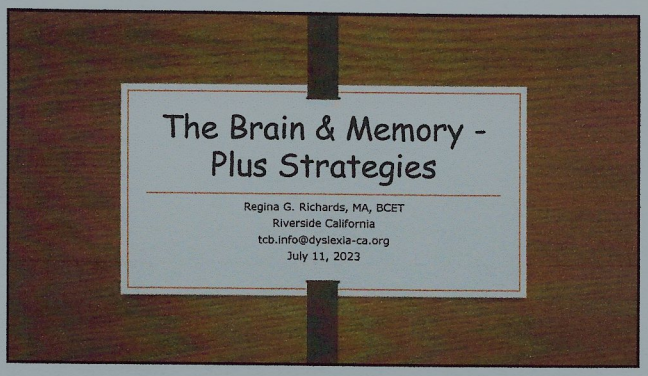

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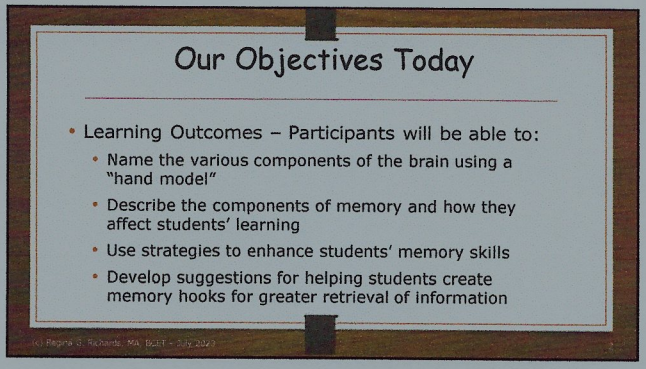

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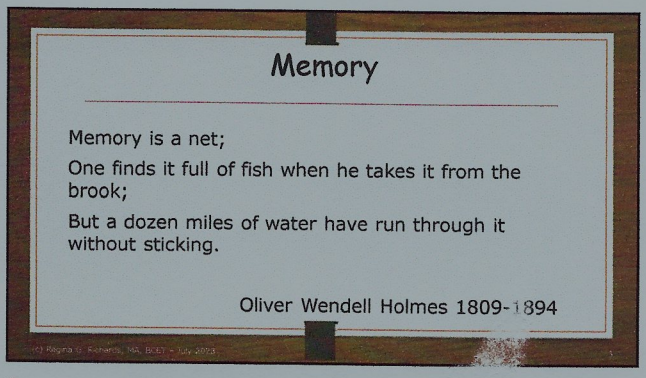

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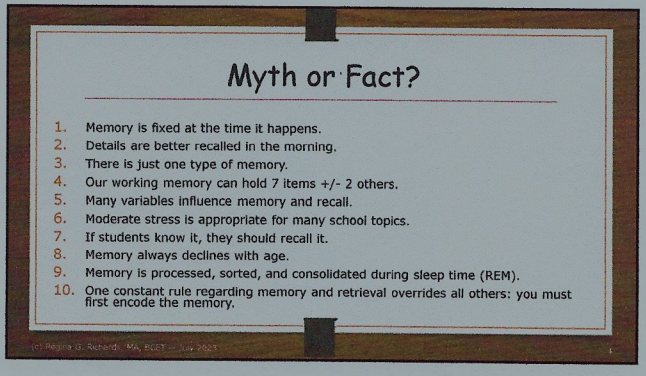

4

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Myth or fact?

1. Memory is fixed at the time it happens. --- False
2. Details are better recalled in the morning. --- Not always
3. There is just one type of memory. ---- False
4. Our working memory can hold 7 items +/- 2 others. ---- that's a typical pattern – not always true
5. Many variables influence memory and recall. ---- TRUE
6. Moderate stress is appropriate for many school topics. --- TRUE
7. If students know it, they should recall it. --- False
8. Memory always declines with age. ---- False
9. Memory is processed, sorted, and consolidated during sleep time (REM). --- TRUE
10. One constant rule regarding memory and retrieval overrides all others: you must first encode the memory. --- TRUE

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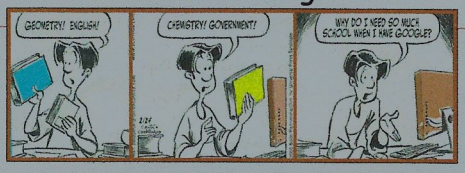
5

We have Google



If students can apply the information that has been presented to them, it becomes useful and meaningful.

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6

OUR BRAIN

- Let's look at how the brain is designed

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Our Brain Has 3 Main Sections

- The cerebrum
- The cerebellum
- And the brain stem

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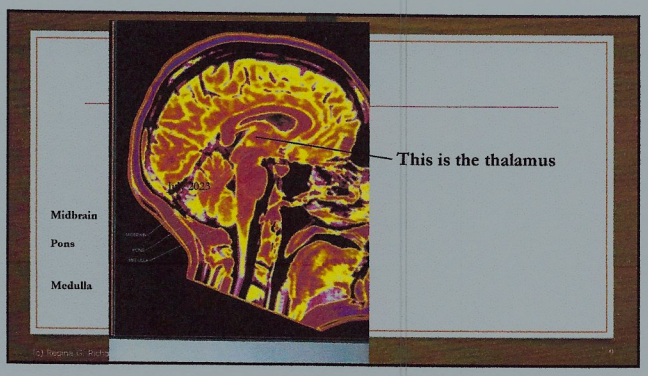

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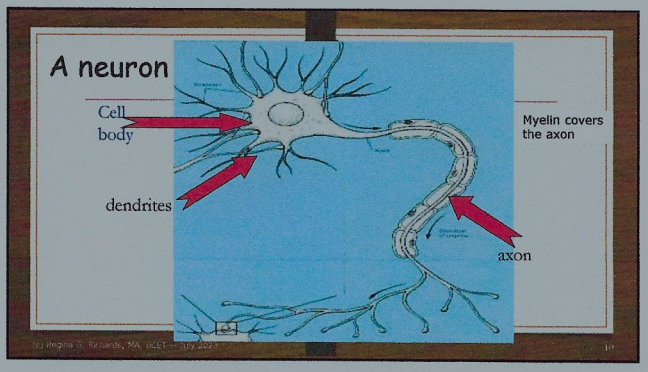


10

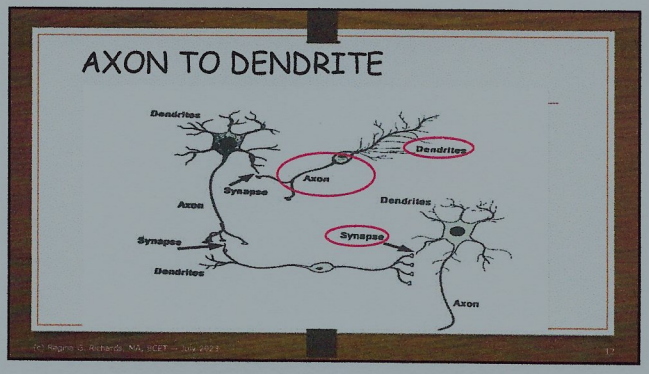
HOW BRAIN CELLS COMMUNICATE

- Electrical

&

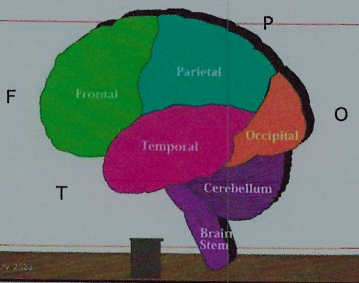
- Chemical

11



12

A 3 LB. SOUFFLE



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13

The Brain – a 3 lb. souffle

- The size of our fist
- Thumbs – Frontal lobe
  - Problem solving – creativity – planning – organization
  - Repeat: "I'd rather have a bottle in front of me than a frontal lobotomy."
- Under pointer finger – Temporal lobe
  - Talking, memory, hearing
  - Repeat: "T – talking, timing, tempo"

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The Brain - continued

- Close to bottom of pointer finger – Parietal Lobe
  - Sensory and motor, i.e., handwriting, body position, crazy ideas
  - Repeat: "Parietal" while moving hands in a circle
- Under pinky finger – Occipital Lobe
  - Visual processing areas
  - Repeat: "Occipital – I see you"
- By wrist – Cerebellum
  - Patterns, important in learning and memory, movement
  - Repeat: March and say "Cer-e-bell-um"

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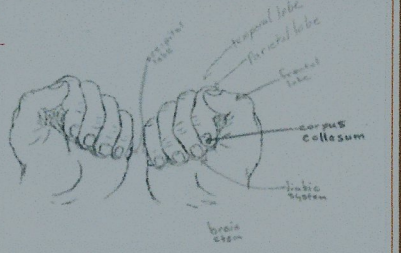
The Brain



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16

Memory is .....

- Not a thing
- It's an ongoing process
- Not fixed
- Not permanent
- Can be improved

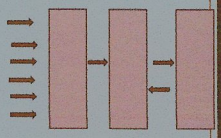


- Memory **CAN BE** improved through better teaching and learning strategies

17

When I went to school.....

- I learned a very simplistic view of memory
  - Stimulus – process – response
- Stimuli include:
  - Sights
  - Sounds
  - Smells
  - Tastes
  - Movements
  - Visuals cues – etc.



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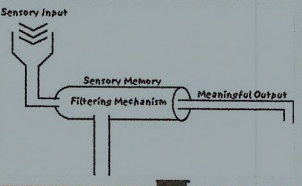
The latest theory

- What % is filtered out?



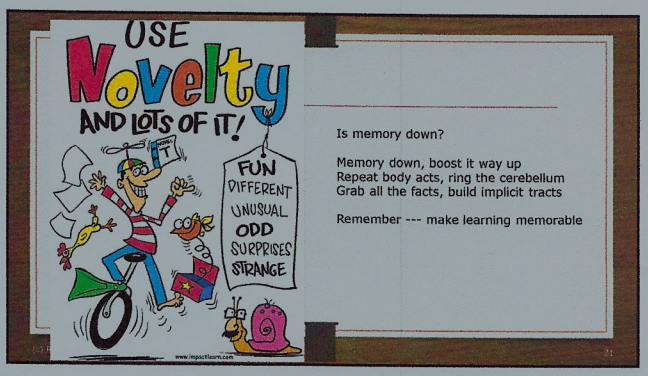
19

We need to increase the % of what is retained

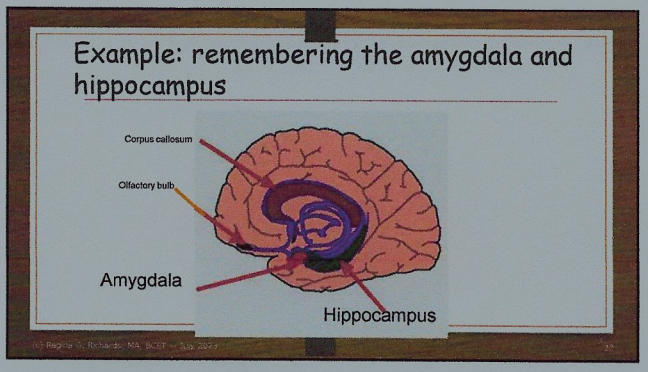
- Enthusiasm is contagious
- Be a carrier



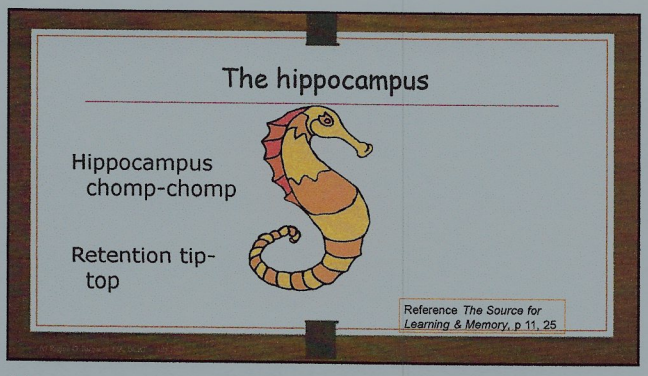
20


USE
Novelty
AND LOTS OF IT!
FUN
DIFFERENT
UNUSUAL
ODD
SURPRISES
STRANGE
Is memory down?
Memory down, boost it way up
Repeat body acts, ring the cerebellum
Grab all the facts, build implicit tracts
Remember --- make learning memorable

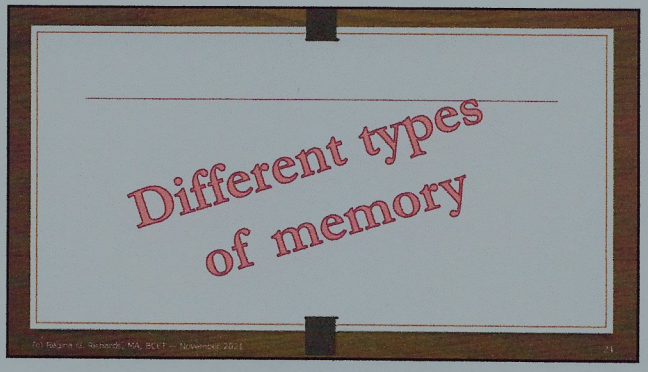
21


Example: remembering the amygdala and hippocampus
Corpus callosum
Olfactory bulb
Amygdala
Hippocampus

22

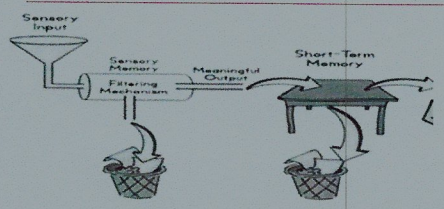

The hippocampus
Hippocampus chomp-chomp
Retention tip-top
Reference The Source for Learning & Memory, p 11, 25

23


Different types of memory

24

The memory process



The Source for Learning & Memory, page 17

25

Memory needs keys

You give some examples – write them in the Q&A box



26

Working memory is short term memory

- It's like our sticky notes
- Working memory is has been redefined to focus on its functionality rather than its duration.
  - It is involved with both storage and manipulation of information
  - It can be thought of as being mentally online – it refers to the temporary workspace where we manipulate and process information
- No one physical location in the brain seems to be responsible for working memory capacity
  - Several parts contribute to this cognitive structure.

E. Bruce Goldstein. *Cognitive Psychology: Connecting Mind, Research and Everyday Experience.* Wadsworth Publishing, 2010

27

Working Memory - continued

- WM has small capacity – generally can hold 4 to 5 elements of new information at one time. Some can hold 7 plus or minus 2 bits.
  - The capacity of WM depends on the elements or chunks as well as the features *
- Novel information in WM is temporary. It's either encoded into long-term memory or it decays, or it is replaced.
  - It MUST be actively attended to or rehearsed.
    - Otherwise, it has a short duration of 10-15 seconds.
    - YOU MUST HOOK IT!

28

Working Memory

- Memory is like a computer.
- Unless you save a file you're working on, it's lost.
- You have a working memory, but it has to be saved in a permanent form.
- If not, it's forgotten

Barry Gordon, MD, PhD, FAAN
Professor of Neurology & Cognitive Science
John Hopkins Medicine in Baltimore

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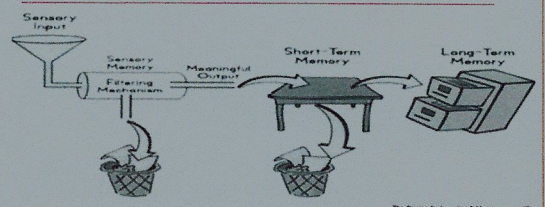
The memory process



The Source for Learning & Memory, page 17

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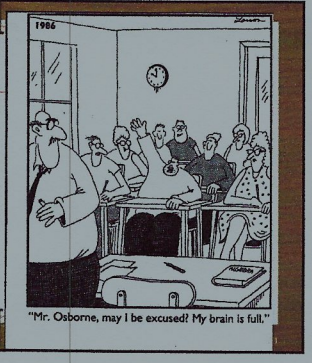
The brain gets "full"



"Mr. Osborne, may I be excused? My brain is full."

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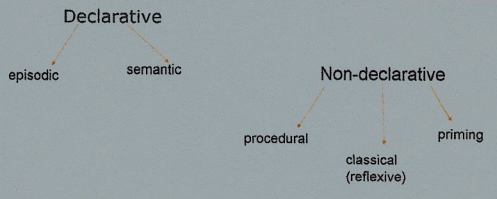
Long-term memory



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Strategies to optimize semantic memory

1. Any mnemonic system
2. Orchestrate variables of the content
3. Ask student teams to create rhymes that reflect key ideas
4. Personalize content – make it more relevant
5. Group and regroup content across disciplines – size, geography, sequence, etc
6. Compare and contrast; critique and analyze
7. Think about other tools you have found helpful

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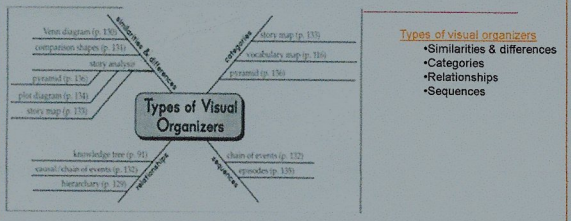
Visual organizers-great for semantic memory



Types of visual organizers
- Similarities & differences
- Categories
- Relationships
- Sequences

From *The Source for Learning & Memory*, page 110

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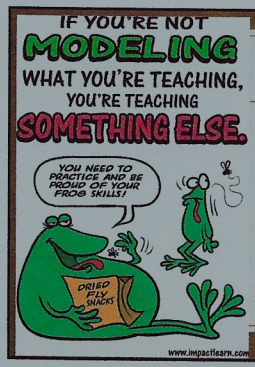
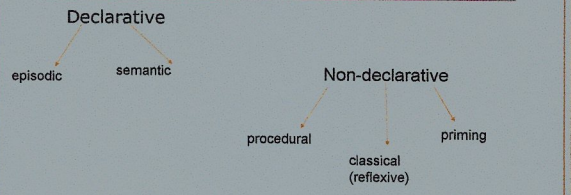


Modeling is critical

- As a teacher or a parent, you should model using graphic organizers for yourself
- Help the student see the value of doing it

35

Long-term memory



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Strategies to optimize procedural memory

- Integrate content with movements
- Use students' bodies with content
  - Ring the cere**bell**um
  - Hands-on learning (science and art)
  - Drama, role play and simulations
  - Spell words using body: **"YMCA"**
  - Manipulatives and models
  - There are many others!

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Using *priming*

- Introduce the key vocabulary first
  - In a fun and/or novel way
- For example, you're going to teach the water cycle
  - Teach movements for the key words while you explain each of them
    - Evaporation
    - Condensation
    - Precipitation
    - Accumulation

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The Water Cycle

Evaporation	Push both arms up
Condensation	Push with both arms straight out to side
Precipitation on my head	Pretend to rain on head
Accumulation	Make arms sweep in front
Water cycle	Arms rotate in circle in front
And we start all in again	Turn around in place in a circle

Music can engage students and the learning process through appealing simultaneously to both the rational and the emotional parts of the brain.

Sue Teele in *Rainbows of Intelligence: Exploring How Students Learn* (Based on Multiple Intelligences)

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Music and the brain

- "Classical music expands my mind"
- It activates and elaborates neural networks
  - The networks are consolidating – helps to transfer memory from short term to long term
- Dopamine –
  - Affects many parts of behavior & physical functions
    - Learning – motivation – heart rate – blood vessel function – kidney function – lactation – sleep – mood – attention – pain processing & movement

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What is neuroplasticity?

- Neurons and neural networks
- Change their connections and behaviors
- In response to new
  - Information
  - Sensory stimulation
  - Development
  - Damage
  - Dysfunction

41

Neuroplasticity

- Brain reorganization
  - Axonal sprouting
    - Undamaged axons grow new nerve endings to reconnect neurons
      - whose links were injured or severed
    - Undamaged axons sprout new nerve endings and connect with other undamaged nerve cells
      - forming new neural pathways

42

Neuroplasticity - 2 directions

- Synaptic pruning
- Synaptic reformation
  - Provides ability to learn and remember

If one's brain is constantly challenged by and engaged with a variety of stimulations and new experiences, while also exposed regularly to that which is already knows, it is better able to retain its adaptive flexibility, regenerative capacity, and remarkable efficiency throughout life.

43

How can you boost a child's brain response to language?

- Discussion
  - The back and forth of conversation between adult and child changes the child's brain
    - Regardless of parental income or education!
  - Conversation more important than "dumping words" on them

http://news.mit.edu/2018/conversation-boost-childrens-brain-response-language-0214

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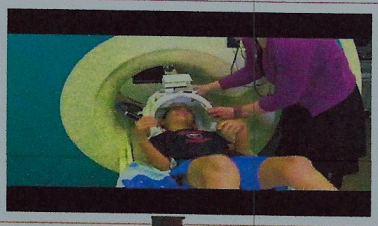
Beyond the 30 million word gap

This video will not show in the re-cording – The link will be with the handouts



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STRATEGIES

46

Memory is better enhanced by:

- Memory is better enhanced by Simultaneous Multisensory Teaching

visual



47

Simultaneous Multisensory Teaching

auditory



tactile/kinesthetic



48

Simultaneous MS teaching contains:

- Direct teaching
- Continuous interaction



Song by Jerry Mills "I Wrote My Own Name Wrong"

https://www.youtube.com/watch?v=bbsITt74fBo

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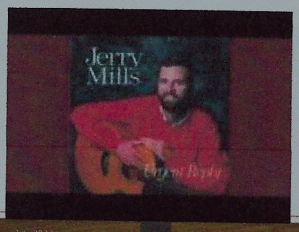
Jerry Mills



Song by Jerry Mills
Album: Urgent Reply
Song: I Wrote My Own Name Wrong

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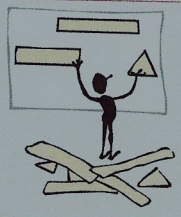
Multisensory Teaching



Organization of materials follows a logical order:

The sequence:

- Begin with the easiest
- Progress methodically
- Recognition before retrieval
- Experience before label

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Executive function or phonology

- Problems in phonology explain differences in decoding
- Problems in executive functioning more related to fluency

Virginia Berninger – University of Washington
IDA National Conference November 2008

52

Linking

- Can't just teach phonology
  - Or orthography
  - Or morphology
- Have to teach kids how to ***link*** all of these

This fits in with the philosophy of *Structured Literacy* - a highly recommended philosophy by IDA

https://socal.dyslexiaida.org/tools-information-resources/structured-literacy/

Virginia Berninger – University of Washington
IDA National Conference November 2008

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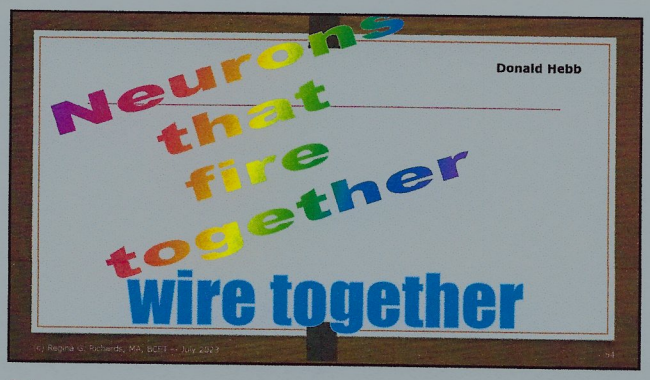

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A teaching tip

Recognition

before

retrieval

55

Recognition before retrieval

- Recognition
  - Developmentally more basic
- Retrieval
  - Requires sorting through & pulling out from among all known information

Given recognition task, student errors --- _____
Given retrieval task, student errors ---- ____

56

Please label each activity – recognition or retrieval

- A dictated spelling test
  - i.e., spell "*wonderful*"
- A word written 3 or 4 ways and student must select the correct spelling i.e, select the correct spelling
  - *wondarful*
  - *wondirfull*
  - *wonderful*
  - *wondarfil*

57

Inky Pinky

1. Comical hare	a. Airy fairy
2. Careful pupil	b. Narrow arrow
3. Thrifty horn	c. Funny bunny
4. Thin shaft	d. Frugal bugle
5. Light sprite	e. Prudent student

58

Inkitity pinkitity

1. Royal cloth	a. Effervescent adolescent
2. Star war	b. Constellation altercation
3. Bubbly teenager	c. Imperial material

Source:
Source for Dyslexia & Dysgraphia

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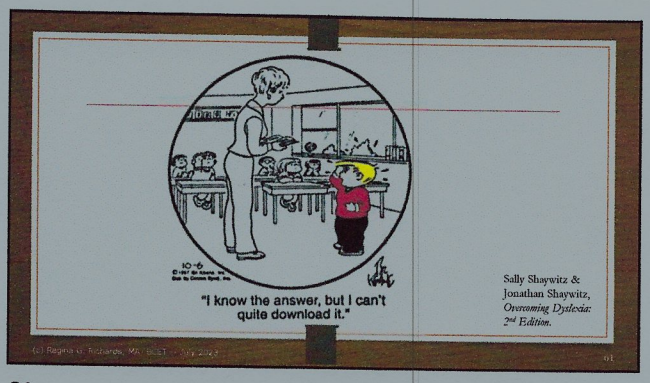
Inky pinky

1. Vegetable for talking bird
2. Unreliable dill
3. Gruesome tale
4. Small person's nervous habit
5. Nuptial land vehicle

60



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Rehearsal Strategies

- Visualization
- Creating a story
- Mnemonics
- Linking
- Acting out a process
- Role playing
- Creating a model
- Developing a song, skit
- Split-page notetaking
- Creating questions
- Think, pair, share
- Games
- Reciprocal teaching
- Developing a graphic

62

Rules for retrieval - continued

As educators we must be aware of the stimulation used during instruction so we may provide the same stimulation for assessment



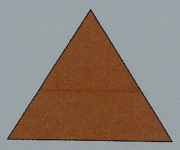
63

Average retention rates

Arrange the following strategies from **least** at top to **greatest** at bottom – based on their impact with respect to their capacity to foster retention:

- lecture
- practice by doing
- teach others
- discussion group
- audio-visual
- demonstration
- reading

In question area, write your top 2 and your bottom 2



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Average Retention Rates

Please arrange the following strategies from least (at top) to greatest (at bottom) impact with respect to their capacity to foster retention:

- lecture
- practice by doing
- teach others
- discussion group
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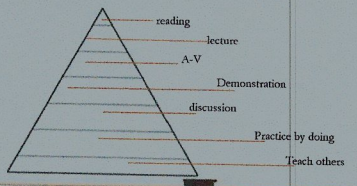
- demonstration
- reading



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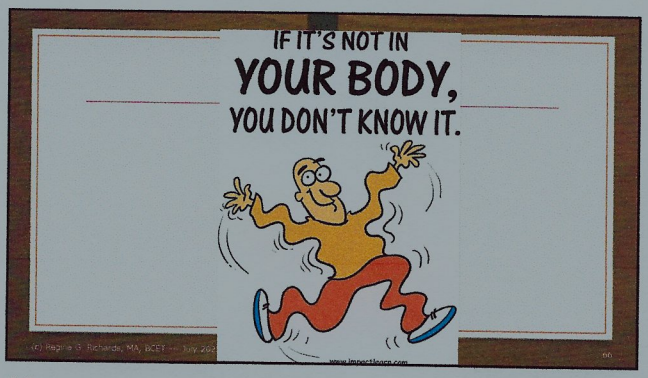

66

Metacognition

Help the student know what he/she knows

67

3 metacognitive aspects for literacy

- Metacognition
  - Ability to reflect upon and monitor cognitive activity
- Metalinguistic awareness
  - Ability to think about and reflect upon the nature and function of language
- Metalanguage
  - The language used to describe language

Marcia Henry
Unlocking Literacy, Edition 2

68

Metacognitive strategies

- "More effective than rote or passive memorization approaches in almost every domain of learning"
  -Moats and Farrell, 2005
- Includes
  - Deliberate rearrangement, regrouping, or modal transfer of information
  - Conscious choice of and evaluation of the strategies used to accomplish a task

69

To increase retention & encourage transfer (re language)

- Keep the aspects of language structure in mind as we develop our teaching sequence
- Plan our lessons to move from the known to the unknown
  - And from the fundamental to the more advanced
- Enhance direct instruction with
  - Guided discovery
  - While being mindful of the pace of the new concept introduction

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Using visual mnemonics

Sound/symbol associations

- Mnemonics
  - Silly sentences
  - Corresponding pictures to color
  - Act out the sentences
- Patterns
  - A primary sound for each letter
  - Multiple sounds for a spelling
  - Multiple spellings for a sound

Memory Foundations for Reading
Presents the sounds in patterns, with mnemonics

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Some acronyms and acrostics

Allows you to use strategies intrinsically - slowing down to do something it's a process of deceleration - so you can exercise quality control

- **HOMES**: The Great Lakes
- **Roy G. Biv**: colors of the rainbow
- **POWER**
  - **P**lan
  - **O**rganize
  - **W**rite
  - **E**dit
  - **R**evise & enhance

- **LISTN**
  - **L**ook at speaker
  - **I**nterest in conversation
  - **S**peak less than half
  - **T**ry not to interrupt or change topic
  - **N**otice body language
- **SLANT**
  - **S**it up straight
  - **L**ean forward
  - **A**sk questions
  - **N**od your head
  - **T**rack the teacher

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Mnemonics for reading

- **SQ3R**
  - Survey
  - Question
  - Read (chunking)
  - Recite
  - Recall
- **RCRC**
  - Read small part
  - Cover
  - Re-tell
  - Check

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Movement

- Less permanent – typical lectures, worksheets, discussions
  - (word based memories)
- More durable –sensory motor stimulation
  - grabs attention
  - pumps up motivation
  - boosts memory

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Movement

- Movement = central mission of the brain
  - Facilitates cognition
  - Physical activity makes it easier to learn
    - Heart
    - Brain glucose & oxygen
    - Increases nerve connections

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angles

Angle	Form Shape	Say
Right angle	Index finger & thumb	
Acute angle	1st 2 fingers spread in a "v"	
Obtuse angle	Hang loose	



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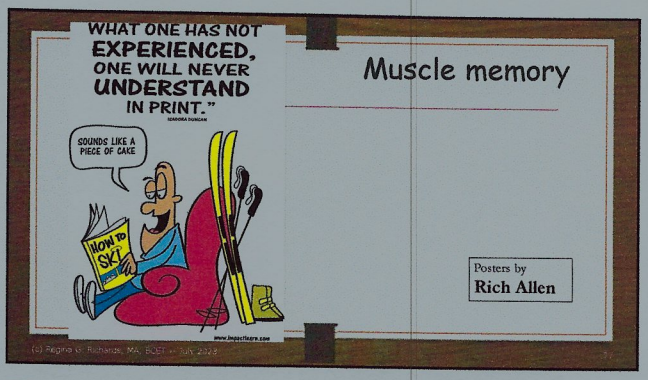
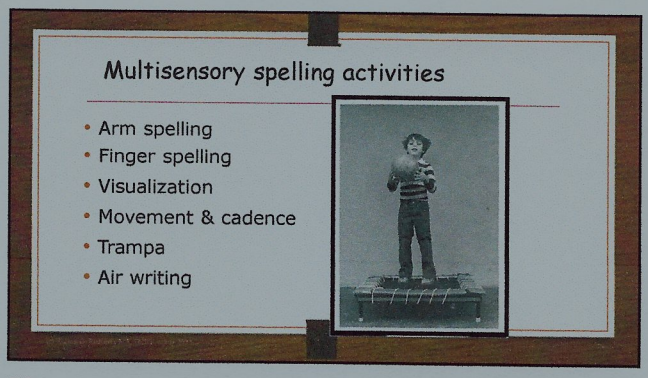
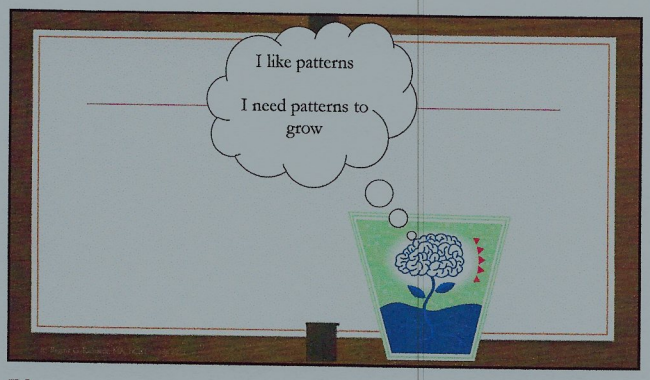

WHAT ONE HAS NOT EXPERIENCED, ONE WILL NEVER UNDERSTAND IN PRINT."
SOUNDS LIKE A PIECE OF CAKE
HOW TO SKI
Muscle memory
Posters by
Rich Allen

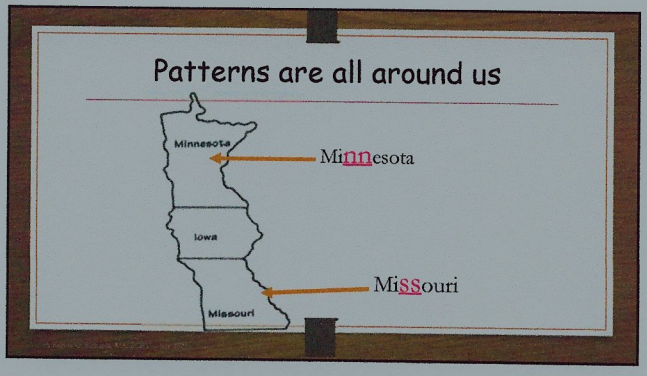
77


Multisensory spelling activities
Arm spelling
Finger spelling
Visualization
Movement & cadence
Trampa
Air writing

78

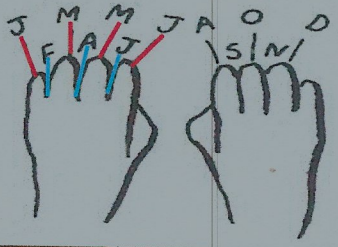

I like patterns
I need patterns to grow

79


Patterns are all around us
Minnesota
Minnesota
Iowa
Missouri
Missouri

80

The months



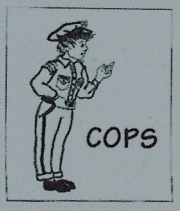
81

Mnemonics for Editing

Have the students "police their work".

C = check capitalization
O = check organization
P = check punctuation
S = check spelling

From LEARN – Playful Strategies For All Students

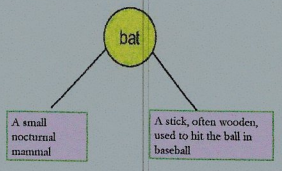


82

Multiple meanings



Is Mr. Magic losing his hair, his hare, or both?



83

Quotes About Learning and the Brain

- **Learning** is the process by which we acquie new knowledge about the world.
- **Memory** is the process by which what is learned can be retained in storage with the possibility of drawing on that at some later time.
- There is a distinction between learning and memory, but these two functions are so intricately linked that they continuously influence each other.

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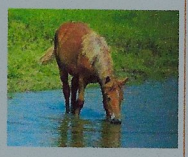
A wonderful theme

Why struggle to motivate your students?

Instead, lead them to an **addiction**

Of their own greatness.



You can lead a horse to water

But you can't make him drink.

It's our job as teachers to salt the hay.

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Thank you for your interest ☺

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