the Hippocampus

The **hippocampus** area of the brain acts as a kind of transit point for long-term memories.

It is essential to the consolidation of information from short-term to long-term memory



Kim Peek -- Declarative Memory

It is the ultimate intellectual flattery to be born with a mind so amazing that brain scientists voluntarily devote their careers to studying it.

Rain Man

Declarative memory without reasoning.

Focused Mode

- The focused mode of thinking is essential for studying.
- This mode is the work of learning, it is the **attentive-cognitive effortful encoding deliberately requiring conscious energy burning attention necessary to introduce new information to the brain.**

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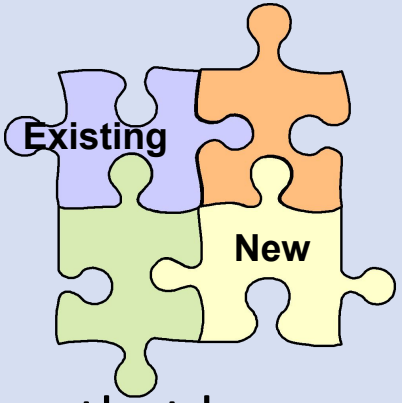
> *It is a great nuisance that knowledge can be acquired only by hard work.*
>
> Somerset Maugham

Diffuse Mode



The diffuse mode of thinking occurs in the subconscious.

- Diffuse mode originates from preliminary thinking that has been done in the focused mode.
- Diffuse mode thinking is more random than focused mode, often finding connections and associations between new information and existing stored information.
  - Allows organization that forms initial dendrite connections.
  - Sleep-on-it.

Barbara Oakley -- Introduction to Focused and Diffuse Modes (edited)

Introduction to the Focused and Diffuse Modes

Learning How to Learn

8 Rules of Learning

Working smart leads to effective and efficient learning.

Unless you try to do something beyond what you have already mastered, you will never grow.

Ralph Waldo Emerson

1. Exercise

- Working out may keep the brain sharp, exercising four hours after learning a task has been shown to improve memory.
- Researchers led by Laura Chaddock-Heyman, reports that children who are more fit have more white matter in their brains than those who aren't as fit.
- Physical activity can slow brain aging by as much as 10 years, reports a new study published in the journal *Neurology.*

Rule #1 Exercise Boosts Brain Power -- John Medina

Exercise

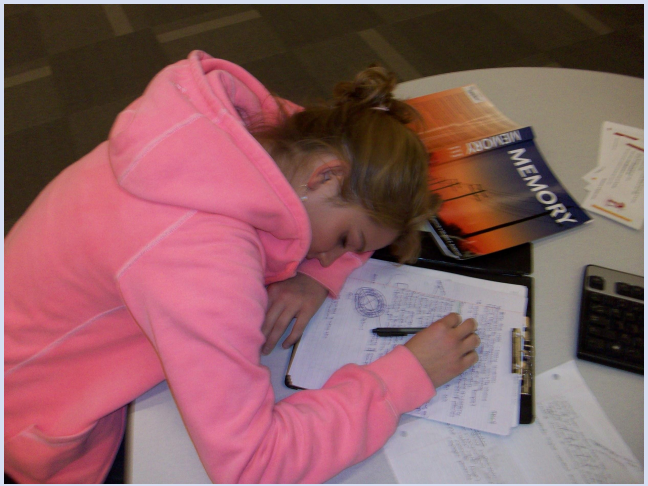
2. Take Breaks, Avoid Fatigue

Stop when “your brain gets full”

“Sleep on it” …. Use diffuse learning to your advantage.

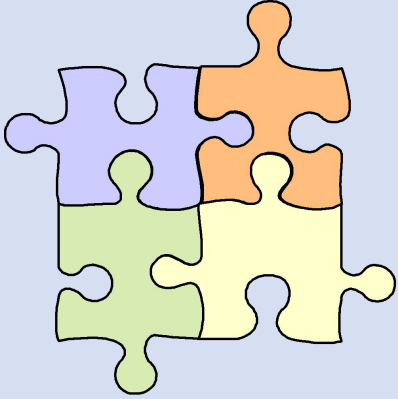
Brain Rule #7: Sleep well, think well. -- John Medina

The Importance of Sleep -- Barbara Oakley



Sleep

3. Pre-learning



- Get a look at the big picture, from the top down.

- Students should preview/overview new material, looking for and incorporating "neural hooks" to assist in recall and retention.
  - Make mental or written outlines.
  - Attach new learning (short-term memory) to something already learned (long-term memory).

4. Metacognition

Metacognitive knowledge is “knowledge about thinking and awareness of and knowledge about one’s own thinking processes.”

New developments in the science of learning also emphasize the importance of helping people take control of their own learning. Since understanding is viewed as important, people must learn to recognize when they understand and when they need more information

Tedx -- Dr. Derek Cabrera -- How Thinking Works -- Introduction

Tedx -- Dr. Derek Cabrera -- How Thinking Works -- YouTube (16 minutes)

Think About It

Think about how to use information when learning.

5. Set Goals

Students will:

Set long-term and short-term goals

Explicitly set the criteria for success.

Become empowered in their own learning

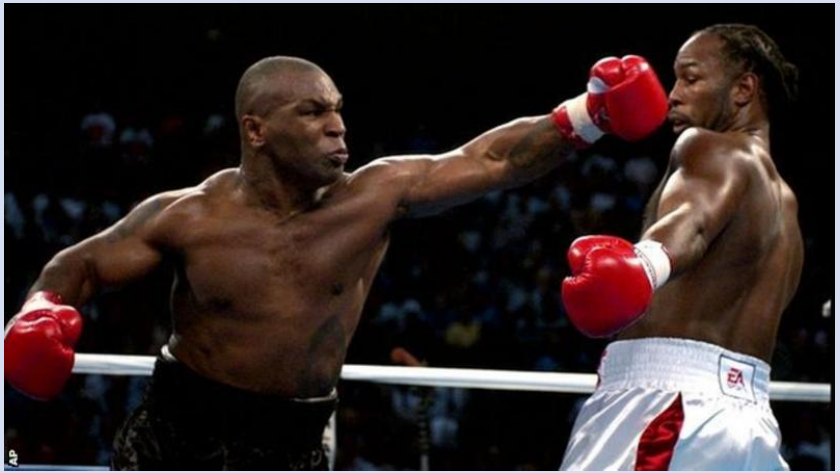
Students will set goals, write them down, and review them frequently.

6. Take on difficult tasks first

Do the most difficult work when you are at your best.

Avoid studying when fatigued

Reward yourself for completing difficult tasks.



Focused Mode--Pomodoro Method

- Remove all distractions.
- When using focused mode, concentrate (cognitive work) with a goal of understanding and making connections to something you already know.

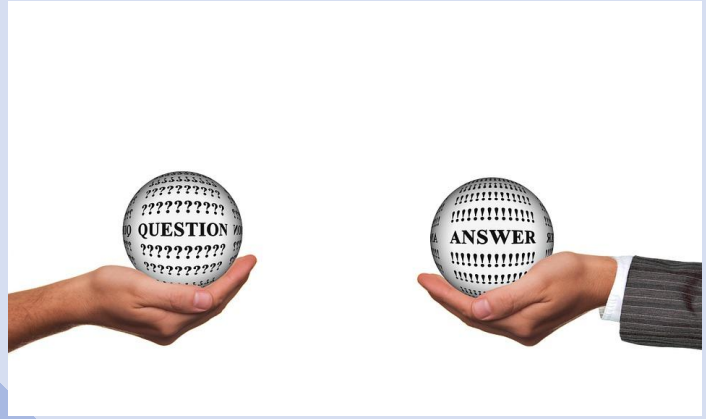
Introduction to the Pomodoro Method -- Barbara Oakley

Study with the purpose of developing recall
Develop questions about the material

Cognitive effort should be directed at organizing material with purpose of recall -- make connections between new material and what you already know

Ask “what, how, and why” questions about the material acquired.

Use simple analogies.



Sustained concentration

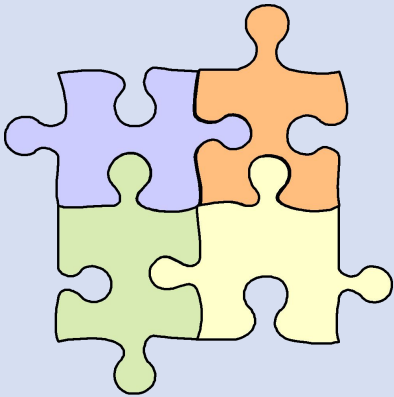
7. Chunking

Chunks are pieces of information bound together by meaning.

Each month of the year can be represented by three letters, such as Jan, Feb, ….
Using chunking, a person would be able to recall the months of the year using three letter representations of each month associated with the month name.

Add to learning by making associations between chunks of learned material.

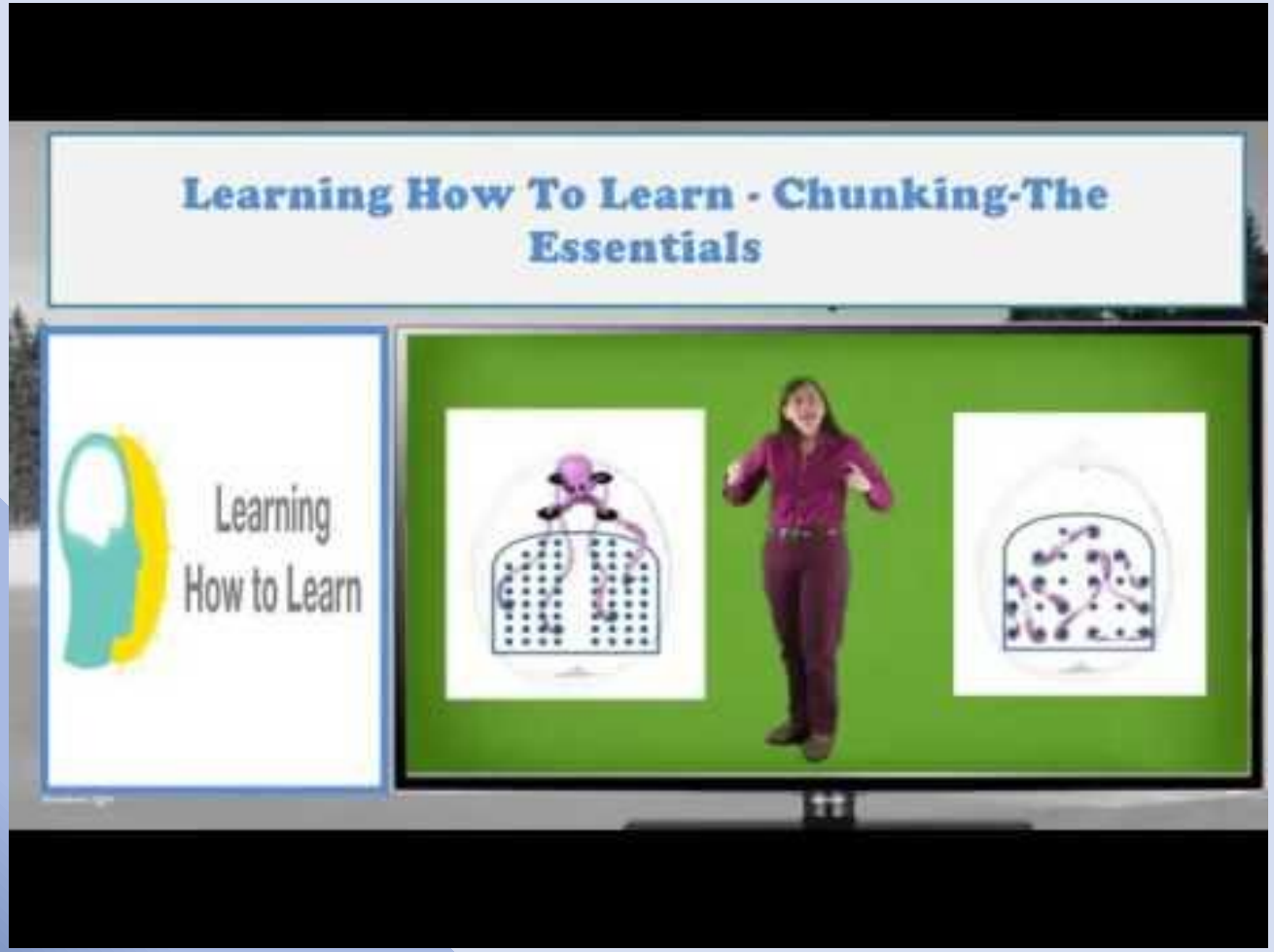
Chunking -- The Essentials -- Barbara Oakley -- *Learning to Learn*



Chunking...Bottom-up, Top-down

- There is a bottom-up chunking process where practice and repetition can build and strengthen each chunk and its connections to other information.
- There is a top-down big picture process seeing where each chunk fits in and when to use it.
- Application occurs when the bottom-up and top-down processes meet -- where do the chunks fit in the big picture.
- Seeing the big picture, and its associated parts allows for evaluation and analysis.

Connect related pieces of information -- recall



8. Spaced Repetition

Practice/rehearse 90-120 minutes after learning new information.

Practice/rehearse every other day to enhance recall and long term memory.

Studying for 20 minutes a day is better than studying for 60 minutes on a single day.

Brain Rule #7 -- Repeat to Remember -- John Medina

Repeat to Remember

Exploration

- When you make them successful at learning, they will have a tendency to seek more success. The better they get at learning, the more time the spend, enjoying learning. Their successes reinforce their commitment.

John Medina, Brain Rule #12: Exploration

Exploration

Teachers and Students

Work Smart, Not Hard

- It is hoped that by instituting researched and proven learning processes that students will recognize an easier way to learn and incorporate learning into ***all*** their classes, present and future.
- Tell your students, **“Get good at it, then see if you want to quit.”**
- After all, isn’t education supposed to be about getting good at challenging things.

Thank-you