Practical Applications of Brain-based Strategies to Enhance Learning

Jeremy Moore, Principal
Tracy Sellers, Reading Coach

Introduction

- **What is Brain-based Learning?**
- **Brain Physiology/Neuroscience 101**
- **Why learning about how kids' brains function is important for educators**
- **Core Principles of Brain-based Learning**
- **Nutrition and learning**
- **Practical classroom applications of brain-based strategies**
- **Various brain-based strategies throughout the presentation**

TURN ON YOUR BRAIN

<u>Directions</u>: In the following line of letters, cross out six letters so that the remaining letters — without altering their sequence — spell a familiar English word.

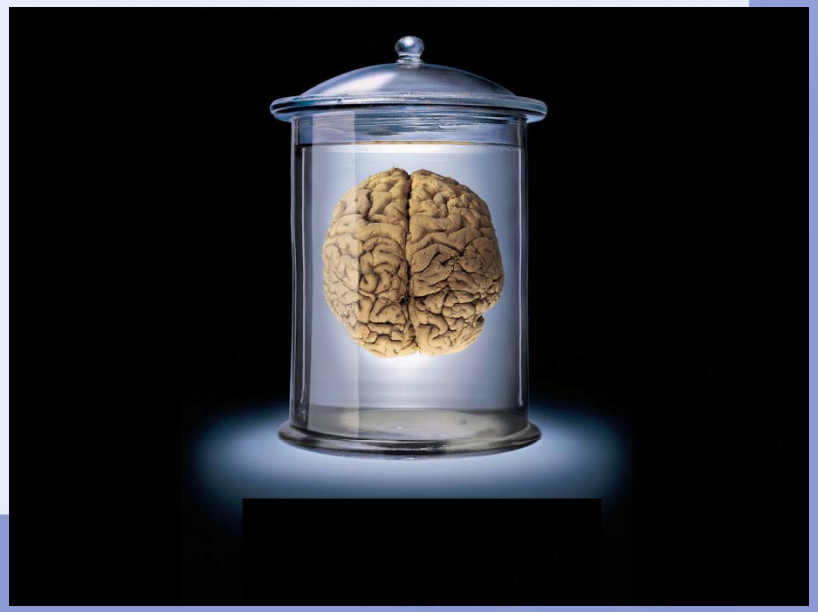
B S R I A X L E I T N T E R S

Hint: If you're having difficulty, go back and read the directions very carefully.

ANSWER

B S R I A X L E I T N T E R S

… BRAIN



What is Brain-Based Learning?

It's E-S-P!

It's the Purposeful

Engagement

of effective

Strategies

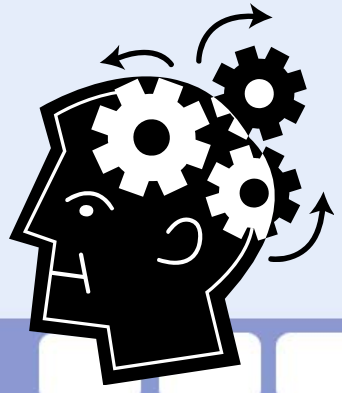
derived from

Principles *of*

neuroscience

12 Core Principles are based on …

- **Taking what we know about the brain, about development and about learning and combining those factors in intelligent ways to connect and excite students' desire to learn.**
- **Combining emotional, factual and skill knowledge into a cognitive tool.**



The three instructional techniques associated with brain-based learning are:

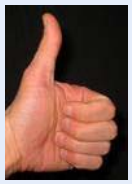
- **Orchestrated immersion--Creating learning environments that fully immerse students in an educational experience**
- **Relaxed alertness--Trying to eliminate fear in learners, while maintaining a highly challenging environment**
- **Active processing--Allowing the learner to consolidate and internalize information by actively processing it**

What Brain-Based Learning Suggests

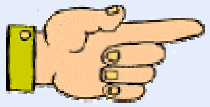
How the brain works has a significant impact on what kinds of learning activities are most effective. Educators need to help students have appropriate experiences and capitalize on those experiences.

Brain Break

- **Drink Water**
- **Stand up …**
  - **Give a thumbs up on your right hand**

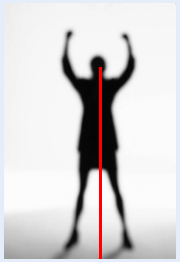


  - **Point forward with your pointer finger on your left hand**



… see if you can switch those two fingers simultaneously while alternating your hands

Why it works …



Imagine a line going down the middle of your body from your nose to your toes.

Activities that visually or kinesthetically cross over this body midline are known collectively as cross lateral activities.

These activities stimulate all four lobes of the brain needed for learning:

Frontal – higher-order thinking

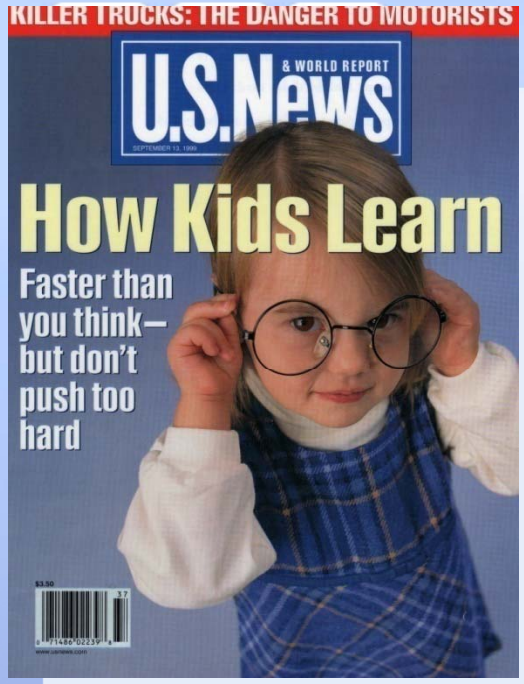
Occipital – processes visual information

Parietal – relays motor and sensory stimuli

Temporal – processes auditory information

Neuroscience is Exploding!

- **We've learned more about the brain in the last 10 years than in the previous 100 years!**
- **Over 255 brain journals now published!**
- **37,000 scientists from 62 countries produce countless studies daily**
- **Have you noticed the news?**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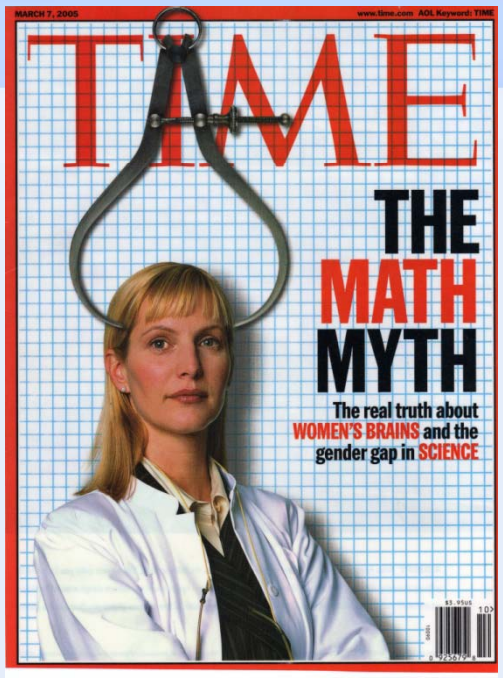
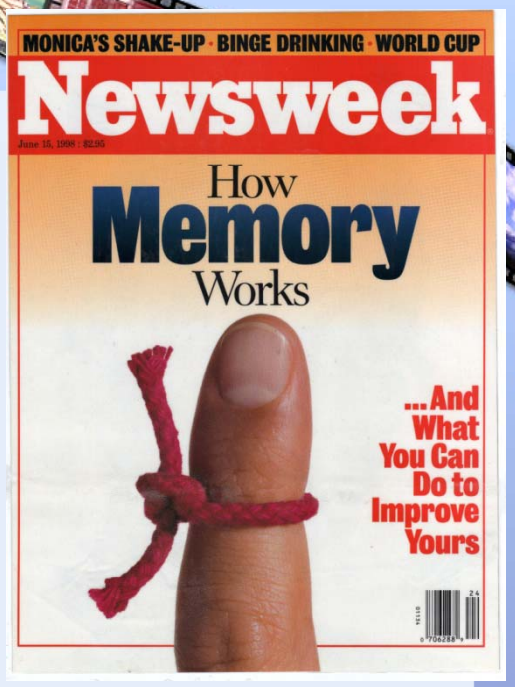
How Kids Learn
Faster than you think— but don't push too hard


MARCH 7, 2005
TIME
THE MATH MYTH
The real truth about WOMEN'S BRAINS and the gender gap in SCIENCE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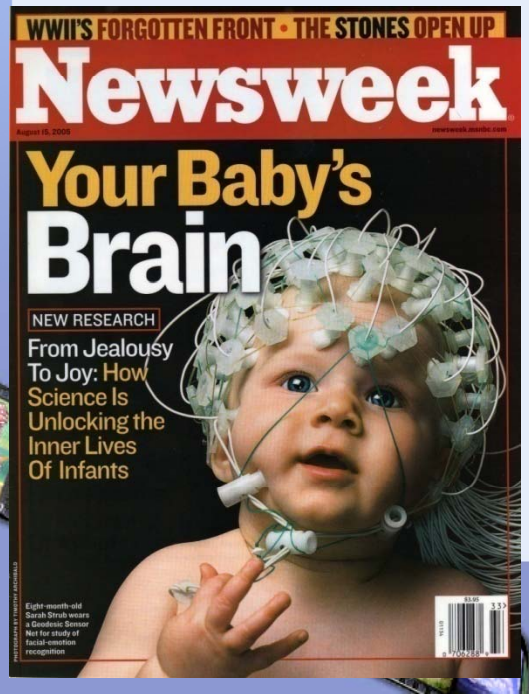
How Memory Works
...And What You Can Do to Improve Yours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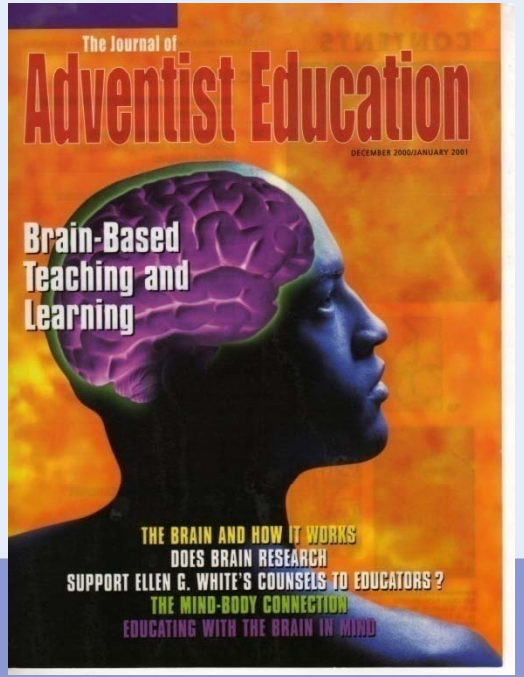
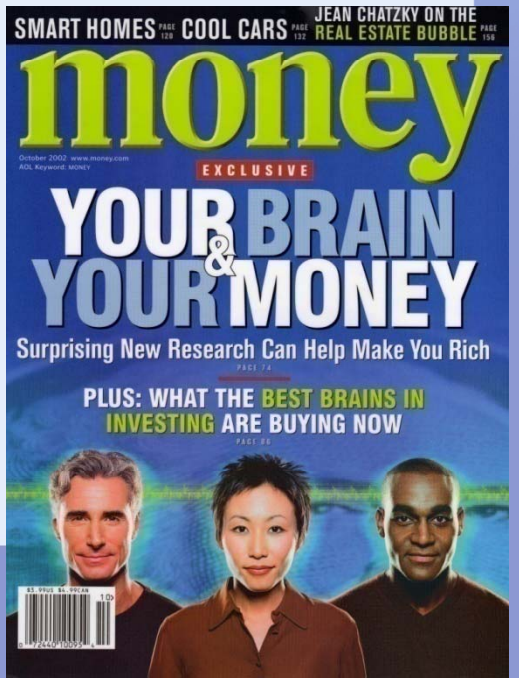

The Journal of
Adventist Education
DECEMBER 2000/JANUARY 2001
Brain-Based Teaching and Learning
THE BRAIN AND HOW IT WORKS
DOES BRAIN RESEARCH SUPPORT ELLEN G. WHITE'S COUNSELS TO EDUCATORS?
THE MIND-BODY CONNECTION
EDUCATING WITH THE BRAIN IN MIND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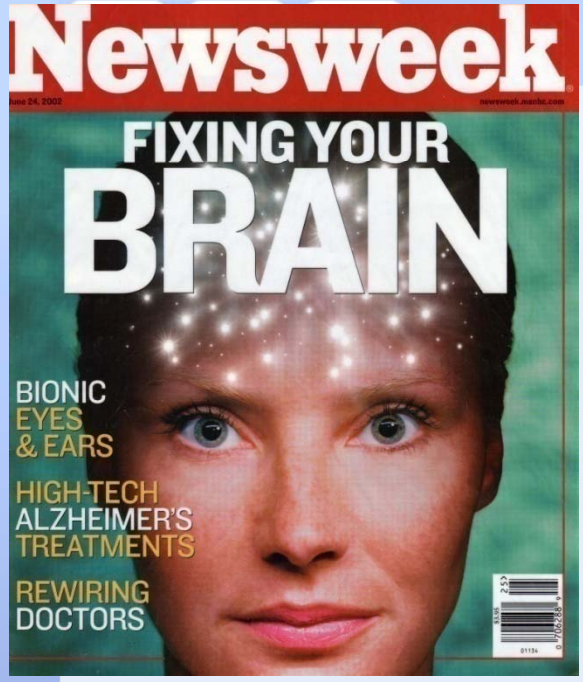
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EYES
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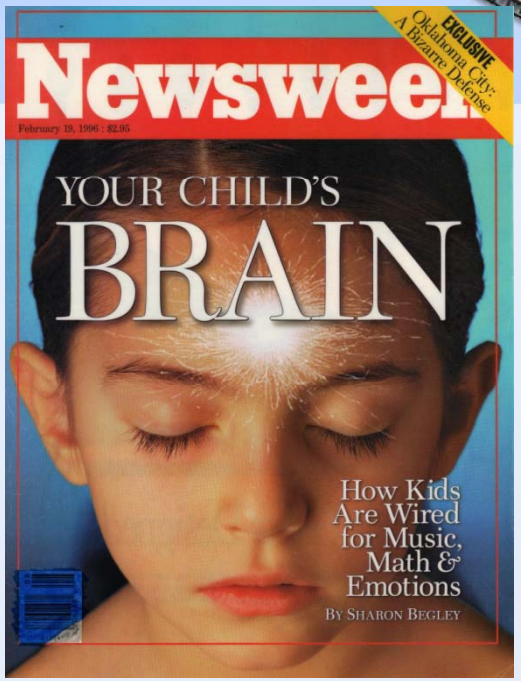
ALZHEIMER'S
TREATMENTS
REWIRING
DOCTORS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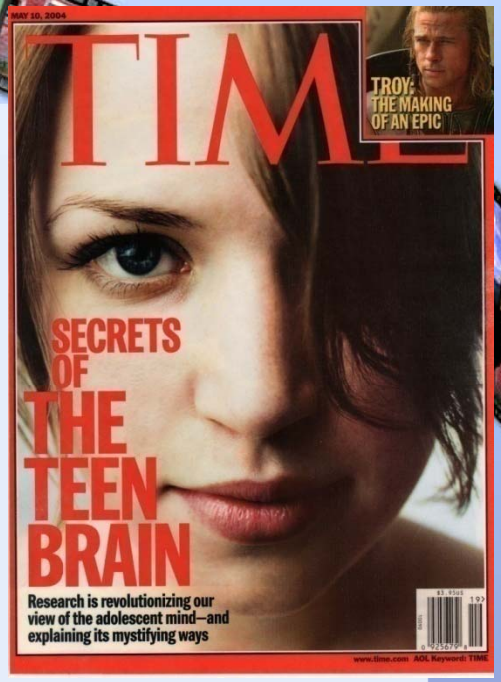
By Sharon Begley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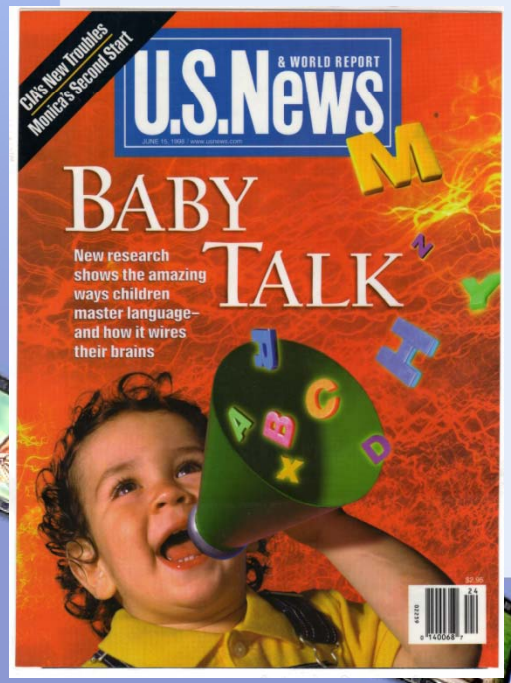
Research is revolutionizing our
view of the adolescent mind—and
explaining its mystifying ways


CIA's New Troubles
Monica's Second Start
U.S.News
& WORLD REPORT
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TALK
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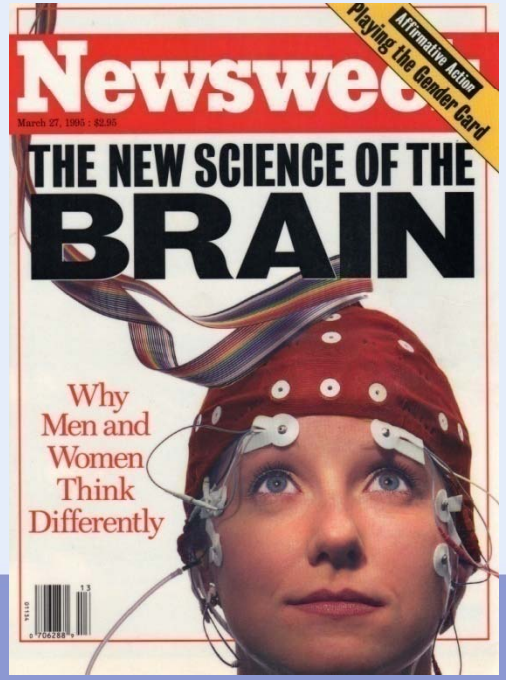
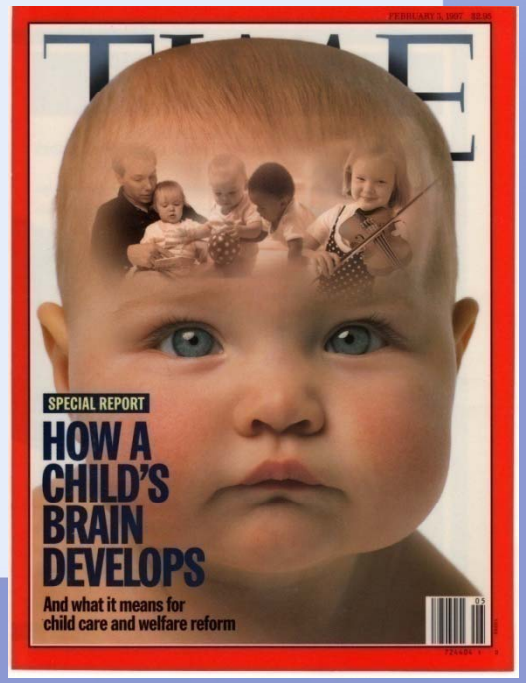
shows the amazing
ways children
master language–
and how it wires
their brains


Affirmative Action
Playing the Gender Card
Newsweek
THE NEW SCIENCE OF THE
BRAIN
Why
Men and
Women
Think
Differently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And what it means for
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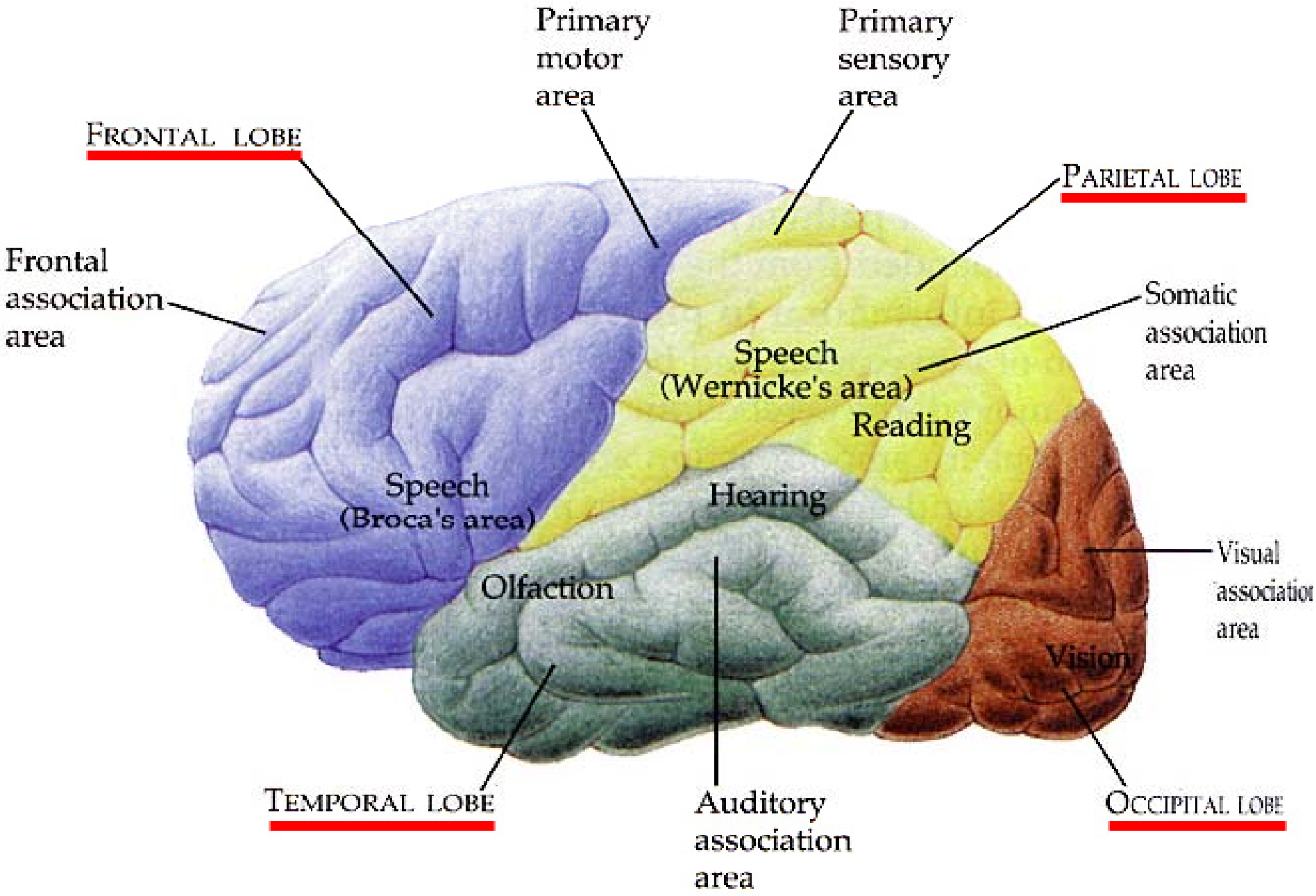
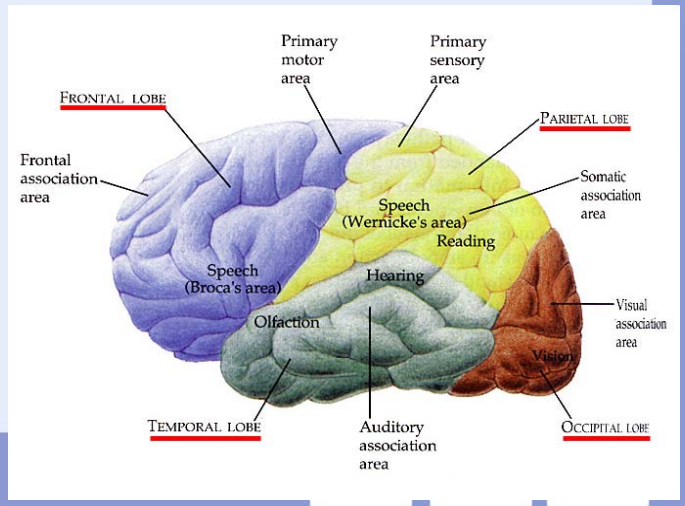

Primary motor area
Primary sensory area
FRONTAL LOBE
PARIETAL LOBE
Frontal association area
Somatic association area
Speech (Wernicke's area)
Reading
Speech (Broca's area)
Hearing
Visual association area
Olfaction
Vision
TEMPORAL LOBE
Auditory association area
OCCIPITAL LOBE

- **FRONTAL LOBE - CORTEX**
  - Creativity - Judgment - Optimism - Context
  - Planning - Problem solving - Pattern making
- **UPPER TEMPORAL LOBE – WERNICKE'S AREA**
  - Comprehension - Relevancy - Link to past (experience) - Hearing - Memory - Meaning
- **LOWER FRONTAL LOBE - CORTEX**
  - Speaking/language - Broca's area
- **OCCIPITAL LOBE – SPATIAL ORDER**
  - Visual processing - Patterns - Discovery
- **PARIETAL LOBE**
  - Motor - Primary Sensory Area - Insights
  - Language functions
- **CEREBELLUM**
  - Motor/motion - Novelty learning
  - cognition - balance - posture

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smc PENTAX-A
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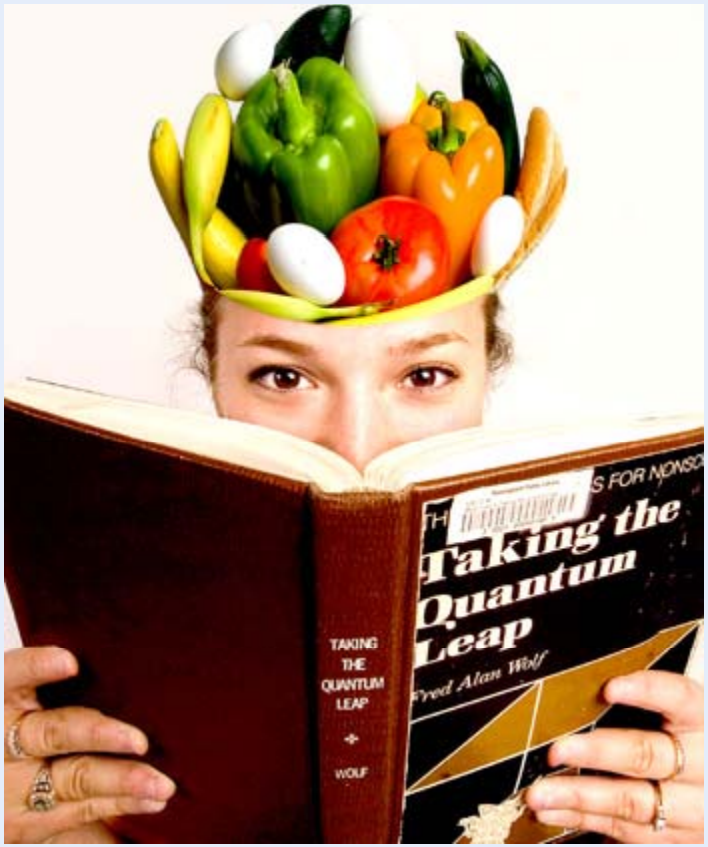
How is your brain like…?

- A cabbage
- A raisin
- A pillowcase
- A grapefruit
- String cheese
- A walnut



Neuroscience 101

- **Weighs only 3 pounds (about 2% of the average body weight)**
- **85% Water**
- **Uses 20% of the oxygen we breathe**
- **Uses 20% of the calories we consume**
- **Contains more than 100 billion neurons (more than stars in the Milky Way Galaxy)**
- **At times, during gestation, the fetus' brain makes 250,000 new nerve cells per minute!**

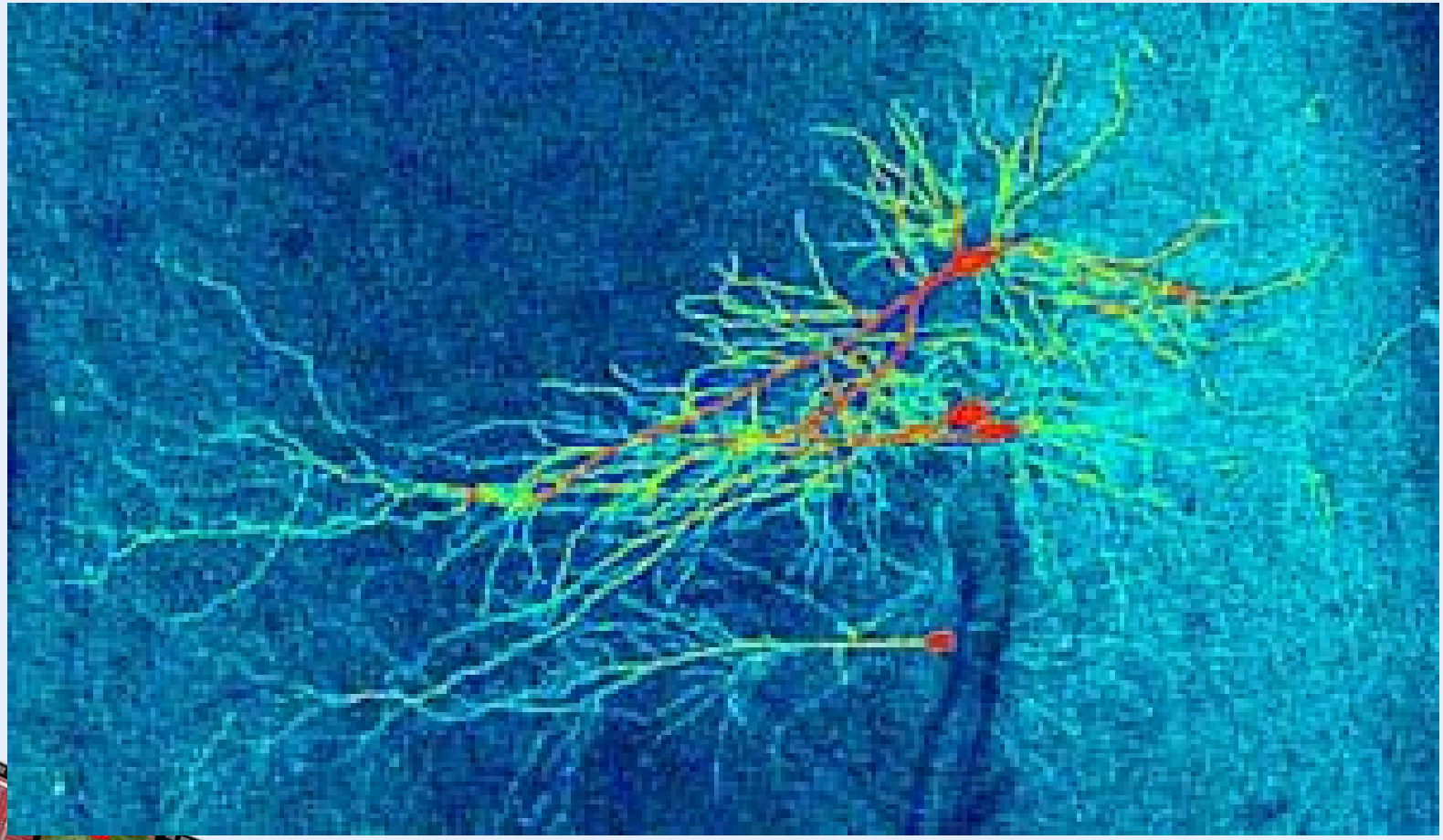
Neuroscience 101

- **Babies are born with 100 billion neurons, but only a relatively small number of them are connected.**
- **Brain development is especially rapid during the first year.**
- **By age three, the brain has formed about one thousand trillion “connections”, about twice as many as adult brains have.**
- **The ages between 3-10 are time of rapid social, intellectual, emotional and physical development. Brain activity in this group is more than twice that of adults.**

Neuroscience 101

- **Although new synapses continue to form throughout life, never again will the brain be able to master new skills or adapt to setbacks so easily.**
- **Age 11, the brain begins to "prune" the extra connections at a rapid rate. (Use it or lose it!)**
- **Prefrontal Cortex (PFC) continues to develop into the mid-twenties. (judgement center, maturity)**
- **After about age 25, the brain slowly starts shrinking. Some research suggests that the male brain shrinks at a faster rate than the female brain.**

Learning requires neurons to make NEW LINKS & DELETE EXISTING LINKS with other neurons



How does that relate to Reading? And why is reading so hard?

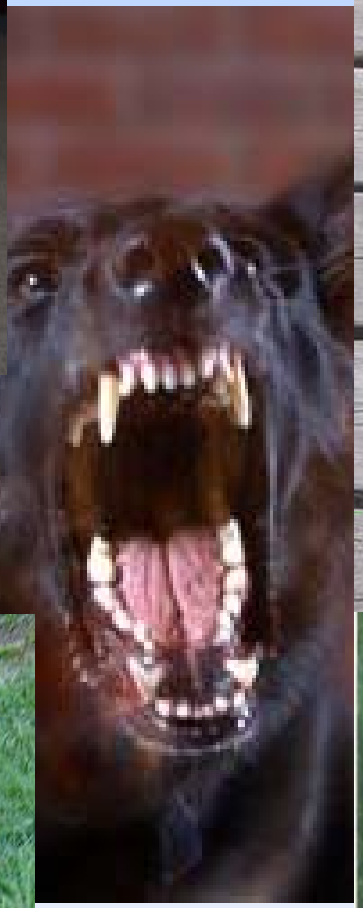
Researchers at the University of Texas-Houston:

"Speech is a biologically evolved skill. We have had speech for 4 million years. We have had written language for 4 thousand years. We are biologically destined to speak, but not to read or write."

Reading is going to have to be

"built" into our brain structures.

dog



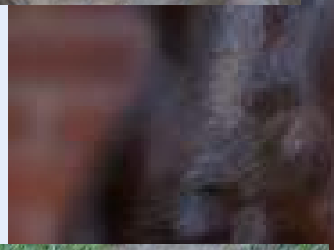
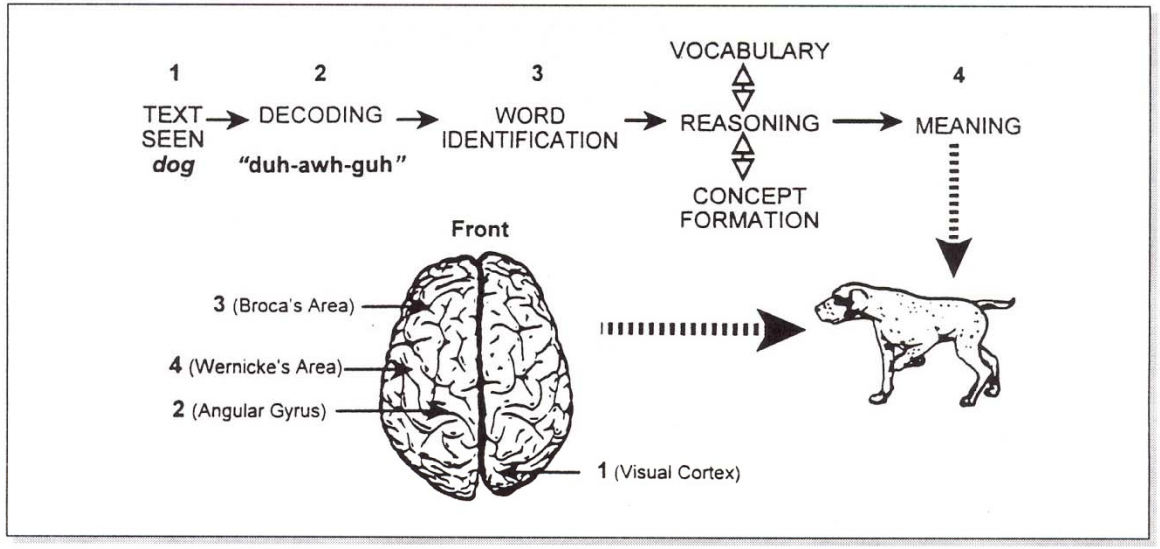


Figure 1.1 Sousa's Model of Reading



SOURCE: Sousa (2001)

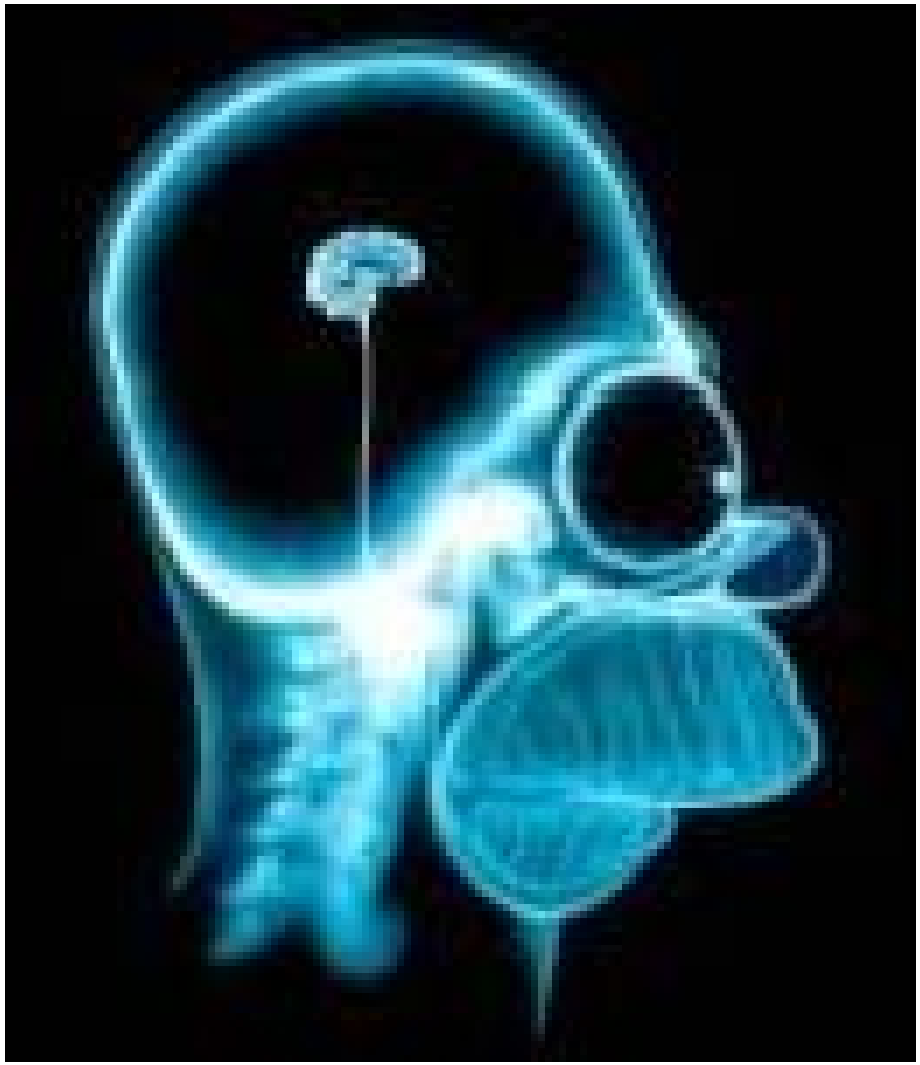
1. The visual stimuli *dog* is immediately transferred to several parts of the brain simultaneously. These areas are heavily involved in the process of reading—the process of translating graphemes (letters on the page) into phonemes (sounds).

** mistranslation can take place throughout this system, leading to reading errors.

2. Angular Gyrus: has been proposed as the primary location for written language.

3. Broca's Area: translation of the sounds into meaningful language - grammar and syntax; as well as relationships and meanings that relate this word to other previously read words.

4. Wernickes' Area: traditionally has been associated with various types of language functions including auditory processing and comprehension.



Scanning Technology Has Helped Researchers Locate Very (extremely) Tiny Areas

Brain Imaging of Readers

(Dr. Sally Shaywitz, Yale 1998)

Observed brains using fMRI during reading process

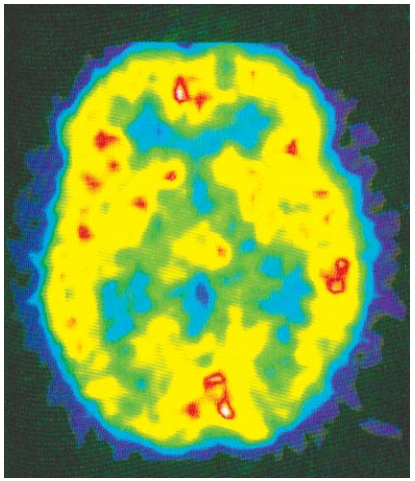
Brain imaging of readers shows us that:

- Good readers use specific portions of the left-brain
- Poor readers have diffused brain activity scattered throughout

Brain imaging of poor readers after direct, systematic, multisensory instruction shows:

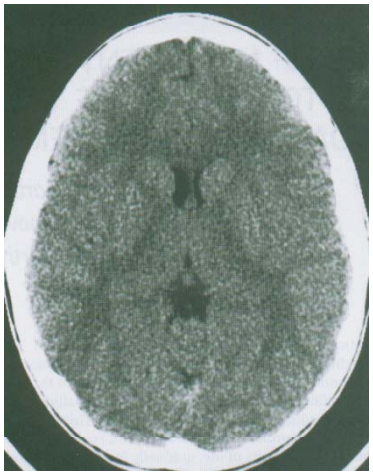
- Significantly increased use of the left-brain
- Newly developed brain activity similar to good readers

PET Scan TOP



SPECT SCAN --TOP

Scans of Typical Controls--Using Two Different Technologies

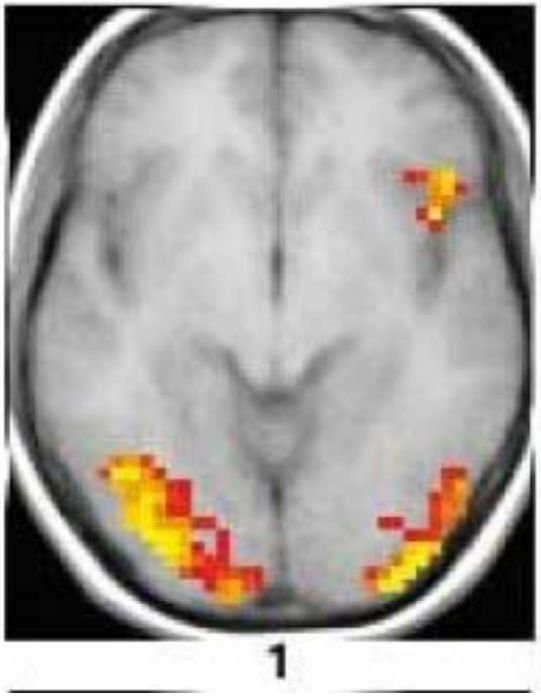


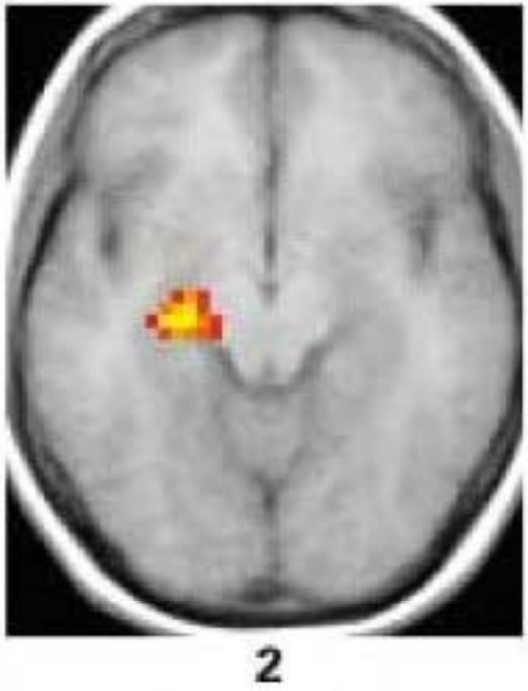
CAT scan

MRI scan

We Can Use Various Types of Brain Scans; Each Provides Different Data

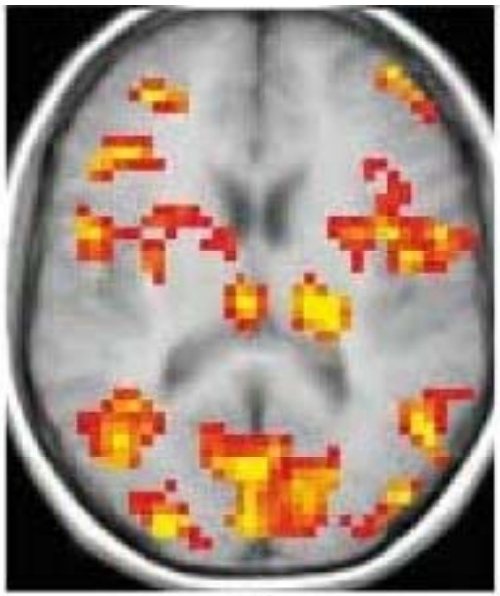
fMRI (functional magnetic resonance imaging) brain scans obtained during a visual memory task





1. Subject asked to remember a face
2. Subject asked to think about the face

Scans 3 and 4 , the subject was asked to compare another face to the remembered face.



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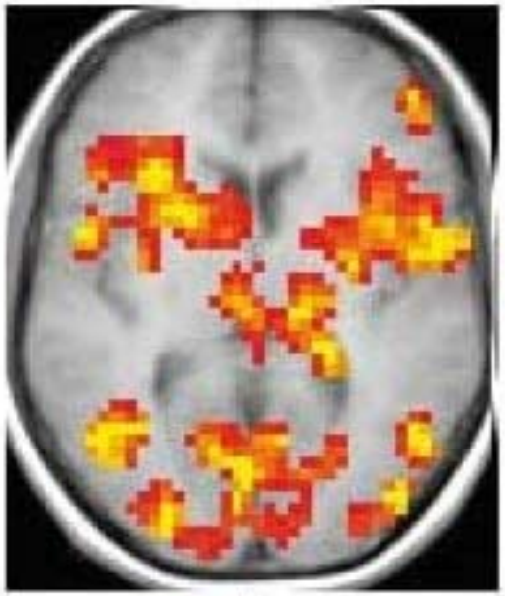
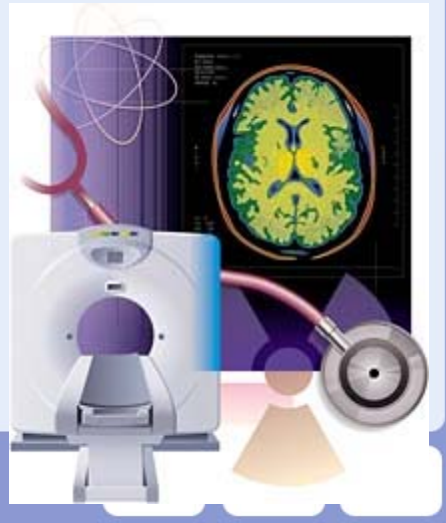


4

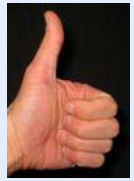
- **The more complex the task, the more areas of the brain are active**

- **How can we make ourselves (as teachers) and students (as learners) more aware of their learning without the sophisticated technological tools?**



Brain Break

- **Drink Water**
- **Stand Up …**
  - **Make a fist with one of your hands**
  - **Give a thumbs up with that hand**
  - **Draw a sideways "8" at nose level with the middle of the 8 crossing directly in front of you nose**



8

… try not to move your head as your eyes follow your hand in the shape of an 8.

Why it works …

Improves the communication between hemispheres and benefits the brain as a whole.

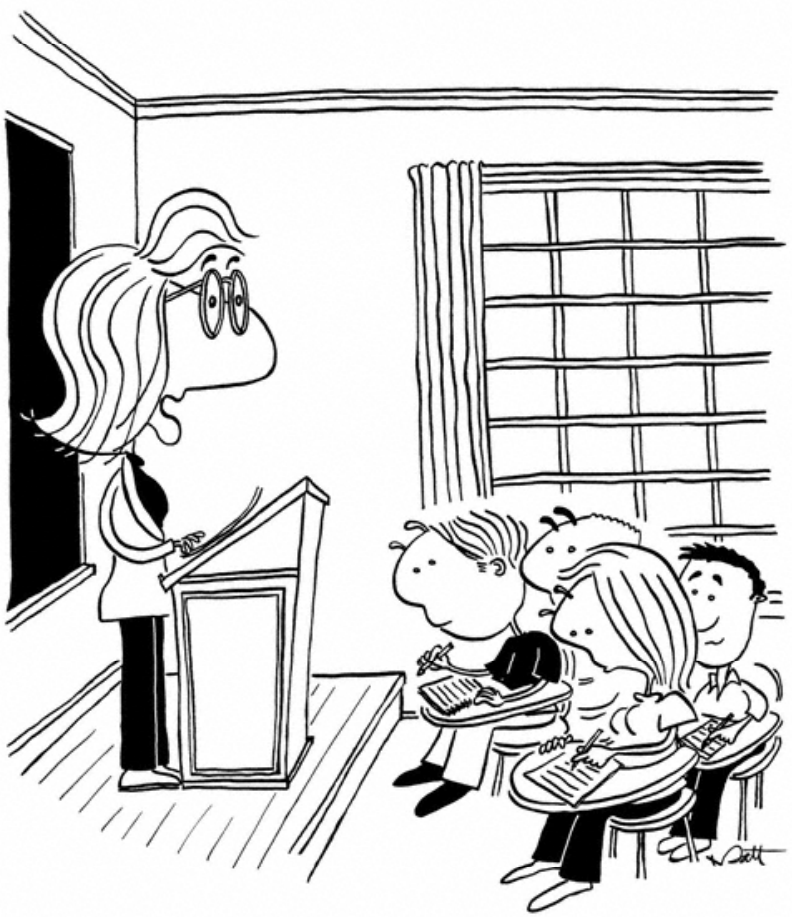
<u>Left Hemisphere</u> – good at sequencing and recognizing parts

<u>Right Hemisphere</u> – good at conceptualizing (seeing the big picture)

***fully utilizing each hemisphere's potential will help the brain learn!**

Twelve Principles of Brain Based Teaching/Learning

- **What are they?**
- **What do they mean?**
- **What are the *implications* of this information for teaching, and understanding ourselves and others?**



"When writing your essays, I encourage you to think for yourselves while you express what I'd most agree with."

12 Principles for Brain-Based Learning

CaineLearning INSTITUTE

Renate Nummela Caine, Ph.D.
Geoffrey Caine, LL.M

Twelve Basic Principles Related to Learning

1. Learning engages the entire physiology
2. The brain is a social brain
3. The search for meaning is innate
4. The search for meaning occurs through patterning
5. Emotions are critical to learning
6. Every brain perceives and creates parts and wholes simultaneously

7. The brain is a parallel processor
8. Learning always involves conscious and unconscious processes
9. We can organize memory in different ways
10. Learning is developmental
11. Learning is enhanced by challenge and inhibited by threat
12. Each brain is unique

12 Principles Overview

1. Anything that affects our physiological functioning affects our capacity to learn (food, water, nutrition=critical components of thinking).
2. Social interactions can actually change the functioning of our brains through solidifying our beliefs, challenging our perceptions, testing our assumptions, and fine-tuning the way we interact with others.
3. Both familiarity and novelty must be combined in a learning environment.
4. The brain's goal is to invest information with personal meaning through making and detecting patterns based on what we already know or have experienced (link to prior knowledge).
5. Emotions from each experience determines whether we want more or less of that experience (positive = enhance learning / negative = inhibit learning)
6. Both hemispheres interact in almost every activity – the brain reduces information into parts and perceives holistically at the same time.
7. The brain responds to the entire sensory context in which teaching and communication occur (information is absorbed through all facets of the environment).
8. Much of our learning is the result of unconscious processing, which means that understanding may NOT occur during class, but may occur hours, weeks or months later.
9. Spatial Memory = registers everything; always engaged; inexhaustible; motivated by novelty

   Rote Memory = recalling unrelated information; motivated by reward and punishment
10. Building the necessary neural connections by exposure, repetition, and practice is important to the student; the richer and more complex the experiences we have, the more elastic our brain becomes (a denser brain leads to greater capacity for new and deeper understanding).
11. The brain learns optimally with maximum connections when appropriately challenged, but becomes less flexible and reverts to primitive attitudes and procedures under perceived threat.
12. Each person's brain matures differently, and brain size and weight can vary by as much as 50%; the brain works better when facts and skills are embedded in real experiences.

1. Learning Engages the Entire Physiology

- **Food, water, and nutrition are critical components of thinking.**
- **We are "holistic" learners - the body and mind interact**
  - **the peptides in the blood are chains of amino acids that become the primary source of information transfer.**

2. The Brain is a Social Brain

- **Our brains continue to build neural connections throughout our lives.**

2. The Brain is a Social Brain

- **Social interactions can actually change the functioning of our brains through solidifying our beliefs, challenging our perceptions, testing our assumptions, and fine-tuning the way we interact with others,**

2. The Brain is a Social Brain

- **The brain develops better in concert with others**
  - When students have to talk to others about information, they retain the information longer and more efficiently!
  - Make use of small groups, discussions, teams, pairings, and question and answer situations.

3. The Search for Meaning Is Innate

- **Each person seeks to make sense out of what he/she sees or hears**
- **Capitalize on this quality!**
  - **Present ideas, experiences that may NOT follow what one expects:**
    - **Speculate**
    - **Experiment**
    - **Question**
    - **Hypothesize**

4. The Search for Meaning Comes Through Patterning

- **The neocortex automatically makes and detects patterns.**
- **When we find a pattern - the interconnection between pieces of information, we create meaning.**

4. The Search for Meaning Comes Through Patterning

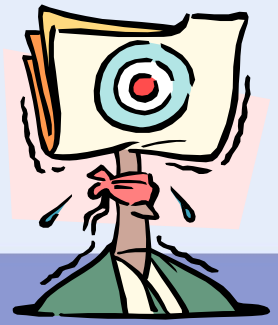
- **The brain's goal is to invest information with personal meaning through making and detecting patterns based on what we already know or have experienced.**
- **The more associations a piece of information elicits, the more firmly it becomes embedded in the brain.**

4. The Search for Meaning Comes Through Patterning

- **Tie learning to prior knowledge**
- **Use Know - Want to know - Learned cycle**

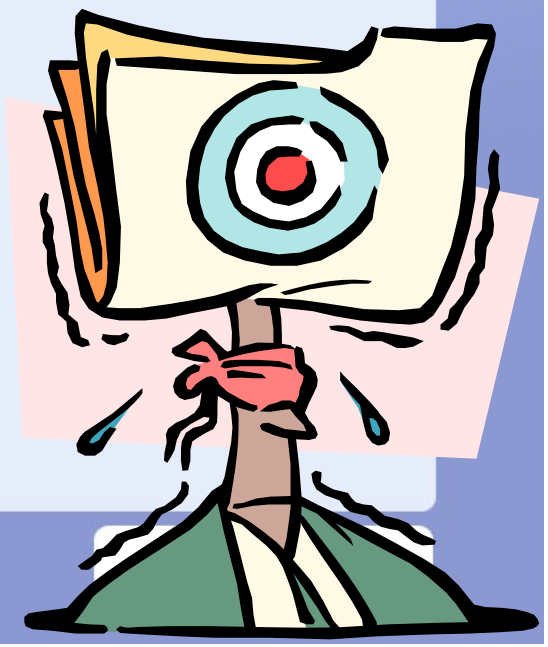
5. Emotions Are Critical to Learning

- **A common form of communication within our brain is the electrical-chemical-electrical process between neurons.**
- **Emotions trigger the chemicals active in the axon-synapse-dendrite reaction. This permits or inhibits communication between the cells.**
- **90% of the communication is carried out by peptides (which are strings of amino acids that travel the blood stream and permit information transfer. Peptides are the glue that connect the body and the brain.**
- **Learning is affected by emotions.**



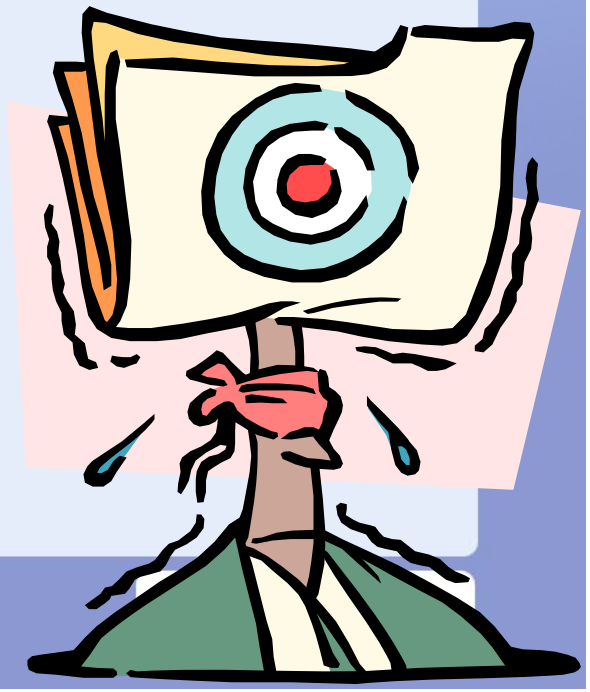
5. Emotions Are Critical to Learning

- **Emotions flavor or color each experience, making us want more or less of that experience.**



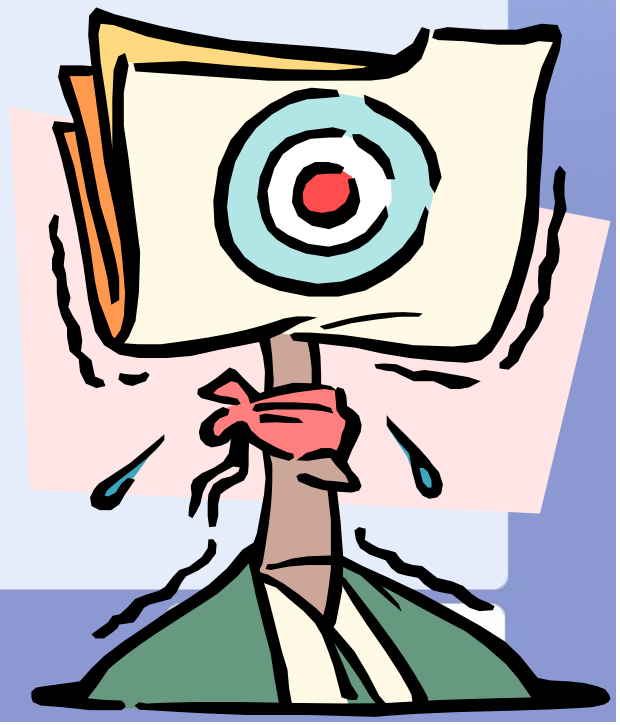
5. Emotions Are Critical to Learning

- **Positive emotions boost the brain's ability to make a neural map of information.**



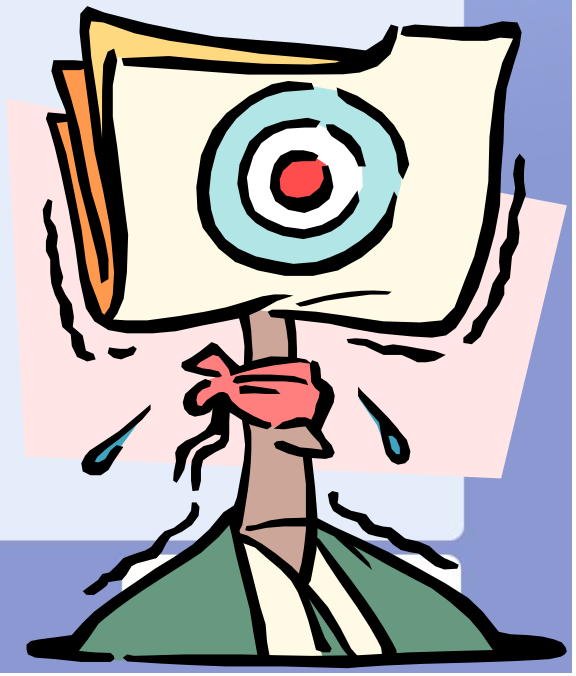
5. Emotions Are Critical to Learning

- **Emotions are enmeshed in the neural networks of reasoning i.e. all thinking, both creative and logical, is emotional.**



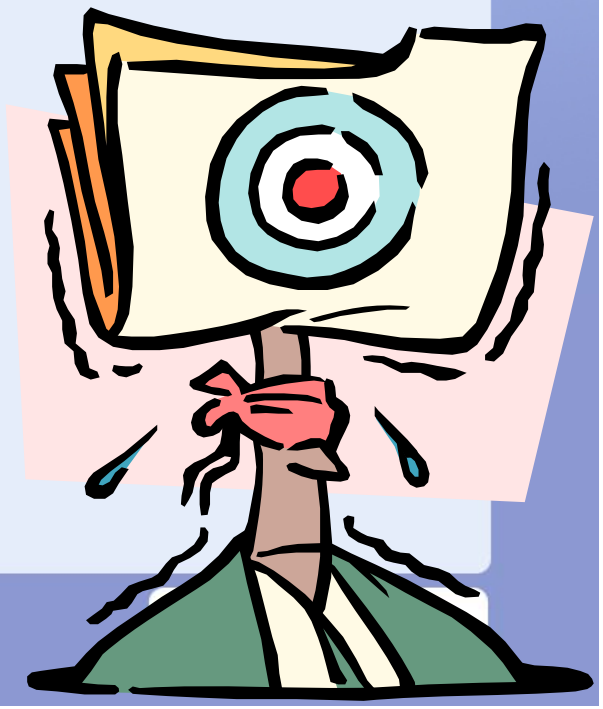
5. Emotions Are Critical to Learning

- **Create and maintain an environment that encourages risk taking, alive with celebration and wonder, and where the learner feels psychologically safe.**



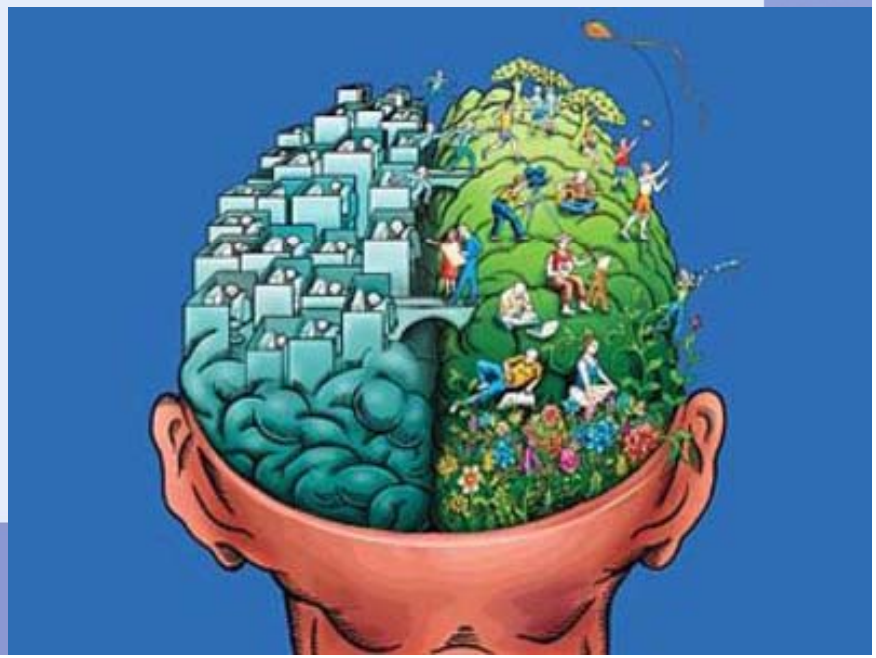
5. Emotions Are Critical to Learning

- **This should be an environment that is positive, challenging, respectful and engaging -- where "inquiring minds want to know!"**



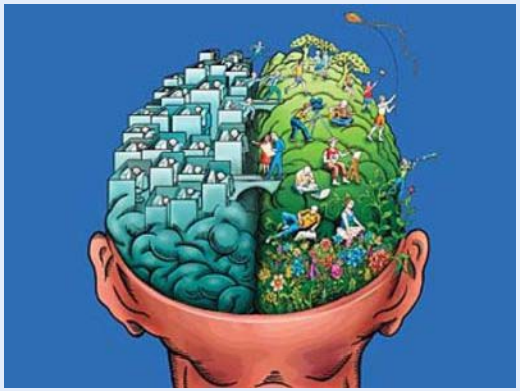
6. The brain simultaneously perceives and creates parts and wholes.

- **Four decades ago, brain researchers believed that each hemisphere of the brain had discrete, specialized functions.**



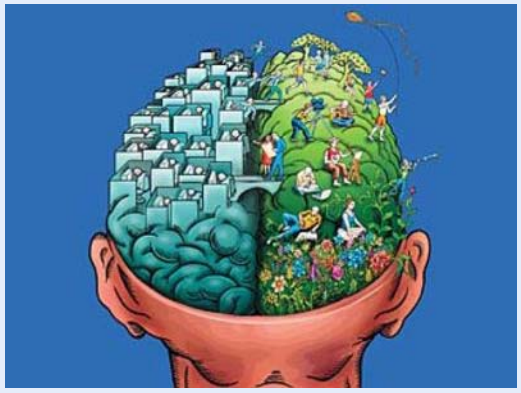
6. The brain simultaneously perceives and creates parts and wholes.

- **We now know that both sides of the brain are active in nearly every activity.**



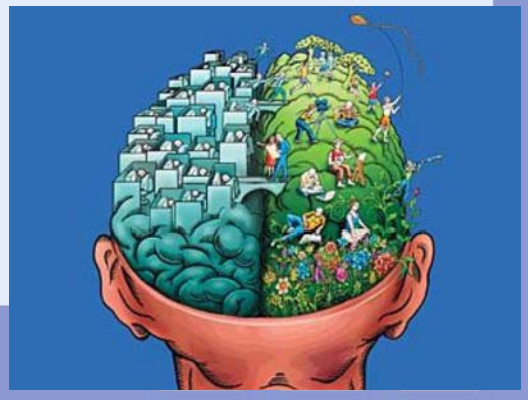
6. The brain simultaneously perceives and creates parts and wholes.

- **Neural impulses move up and down on a vertical axis, from the brain stem to the cortex and back.**



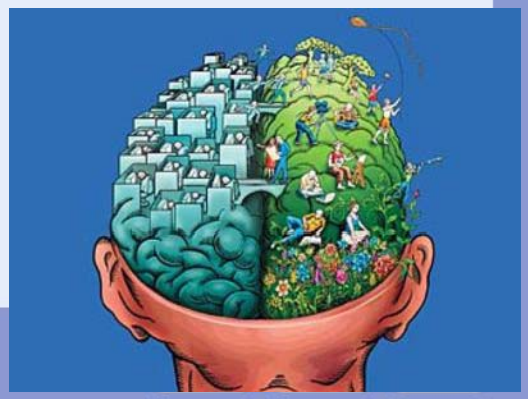
6. The brain simultaneously perceives and creates parts and wholes.

- **Spatial processing - synthesizing small pieces of information to derive larger global relationships - happens left to right across the brain.**



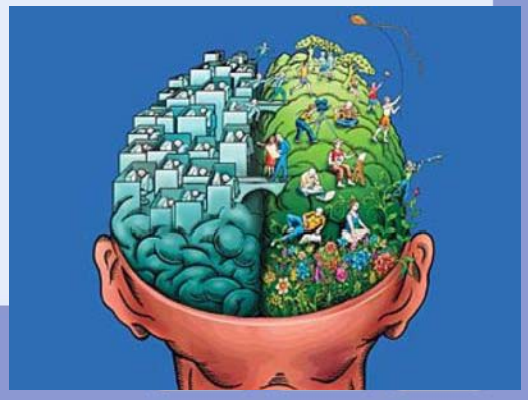
6. The brain simultaneously perceives and creates parts and wholes.

- **Time is processed from back to front, past to future.**



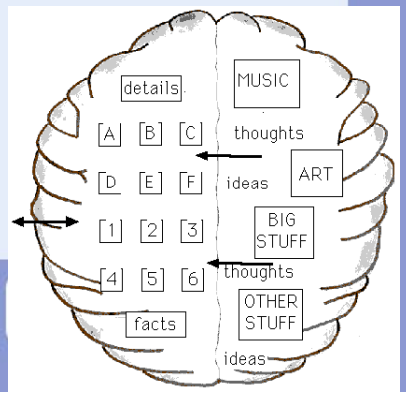
6. The brain simultaneously perceives and creates parts and wholes.

- **Meanwhile, biological particles move throughout the brain. All this activity happens simultaneously!**



7. The Brain is a Parallel Processor

- **Both hemispheres work together**
- **Many functions occur simultaneously**
- **Edelman(1994) found when more neurons in the brain were firing at the same time, learning, meaning, and retention were greater for the learner.**



8. Learning Involves Conscious and Unconscious Processes

- **The brain and body learn physically, mentally, and affectively**
- **Body language as well as actual language communicate**

• How you treat students and how you permit them to treat each other makes a difference in their learning and desire to learn.

• How the physical environment is organized makes a difference.

8. Learning Involves Conscious and Unconscious Processes

- **We absorb everything but attend to that which is novel, out-of-the-ordinary, different, or personally important.**

8. Learning Involves Conscious and Unconscious Processes

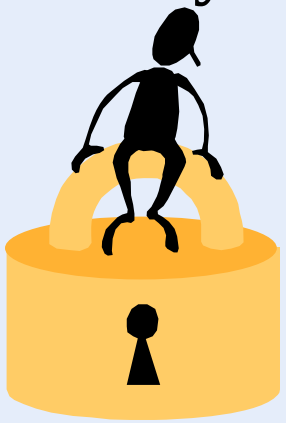
- **Our brains absorb stimuli beyond our conscious attention.**

8. Learning Involves Conscious and Unconscious Processes

- **Active processing occurs when we employ questions that foster metacognition, reflection and creative expression.**

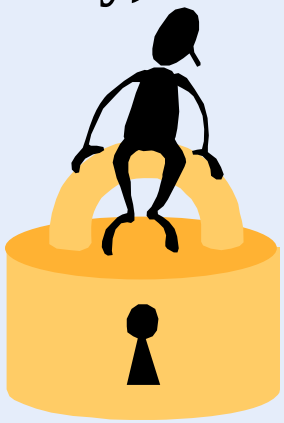
9. Brain Organizes Memory In Different Ways

- **Retrieval often depends upon how the information was stored.**
- **Relevancy is one key to both storage and retrieval**
- **Connect to what students know & what they are interested in**
- **Provide and get examples**
- **Student talk!!!**
  - **Of varying types**



9. Memory

- **Context-embedded information is stored in relationship to locations, circumstances and associations.**
- **This type of memory forms quickly and is easily updated.**
- **Contextual memory is our natural memory ability. It is motivated by curiosity, novelty, sensory activity, and expectations.**



Renee's Classroom

"Photographic Memory"

- **Allow students to study a visual representation for 30-60 seconds.**
- **Have students close their eyes to create their own photo image of what they were looking at.**
- **Open eyes and 'take a picture'.**
- **Move to a different area in the room and repeat steps.**

9. Memory

- **When objects and events are registered by several senses, they can be stored in several interrelated memory networks.**
- **This type of memory becomes more accessible and powerful.**
- **Conversation helps us link ideas/thoughts to our own related memories. Students need time for this to happen!!**
  - **Storytelling - Conversations**
  - **Debates - Role playing**
  - **Simulations - Songs**
  - **Games - Films**

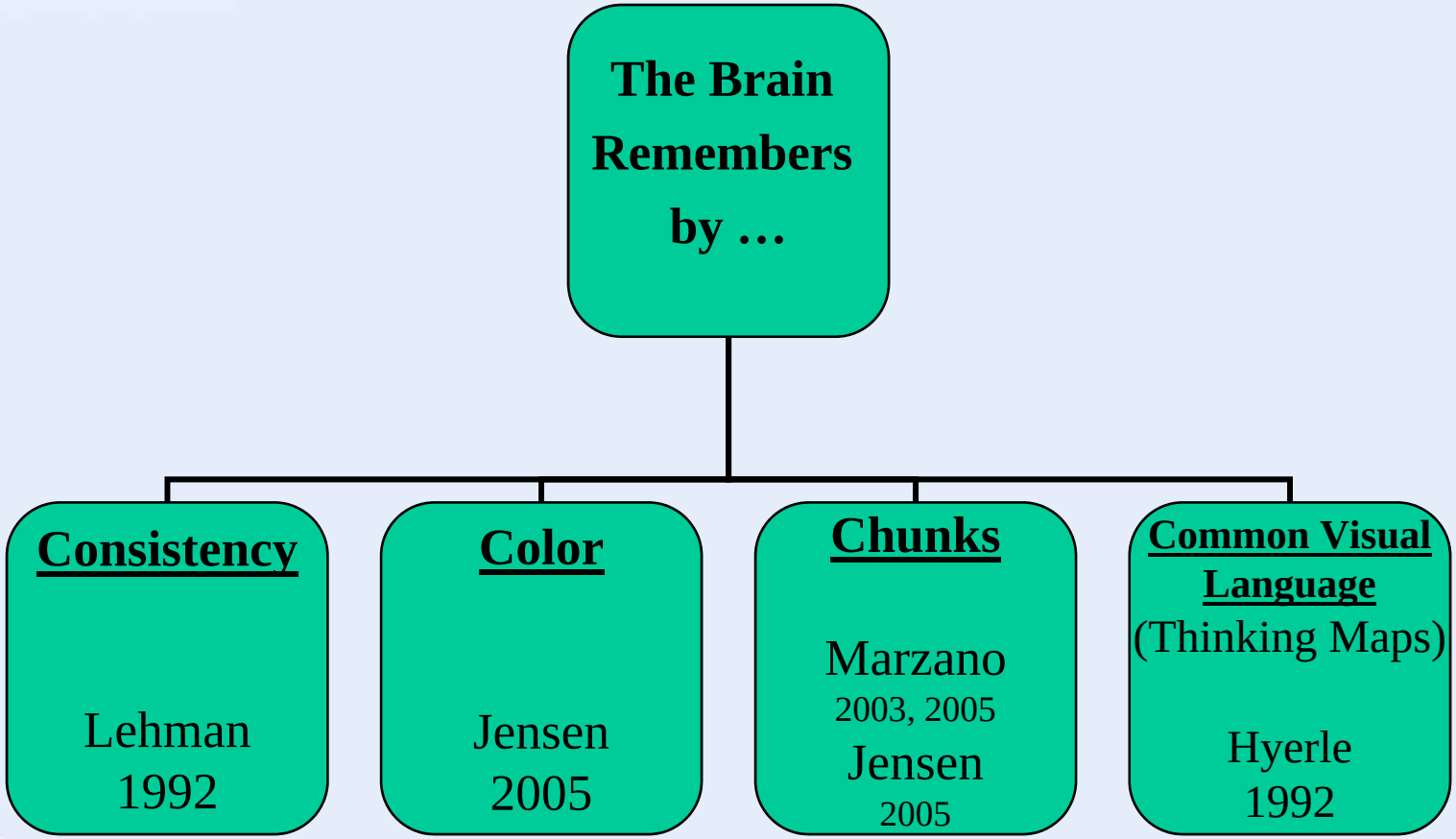
Annie's Classroom

The Water Cycle

- **Incorporating songs and movement –**

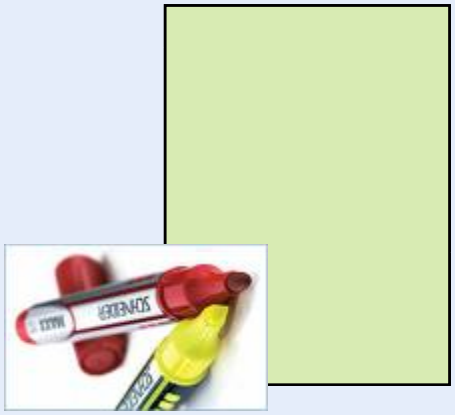
  Movement can help focus attention; emotions stimulate our brains to recall things better. Choosing activities which are new or require students to engage their emotions to facilitate learning. Novel activities also attract attention.

The 4 C's


The Brain Remembers by …
Consistency
Lehman 1992
Color
Jensen 2005
Chunks
Marzano 2003, 2005
Jensen 2005
Common Visual Language
(Thinking Maps)
Hyerle 1992

15 Second Journaling

Grab a piece of paper and a scented marker.



For the next 15 seconds, write what you were just learning about.

Consistency

COLOR

Did you know that the brain likes color?

- **Blue tells the brain to slow down and relax.**
- **Green encourages creative thinking and fresh ideas.**
- **Red gets attention, but can raise stress levels.**
- **Yellow can invoke memory.**
- **Find out more in Beyond Hands-On: Techniques for Using Color, Scent, Taste, Touch, and Music to Enhance Learning by Dr. Bone**

Color and Cognition Chart

Color	Cognitive or Symbolic Impact					
	Excitement	Alertness	Creativity	Reflection	Relaxation	
Black		X				
Blue	X Royal		X Sky	X Aqua	X Pale	
Brown					X Light	
Cream				X	X	
Green			X Jade		X Pale	Avoid yellow-green
Grey					X	
Gold	X		X			
Lavender				X	X	
Orange	X	X	X			
Peach				X	X	
Pink				X Warm	X Light	
Purple	X	X	X			
Red	X	X	X			
Rose			X	X	X	
White					X	Avoid stark whites

Keep in mind the fact that each person will have a different response to color, influenced by his or her experiences. While red might excite *many children*, it could actually *relax* the child who associates the color with his or her favorite stuffed animal or "night night" blanket. Color is an accent for instruction.

Dr. Linda Karges-Bone, “Beyond Hands-On”

CHUNKS

Brain Breaks …

Brain breaks are moments to step outside of curriculum subject lessons and divert the mind into a new context allowing it to:

breathe relax recharge refocus.

Breaks energize, enthuse and re-ignite tired or busy minds. Regular brain breaks are a major feature of accelerated learning allowing children to experience stress-free enjoyable activities.

Use brain breaks to:

- alleviate anxiety;
- improve physical fitness;
- improve fine and large motor movement;
- develop co-ordination and laterality;
- to locate inappropriate behaviors;
- to connect to learning.

Brain breaks can be used to begin morning and afternoon sessions, in between lessons or as a reward for working hard.

Stephanie's Classroom

Brain Breaks

- The Knot
- Finger – Thumb
- Lazy Eights
- Nose – Ear Switch
- Cross Crawl
- Gotcha!

Coordinate Your Brain

- **Brain Gym-enhances learning and coordination. Exercises to boost overall brain function. Helps with ADD and learning disabilities and alleviates stress.**

- **Stimulates both sides of the brain.**

25 brain breaks to try in class

1 Practice rolling your head in circles, slowly one way, then slowly the other way. Then practice deep breathing - count in and out slowly for ten breaths.

2 Choose a piece of energetic music and perform actions for children to mime and copy.

3 Write the key vocabulary from the lesson in the air with one hand. Now try doing the same with your nose. Write the keywords on your partner's back and see if they can work out what you wrote.

4 Trace the number 8 in the air with two hands held together keeping your head still.

5 Practice finger aerobics - sit opposite a partner and both place your hands flat on the desk. Take turns to lift different fingers then try it together and in sequence. Try simple lifts, taps and then stretches.

6 Stand on one leg whilst writing the alphabet in the air.

7 Mime an everyday task around the home or in school and ask your partner to guess what it is. For example, washing the dishes or changing a nappy!

8 Practice making three faces - extremely happy, very sad or really confused. Children stand up whilst you face away from them. Children have to guess which face you will pull by pulling a face themselves. When you turn round, if they pull the same face as you then they score a point.

9 Choose a piece of dramatic classical music then organize the class into small groups telling them which instrument they are going to mime playing. Allow children to 'warm-up' then play the music and conduct the silent orchestra as they play.

10 Blow up some balloons and put inside a silly message. Divide the children into small groups and give each team a balloon. One member of the group is elected to burst the balloon but must do what the message asks!

11 Tape two large pieces of paper to the wall and split the class into two teams. Give each team a colored pen and challenge the children to draw a picture, e.g. a dog driving a bus, a camel surfing. Children take turns to draw for ten seconds at a time. Use a bell to signal when to swap over. Each team tries to guess what the other team has drawn.

12 Ask children to imagine that their hands are their feet then get them to show you how they would eat their lunch, wash their hair, write in their books. Adapt this activity and ask children to imagine their eyes on their knees or their noses on their elbows.

13 Give children a piece of funny text and assign particular words and punctuation marks with a silly sound. For example, a full stop could be a drum, a comma could be a bell, an exclamation mark could be a collective sigh, a question mark might involve everyone standing up and scratching their heads and speech marks could be two claps.

14 With a partner children can tell the class one-line jokes. Children take it in turns to come out to the front of the class with one child asking a question (e.g.' What do you get if you cross a field with a cow?) and the other child repeating the question by saying 'I don't know, what do you get if...' with the rest of the class saying 'Boom, Boom! when the punch line is told (a lawn-mower). Repeat this quickly at a pace so that the momentum is not lost.

15 With one hand pat your head, and with the other circle your tummy. Swap actions or hands, change direction.

16 Put your arms straight down and point your index fingers to the floor. Now close eyes and draw the biggest circle you can with both fingers. Get children to join exactly at the top.

17 Move your right hand to hold your left ear then your left hand to hold your nose. Now swap and repeat again and again.

18 Lift your left knee and touch with your right hand, then right knee to left hand. Progress to elbows and knee, then hands around back to opposite heels.

19 Hold your ears and slowly roll your ear lobes between finger and thumb. Do it nice and slowly and all the way around your ear. How does it feel?

20 With your elbows at shoulder height, practice making big circles, then small circles, forwards and backwards

21 Use finger sums by showing your partner a number sum with your fingers and then seeing if your partner can get the correct answer.

22 Stand opposite a partner and place your palms against your partner's palms, then make the numbers 1-20 together in the air.

23 Face a friend and draw their outline in the air with two hands together following your hand movements with your eyes only.

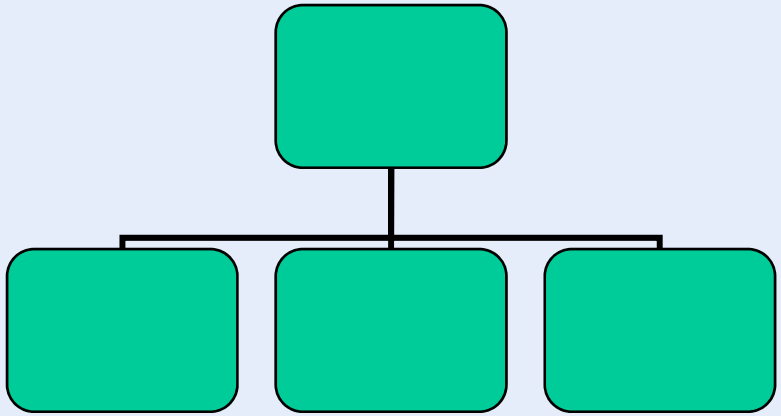
24 Practice yawning stretching your mouth as wide as possible and sticking your chin out from side to side.

25 Sitting down on your hands, extend your feet forwards and rotate your feet in opposite directions

And finally...

Drinking water in lessons has become more commonplace as a way of keeping the brain in tiptop condition. However, it is still the case that certain fluid intakes, such as fizzy drinks and those containing colorings or additives, are causing havoc in the classrooms.

A Common Visual Language



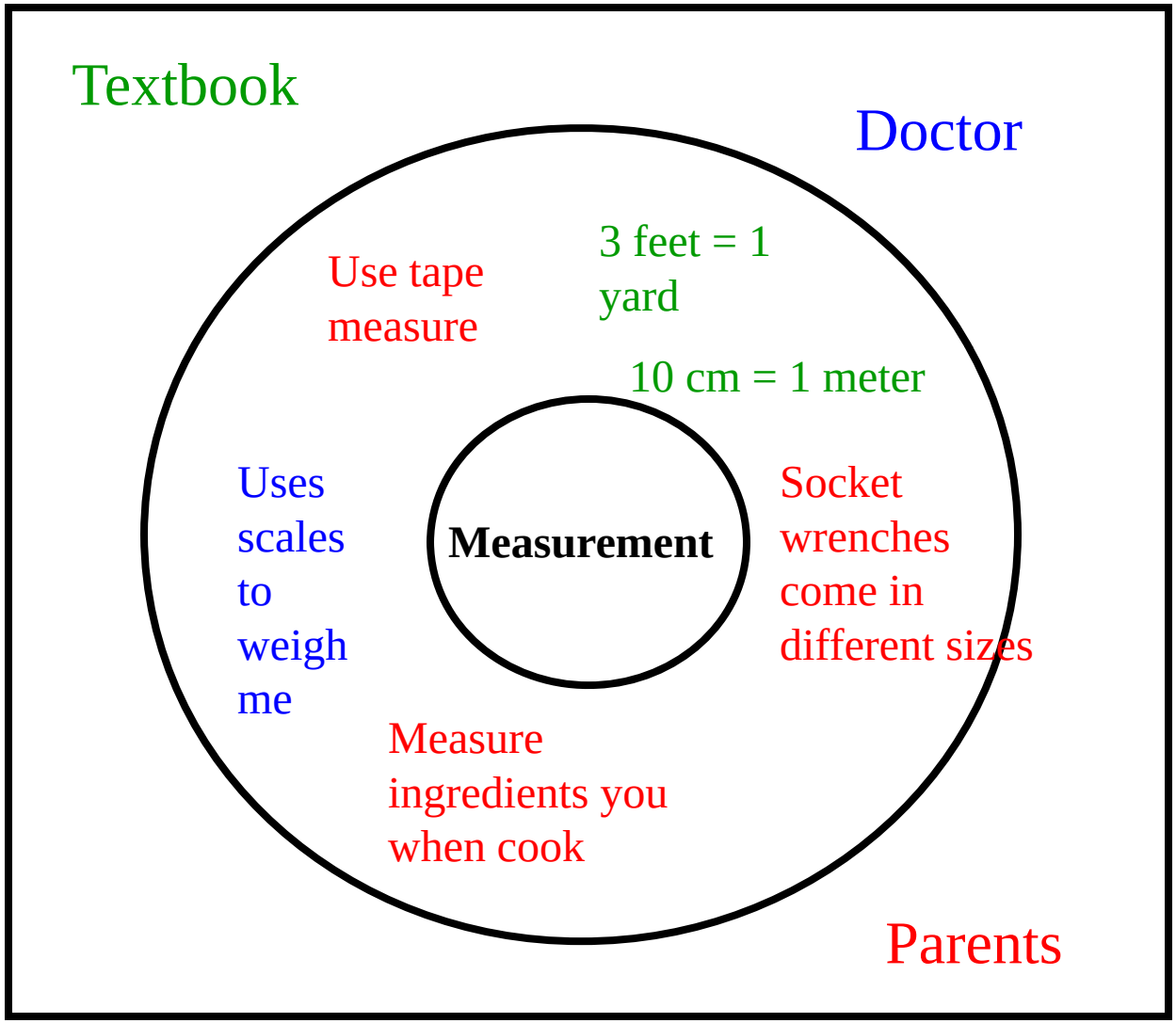
When Creating Thinking Maps Use Color for a Purpose.

Ask yourself,

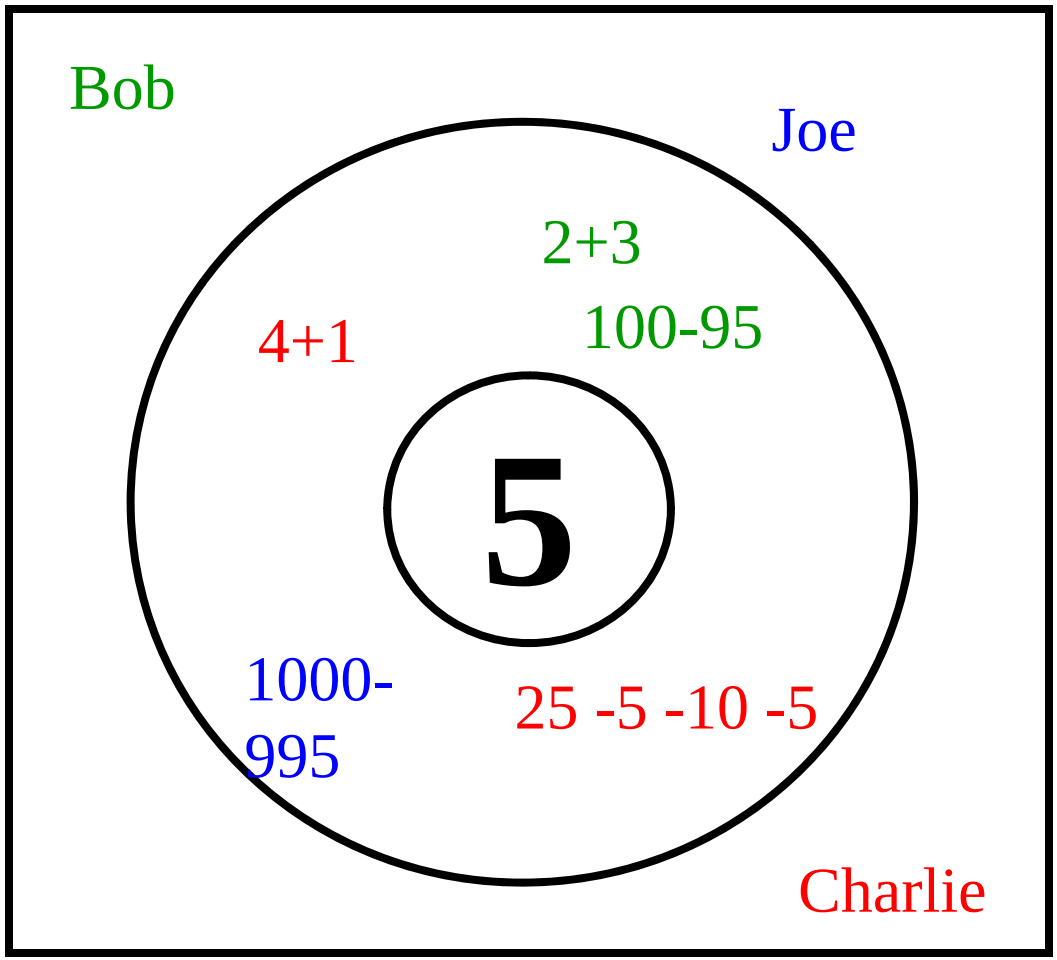
what connections or relationships

do I want my students to see?

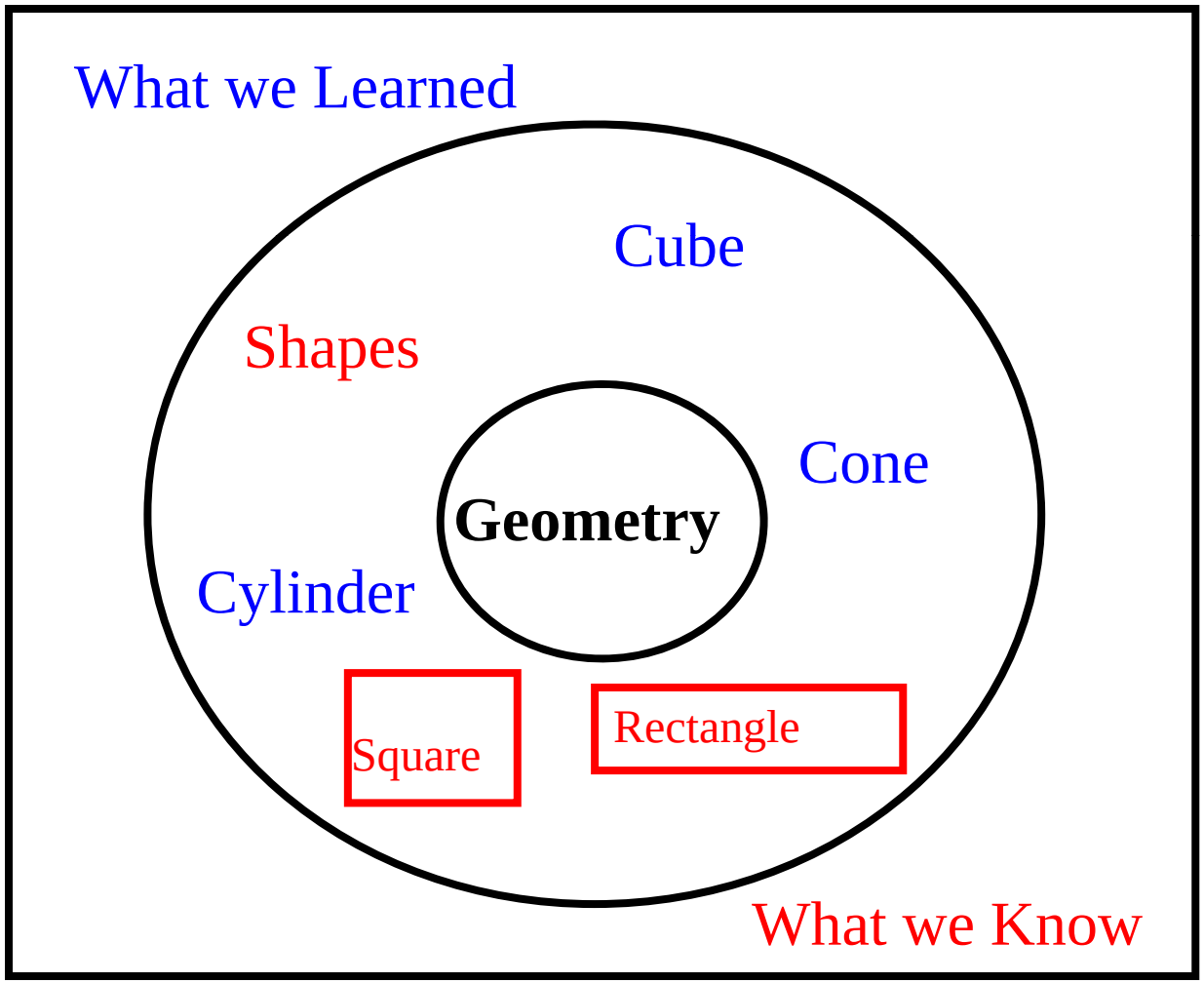
Match the Color to the Source

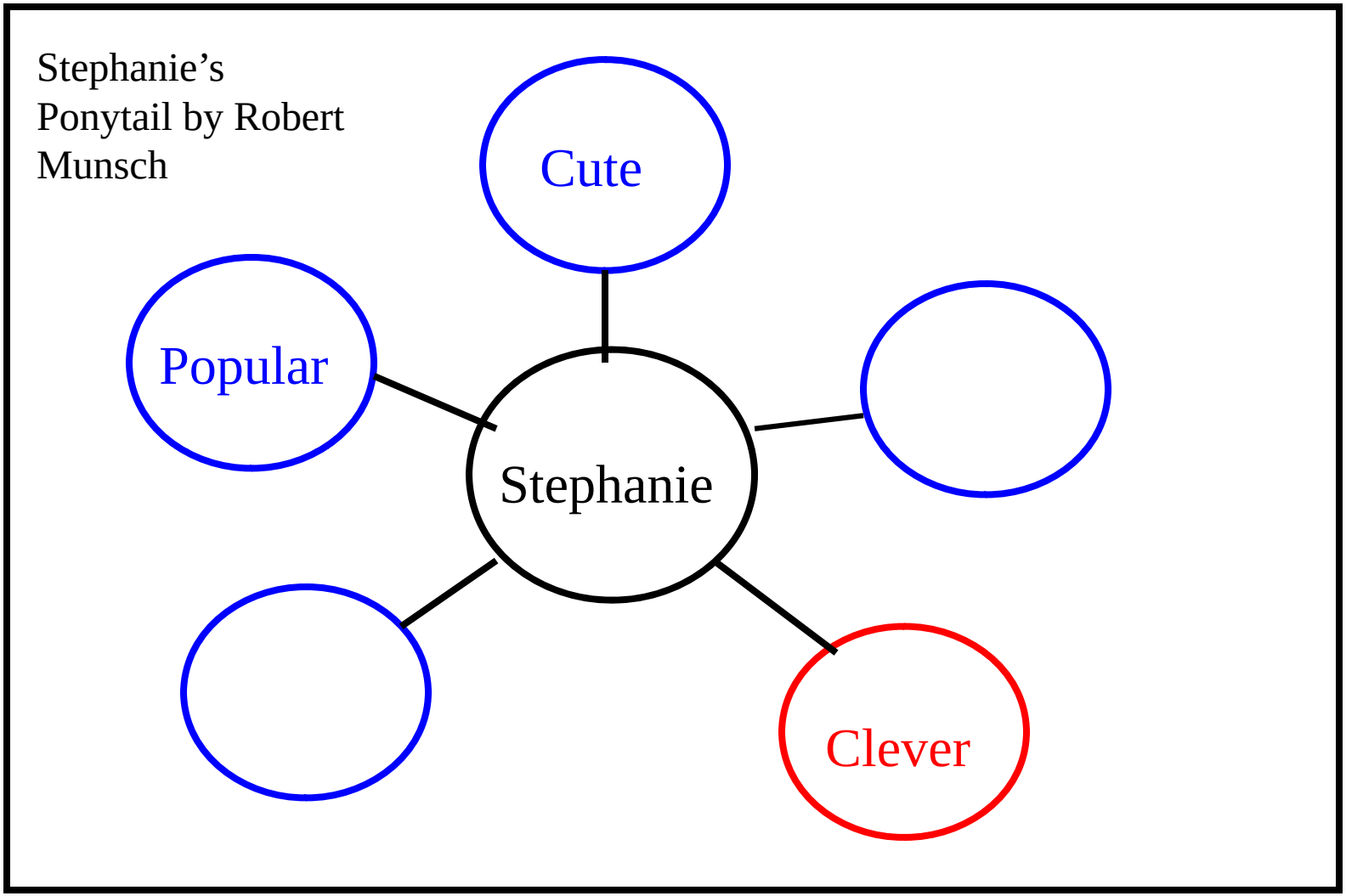


Show the Work or Ideas of Each Student



Show Prior Knowledge and What We Learned





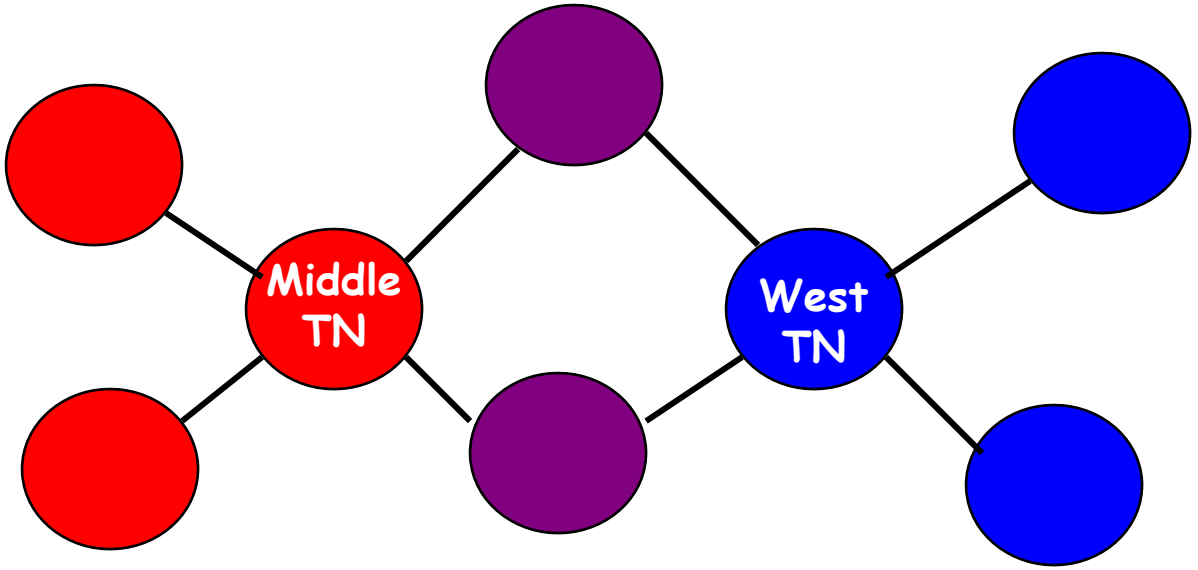
Color Code the Word that BEST DESCRIBES the topic in a different color.

Three Grand Divisions of TN

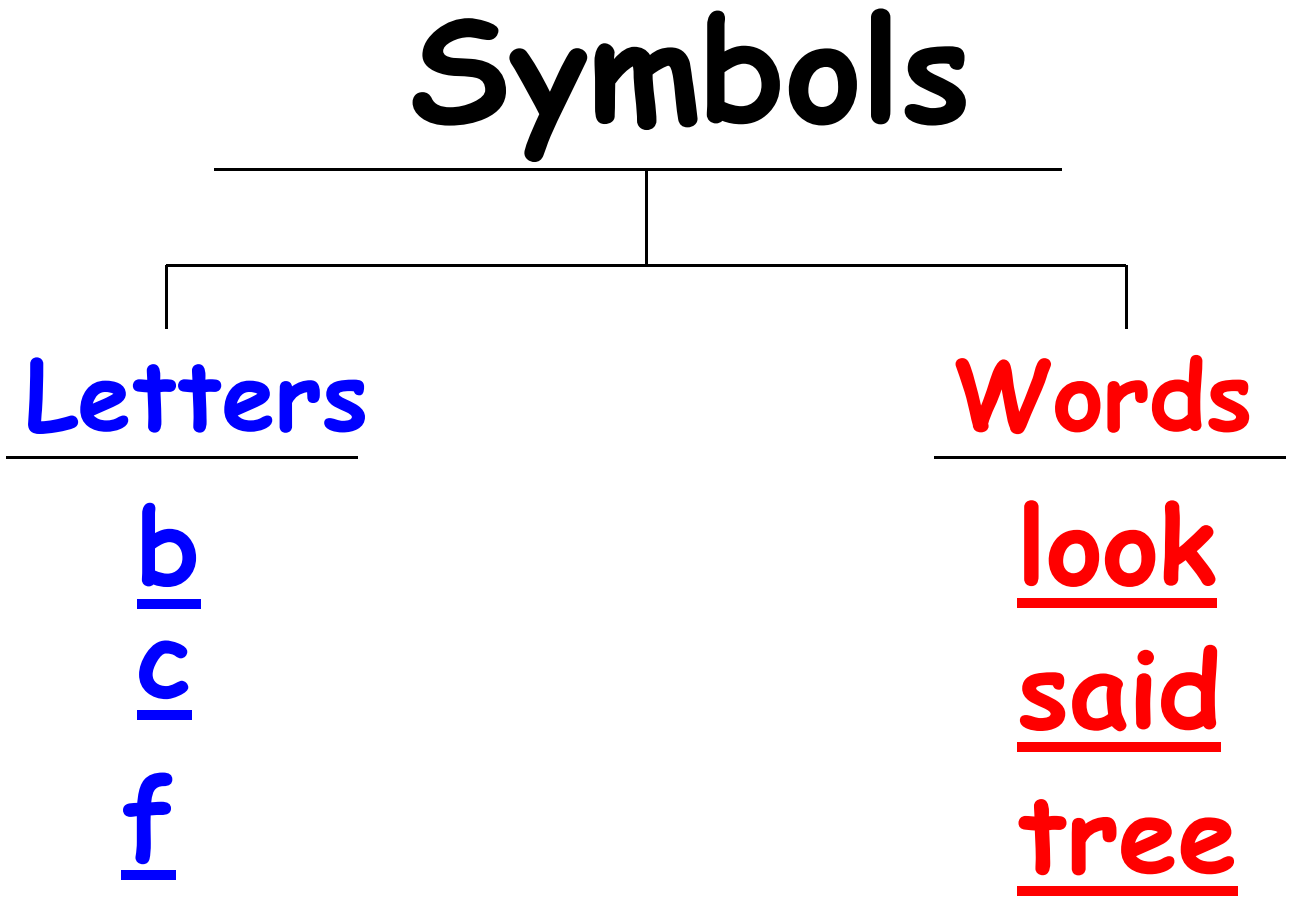
West

Middle

East

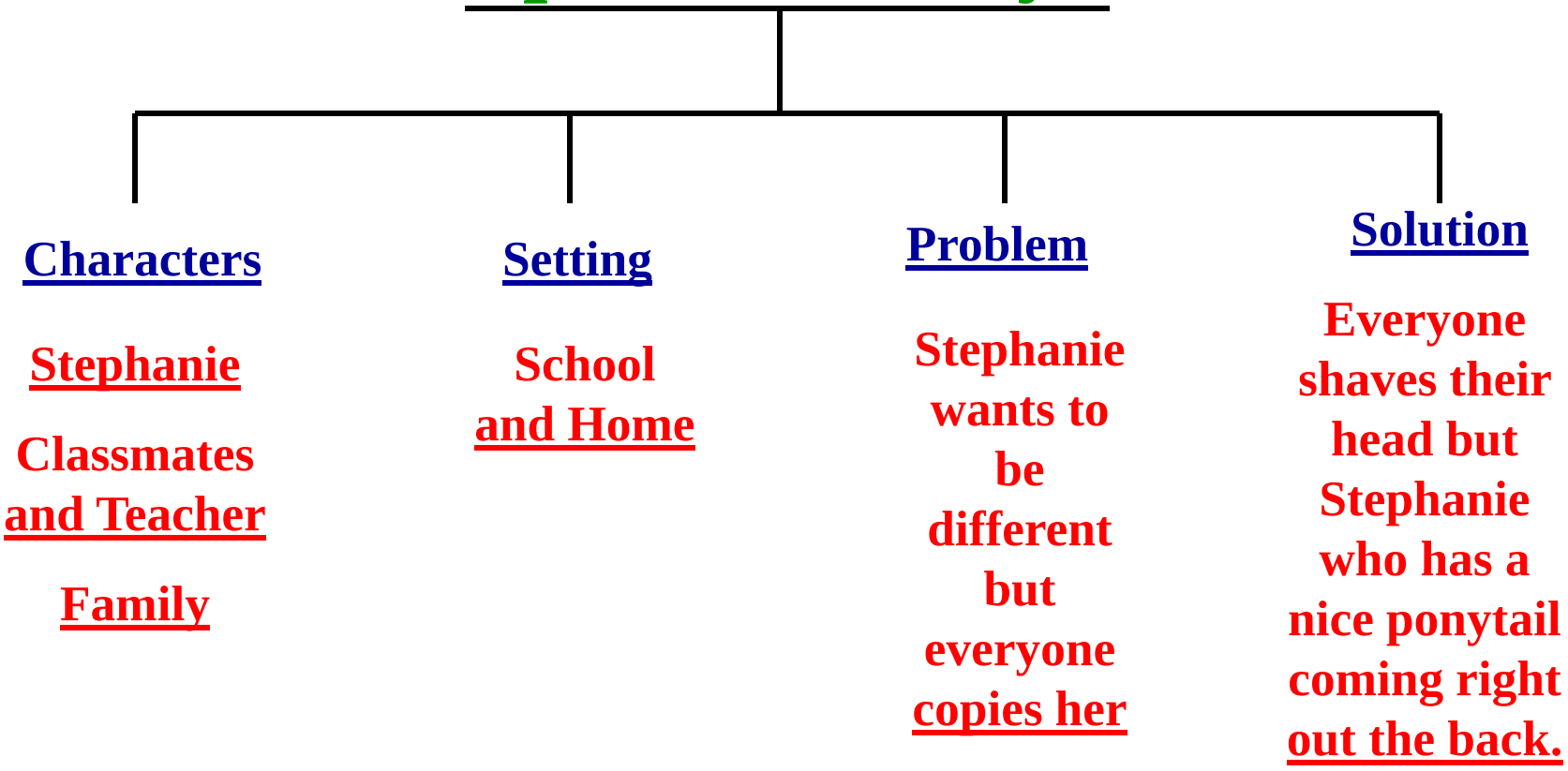


Color Code to Show Likenesses and Differences



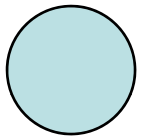
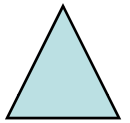
Emphasize Different Categories with Color

Stephanie's Ponytail



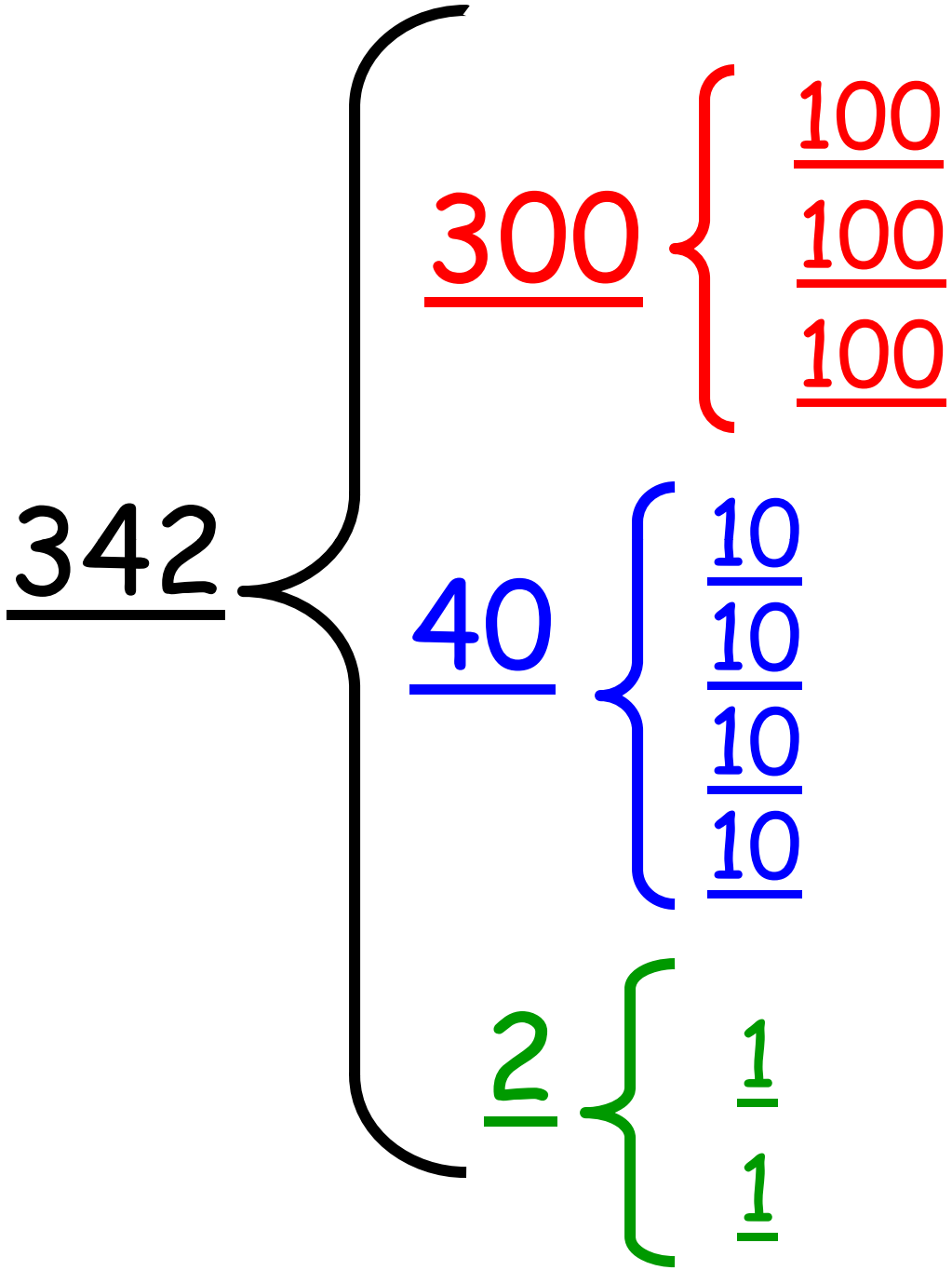
Use color to differentiate between the topic, categories and details.

SHAPES

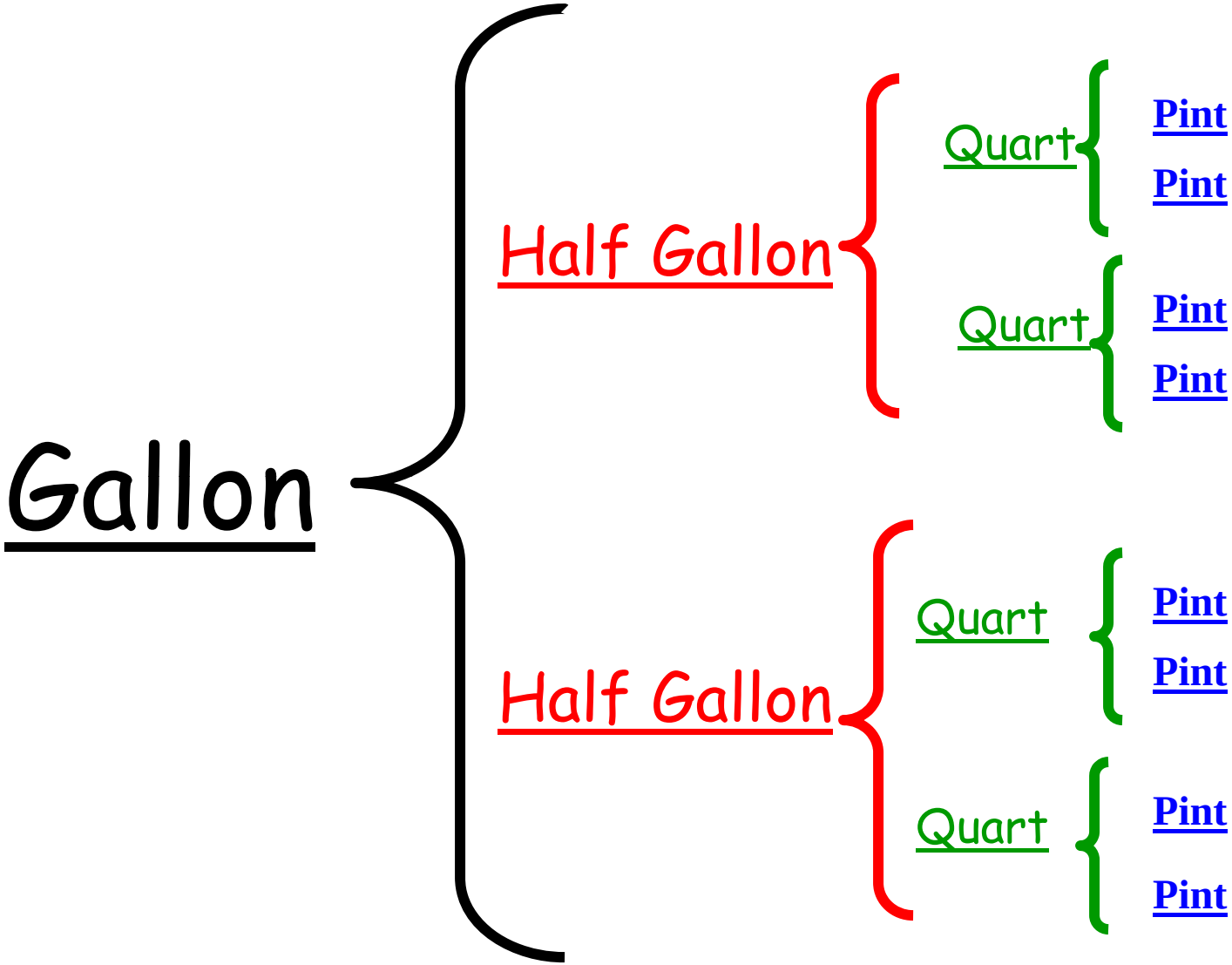
Circle	Square	Rectangle	Triangle
			
Round - No sides	**4 equal sides**	**4 sides – two long and two short**	**3 Sides and 3 angles**
Clock	My Cubby	Teacher's Desk	Sail on sailboat

Use color to categorize across,

as well as down.

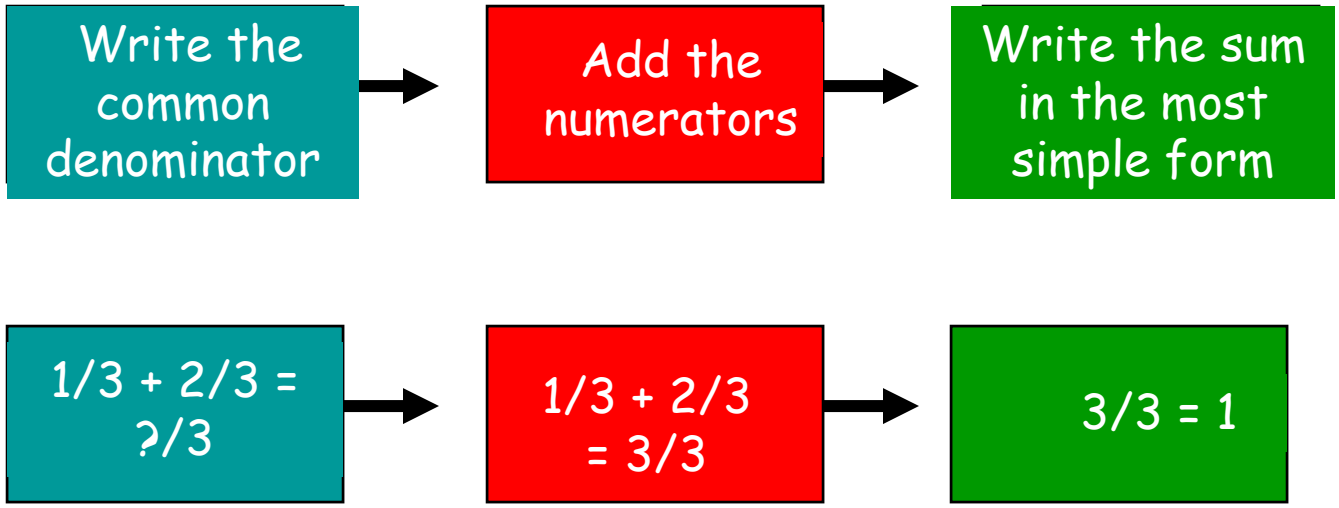


Color Code to emphasize the relationship of the parts and subparts.

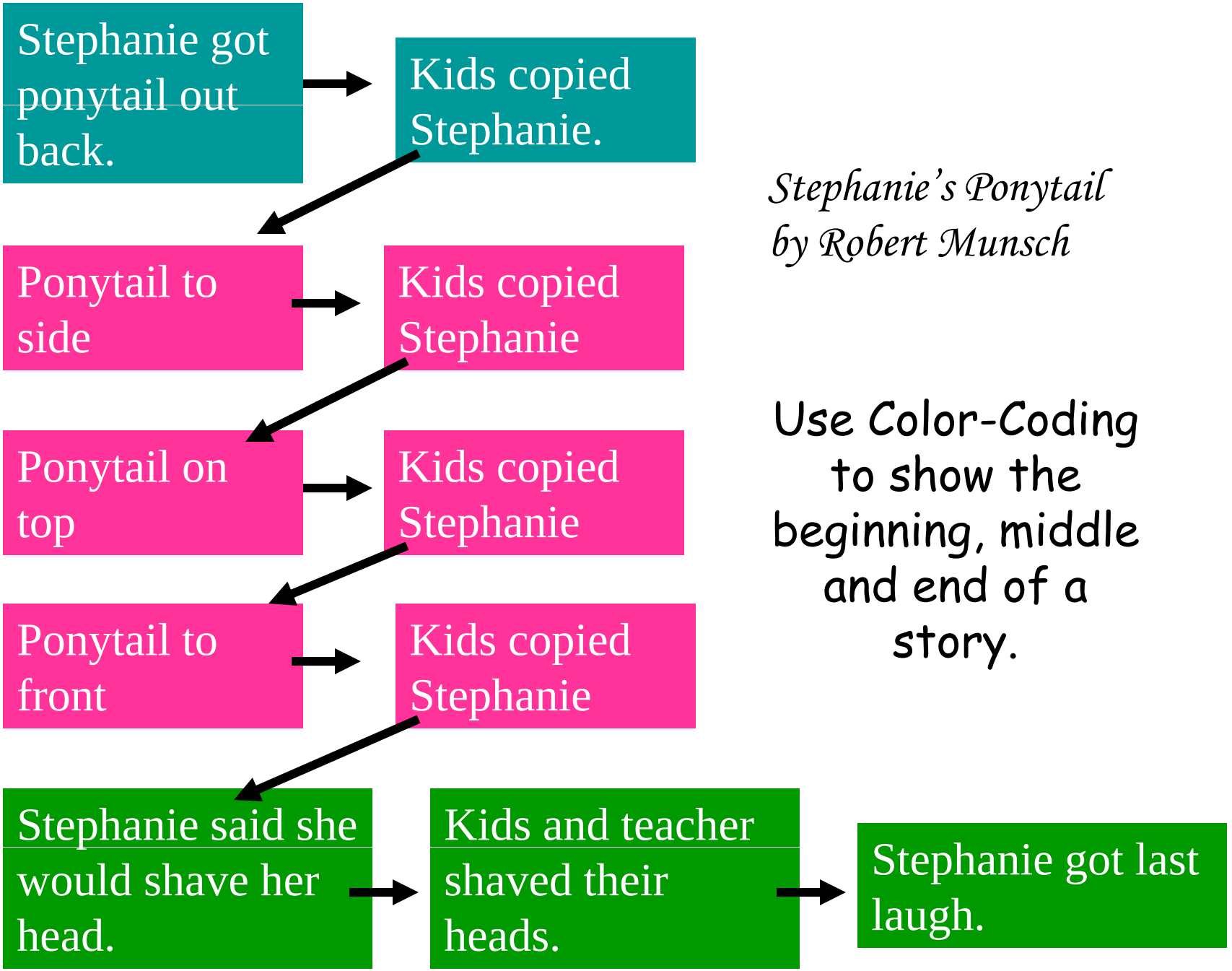


Use color and size to show the pattern of whole to parts in measurement

Adding Fractions with Common Denominators



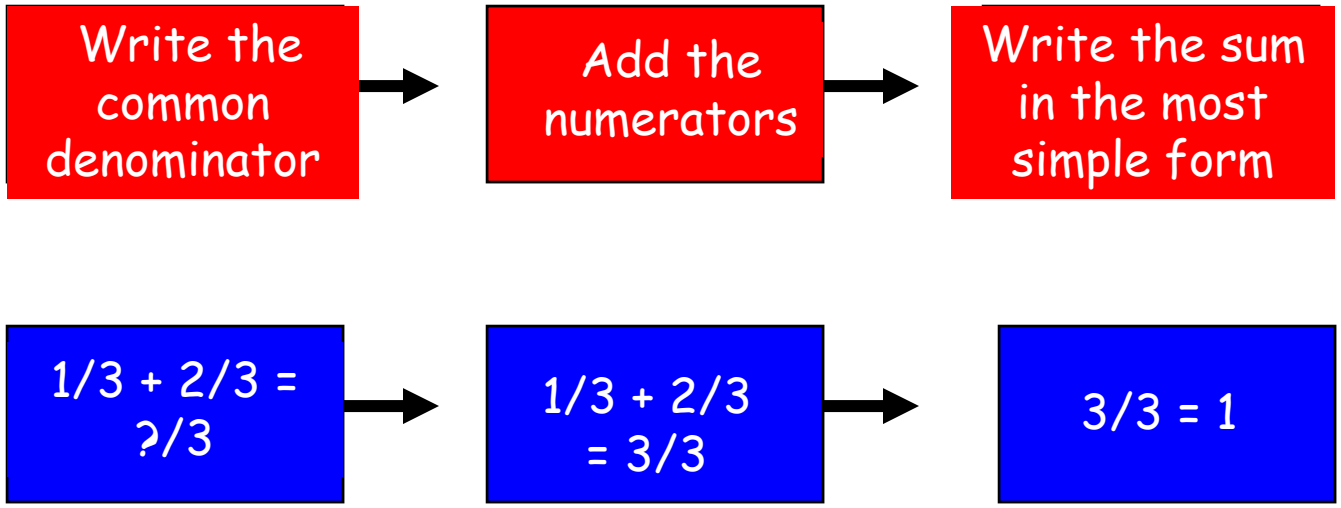
Color-code to emphasize the relationship between the step in the process and the actual work.



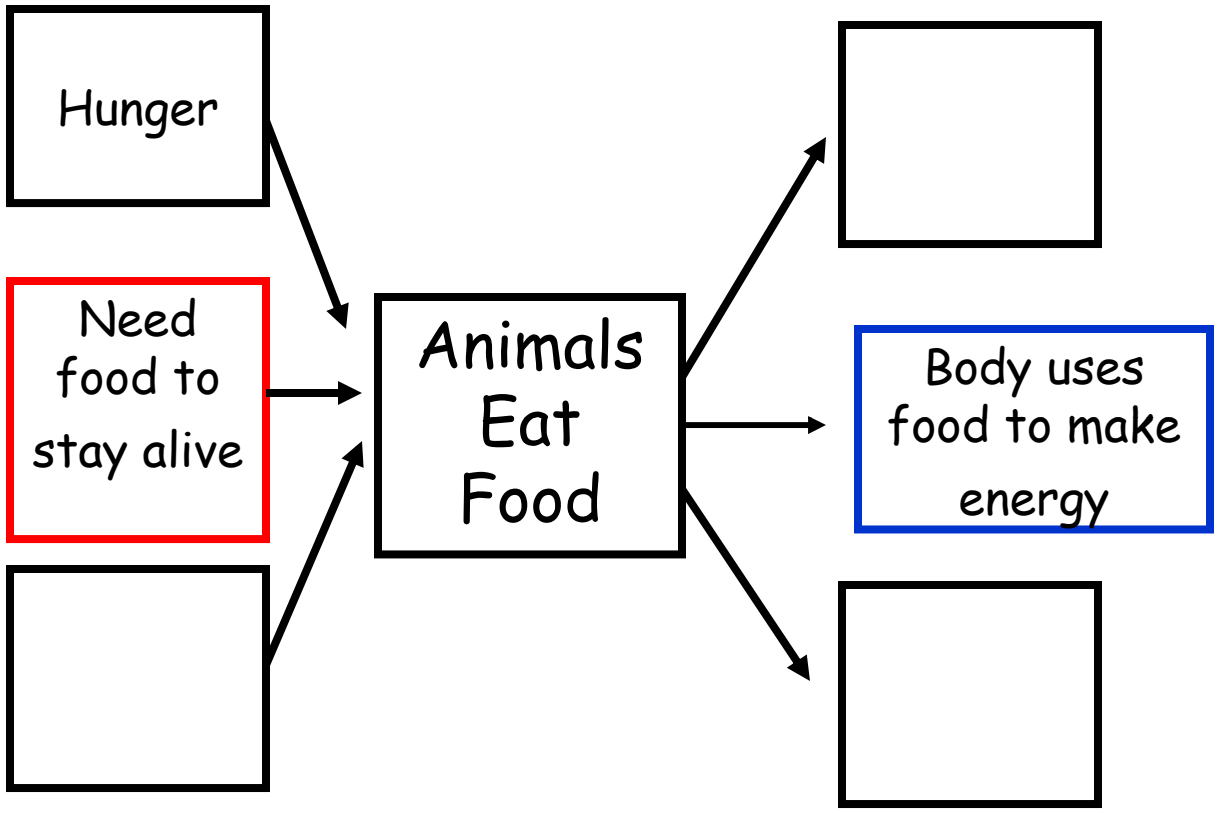
Stephanie's Ponytail
by Robert Munsch

Use Color-Coding to show the beginning, middle and end of a story.

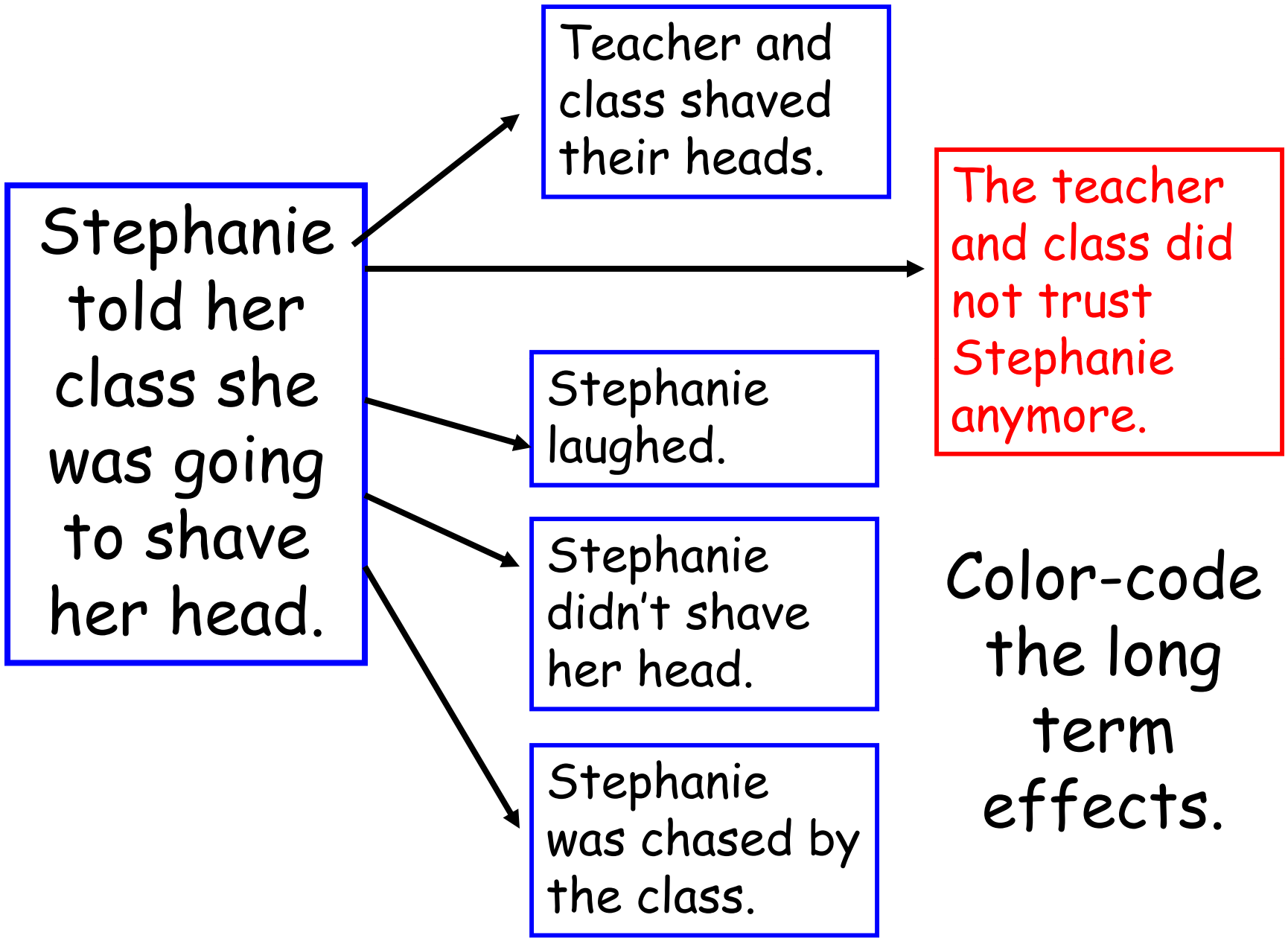
Adding Fractions with Common Denominators



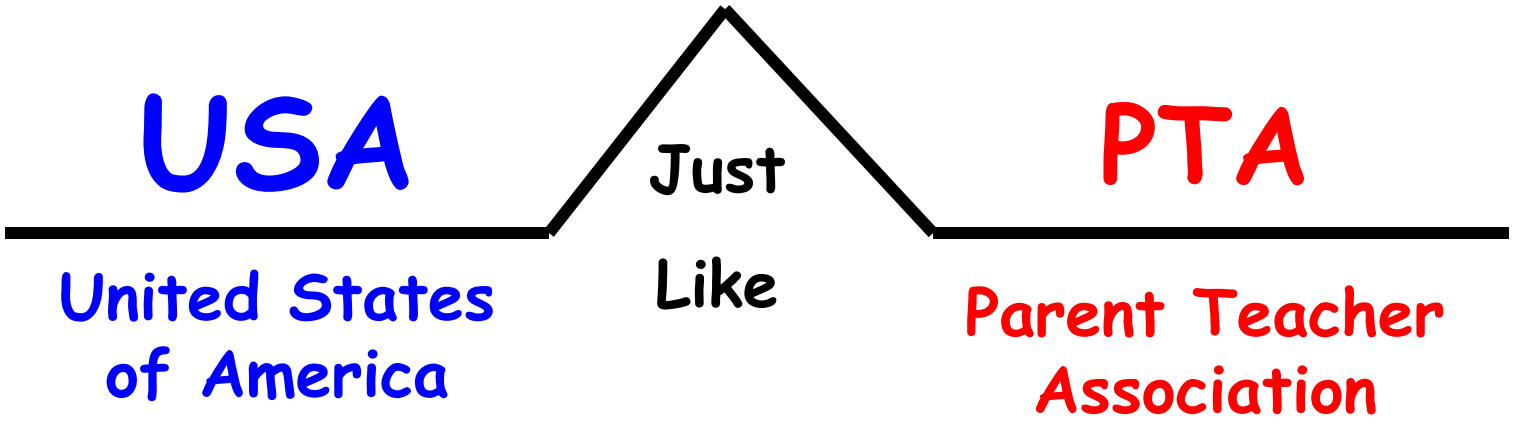
Color-code the steps in one color and the work in another color in a parallel Flow Map.



Color-code the most important cause or effect in a different color.

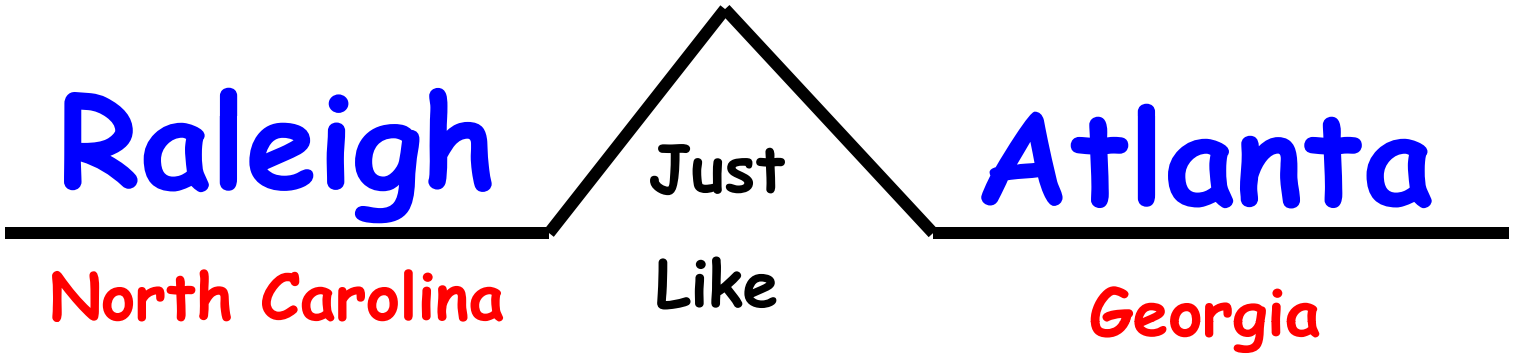


Color-code the long term effects.



Relating Factor: Is the abbreviation for

Color code to show the relationship of each pair

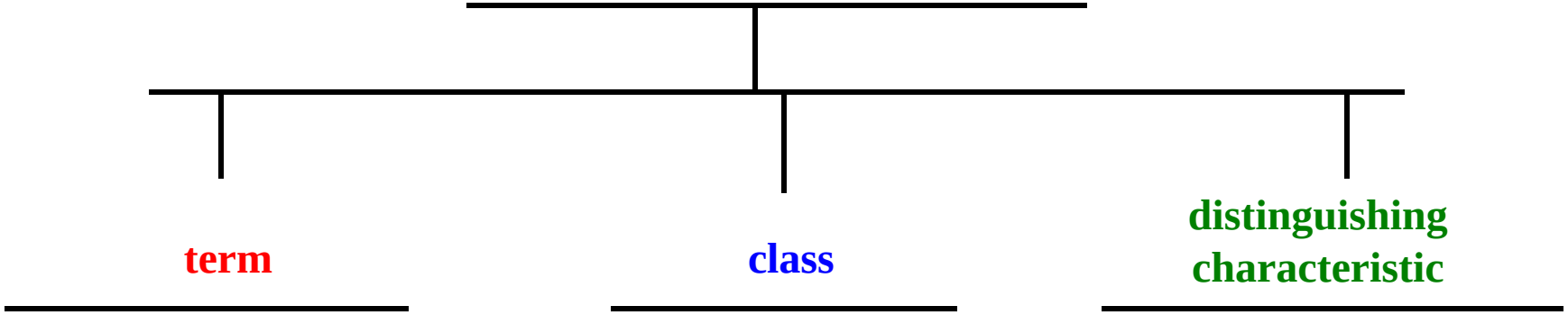


Relating Factor: Is the capital of

Color code to contrast the capitals and the states

Examining Sentence Definitions with a tree map

Conventional Definition Form



Remember the Olfactory Bulb

Researchers have found two areas of the brain that seem to <u>make new neurons</u>:

- **The Olfactory Bulb (smell)**
- **The Hippocampus (lower middle region of the brain between the ears)**

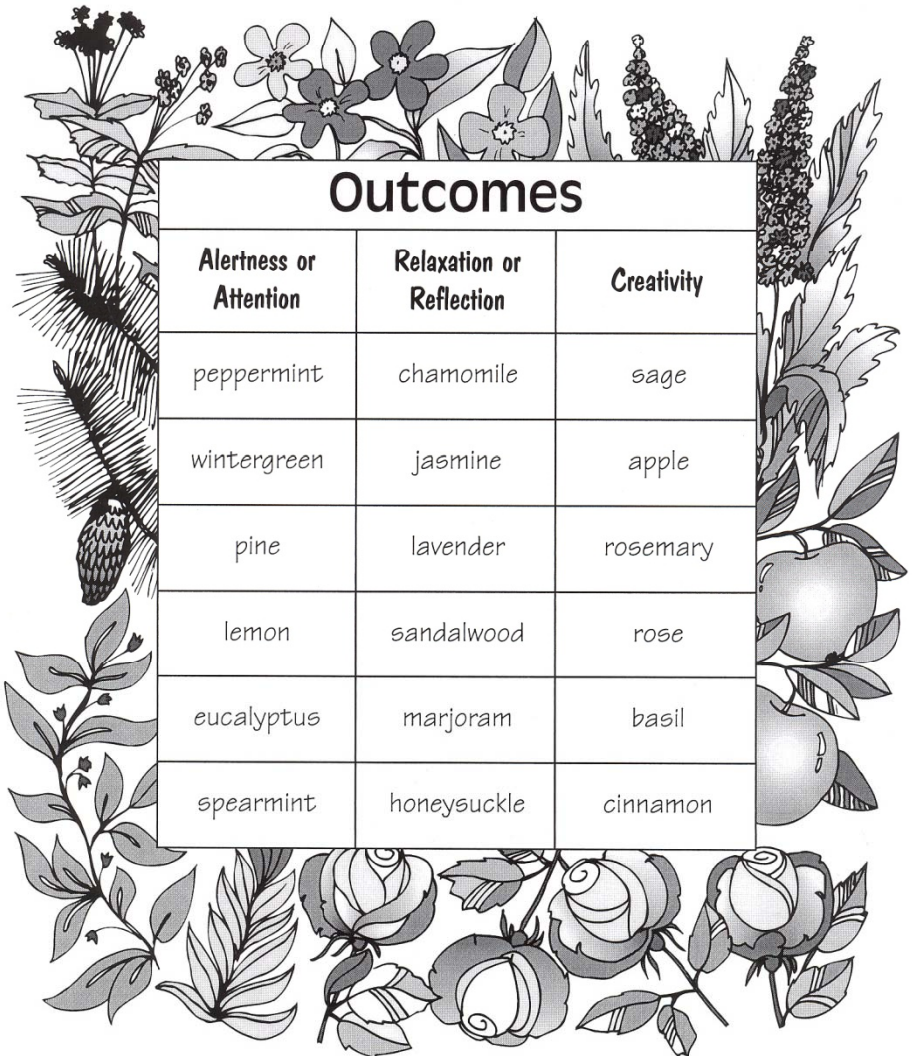
If they <u>both</u> make neurons, essential for creativity and flexibility in thinking, then wouldn't it make *sense* to use *scents*????

Peggy's Classroom

When introducing a new concept,

- **use orange or yellow paper to get the students' attention. These colors trigger excitement, alertness and creativity.**
- **hide citrus scented dryer sheets in the classroom. The orange scent encourages creative thinking. It reduces stress and stimulates the brain.**
- **provide the students with a glass of orange juice**

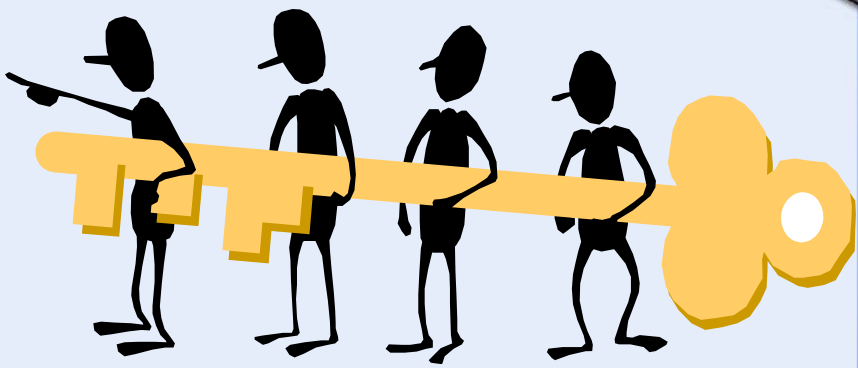
"Scent"sational Aromatherapy Chart



Outcomes		
Alertness or Attention	**Relaxation or Reflection**	**Creativity**
peppermint	chamomile	sage
wintergreen	jasmine	apple
pine	lavender	rosemary
lemon	sandalwood	rose
eucalyptus	marjoram	basil
spearmint	honeysuckle	cinnamon

Dr. Linda Karges-Bone, " Beyond Hands-On"

Memory



- **Short-term memory**
  - **TO HELP:**
    - **Combine or “chunk”**
    - **Recognition**
- **Long-term memory**
  - **Declarative - Factual**
  - **Episodic - Events or experiences**
  - **Semantic - Words**
  - **Procedural - Step by step**

Techniques to Help Memory

- Define the “gist” - OVERVIEW
- Sequence events
- Plot out pictorially the information
- Tell the information to others in own words - TALK
  - Peer teaching/tutoring
- Amplify by giving examples
- Use multiple parts of the brain (emotional, factual, physical)
  - Auditory, Visual, Kinesthetic, Talk
  - Combine
- Use color effectively
  - Yellow and orange as attention-getters

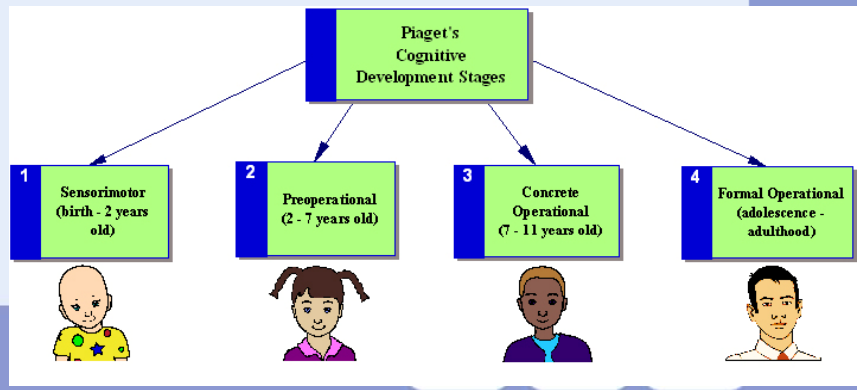
Beth's Classroom

Body Tags

- **Connect a word/concept to different body parts to reinforce memory** - Enhanced learning through movement (educational kinesiology) increases the oxygen in the blood stream and leads to improved concentration and can enhance children's readiness for learning. Structured movements consciously activate the whole mind body system, stimulating nervous-system activity equally in all parts of the brain.

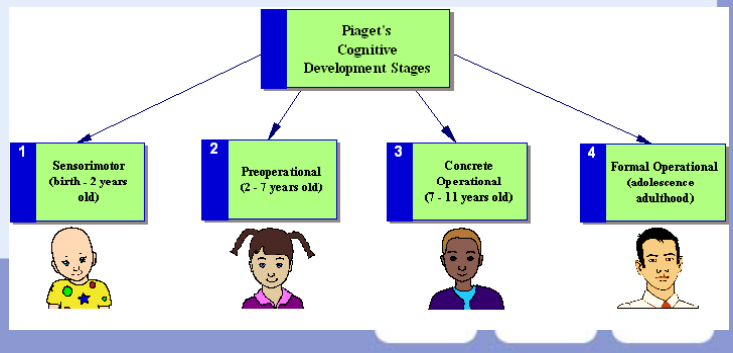
10. Learning is Developmental

- **Depending upon the topic some students can think abstractly, while others have a limited background and are still thinking on a concrete level.**
- **Building the necessary neural connections by exposure, repetition, and practice is important to the student.**



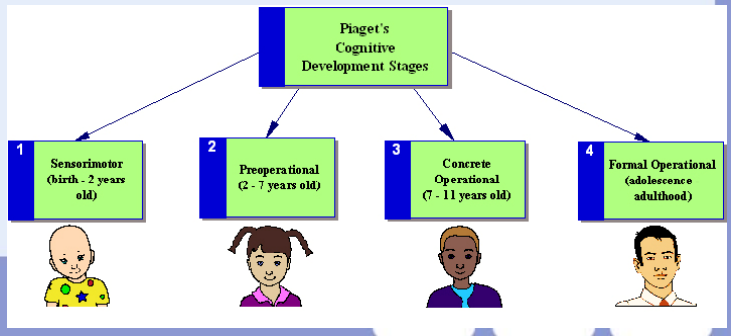
10. Learning is Developmental

- **The richer and more complex the experiences we have, the more elastic our brains become.**



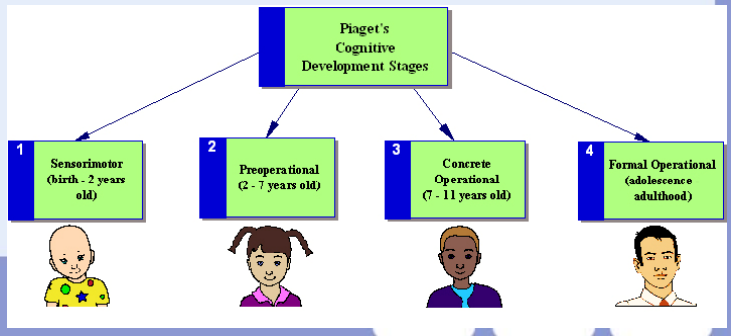
10. Learning is Developmental

- **Our experiences stimulate neural development, creating a thick forest of branch-like neural connections.**



10. Learning is Developmental

- **Because of our experiences, our brains actually become denser providing greater capacity for new and deeper understanding.**



11. Learning is Enhanced by Challenge and Inhibited by Threat

- **The brain's priority is always survival - at the expense of higher order thinking**
- **Stress should be kept to a manageable level**
- **Provide opportunities to "grow" and to make changes**
- **Have high, but reasonable expectations**

11. Learning is Enhanced by Challenge and Inhibited by Threat

- **Our brains actually expand or shut down certain functions based on the presence of challenge or threat.**

11. Learning is Enhanced by Challenge and Inhibited by Threat

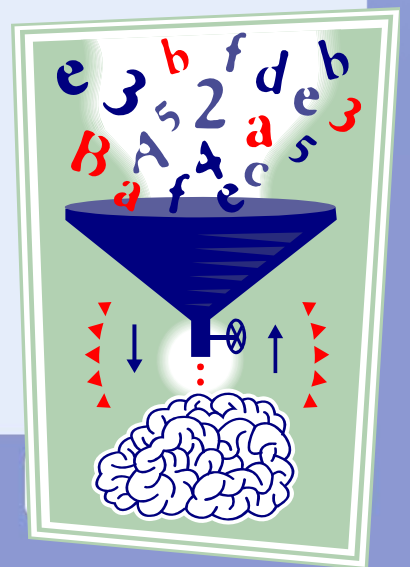
- **We can strengthen the brain through presenting sensory-rich, challenging situations in a safe environment that promotes risk taking.**

11. Learning is Enhanced by Challenge and Inhibited by Threat

- **The more complex the challenge and the safer the social and psychological environment, the greater the learning.**

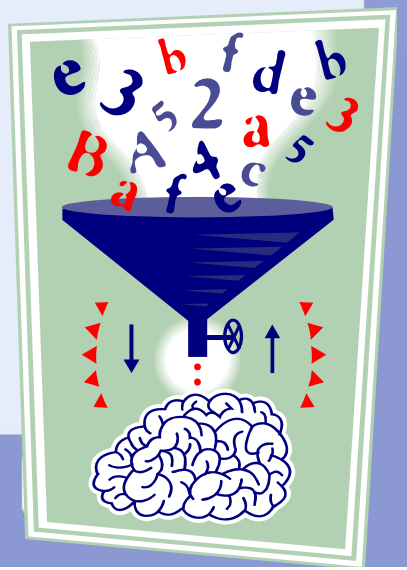
12. Each Brain is Unique

- We are products of genetics and experience
- The brain works better when facts and skills are embedded in real experiences



12. Each Brain is Unique

- **Each person's brain matures differently, and brain size and weight can vary by as much as 50 percent among people of normal intelligence.**



Implications …

- **Show them the “BIG” picture.**
- **Provide challenging assignments that really matter.**
- **Balance clearly delegated assignments with some freedom and flexibility or choice in assignments.**

Implications …

- **Offer increasing responsibility as a reward for accomplishment.**
- **Spend time getting to know your students and their capabilities.**

Implications …

- **Establish a mentoring relationship - where they never think that they are "bothering you" by asking questions.**
- **Create a comfortable, low-stress environment.**

Implications …

- **Focus on the work (class), but be personable and have a sense of humor.**
- **Consistently provide constructive feedback.**
- **Reward them when they have done a good job!**

"The single most important factor influencing learning is <u>what the learner already knows</u>. Ascertain this and teach her accordingly." **David Ausubel.**

Prior learner knowledge = mental models

-not a blank slate

-patterns of thinking

-patterns of understanding and organizing

-patterns of doing, studying, writing a paper

Neuroscience research has determined 5 promoters of learning

(1) Our brains have innate learning programs. (Gallistel, 2003)

(2) Repetition of information triggers long term learning. (Squire and Kandel, 2000)

(3) Excitement during learning promotes long term memory. (Cahill & Gorski, 2003; LeDoux, 2002)

(4) Eating carbohydrates during learning promotes long term memory. (Korol, 2002)

(5) Every night while we sleep 5 periods of dreaming provide differential strengthening of neuron connections for long term memory, and nondreaming sleep causes repetition of the day's information. (Kuriyama, Stickgold, & Walker, 2004)

TEACHERS CAN CONTROL ONLY 2 PROMOTERS

Repetition

&

Excitement

BUT TEACHERS CAN ALSO

LHW1

PERMIT AND ENCOURAGE HEALTHY CARBOHYDRATE SNACKING

AND

TALK TO STUDENTS AND PARENTS ABOUT THE

IMPORTANCE OF SLEEP

Slide 130

LHW1 DR LYNN WATERHOUSE, 1/23/2005

The Brain Needs Sleep!

- **Sleep helps the brain to plant new information in the memory banks.**
- **Exercise (which lifts the brain out of depression) can also aid healthy sleep. A “double dose”.**
- **New research suggests that kids with ADHD display disrupted sleep patterns.**

Brain Break

- **Drink Water**
- **Stand Up …**
  - **Place both arms straight out in front of you parallel to the ground**
  - **Cross your arms at your wrists**
  - **Inter-lock your fingers**
  - **Bend your elbows and allow your arms to fold in toward your chest**
  - **Cross your legs**
  - **Put your tongue on the roof of your mouth**
  - **Close your eyes and take a deep breath**

Why it works …

It increases bilateral processing!

Almost 55% of students in the third and fifth grades who participated in Brain Gym activities for 15 minutes a day were shown to improve their reading scores on standardized tests (Koester, 2001).

Brain Teaser

In this puzzle, a list of words is given. To solve the puzzle, think of a single word that goes with each to form a compound word (or word pair that functions as a compound word).

For example, if the given words are *volley*, *field*, and *bearing*, then the answer would be *ball*, because the word *ball* can be added to each of the other words to form *volleyball*, *ballfield*, and *ball bearing*.

- **blue**
- **cake**
- **cottage**

ANSWER

… CHEESE

Blue cheese

Cheese cake

Cottage cheese

Eat Right to Think Right

- **Seven simple brain-promoting nutritional tips:**
  - **Increase your water intake-hydrate your brain!**
  - **Calorie Restriction**
  - **Fish, Fish Oil, Good Fats and Bad Fats**
  - **Lots of Dietary Antioxidants**
  - **A Balance of Protein, Good Fats and Carbohydrates**
  - **Pick your Top 24 Healthy Foods and put them in your Diet Every Week!**
  - **Plan Snacks**

Top 24 Foods

Lean Protein:

- **Fish (especially salmon, tuna, mackeral, herring)**
- **Poultry**
- **Meat (Lean Beef and Pork)**
- **Eggs**
- **Tofu and Soy Products**
- **Dairy (low fat and skim)**
- **Beans (especially garbanzo beans and lentils)**
- **Nuts and Seeds (especially walnuts)**

Top 24 Foods (con't)

Complex Carbohydrates:

- **Berries (especially blueberries)**
- **Oranges, lemons, limes, grapefruit**
- **Cherries**
- **Peaches, plums**
- **Broccoli, Cauliflower, brussel sprouts**
- **Oats, Whole Wheat, Wheat Germ**
- **Red or Yellow Peppers**
- **Pumpkin Squash**
- **Spinach**
- **Tomatoes**
- **Yams**

Top 24 Foods (con't)

Fats:

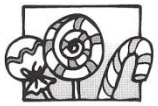
- **Avocados**
- **Extra virgin, cold pressed olive oil**
- **Olives**

Liquids:

- **Water**
- **Green or Black Tea**

Dark Chocolate is "Brain Food"

- **Dark Chocolate is an anti-oxidant.**
- **Dark Chocolate can boost mood. It contains the same cannaboids (chemicals) as marijuana! But in small amounts!**
- **Chocolate eaters live a year longer than others.**
- **Dark chocolate contains flavanols that increase blood vessel dilation.**

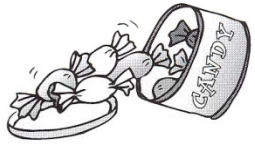


Peppermints for Powerful Learning

Rationale: The scent and taste of peppermint seem to "pep up" the brain, making children more alert. What a great opportunity to introduce new concepts, take a quiz or do an assessment!

Techniques: Offer peppermint lozenges for children to suck on as they learn new letters or sounds. (Not recommended for small children for whom hard candy may pose a choking hazard.)

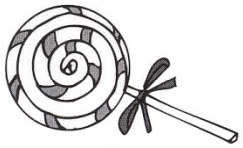
or



Give the children peppermint or wintergreen-scented markers to highlight words that they have written on a chart story or in their journals.

or

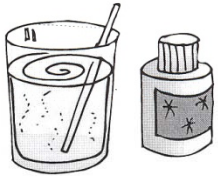
Use peppermint candies as math manipulatives to be counted and matched as you teach number concepts.



or

Heat oil of peppermint in a scent pot as you give new instruction or do an assessment.

or

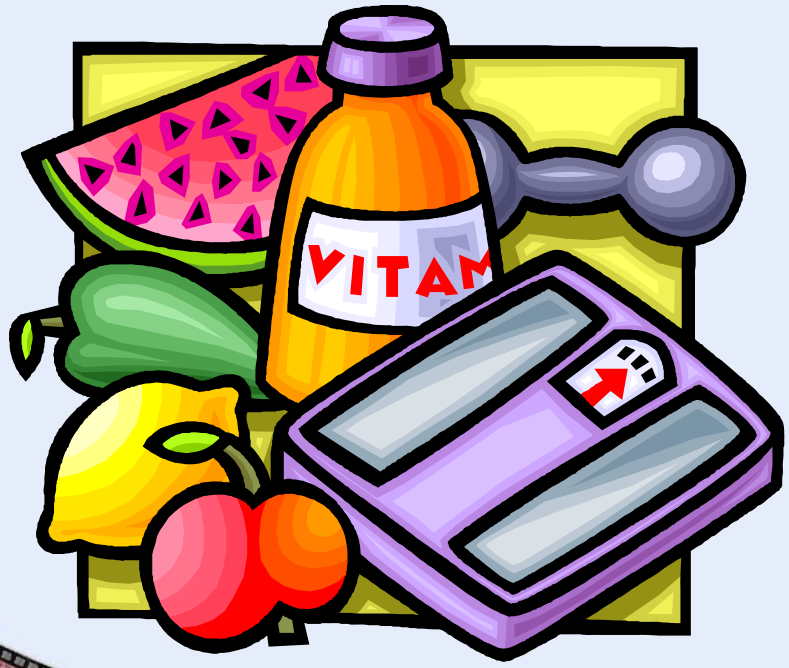


Swirl peppermint flavor into milk at snack time to brighten attitudes.

Uses: The reproducible peppermint candy on page 85 can be used for a writing activity, such as practicing spelling or vocabulary words. Children can cut out the 10 small mints for use as math manipulatives.

Dr. Linda Karges-Bone, "Hands-On"

Vitamins can help raise IQ!

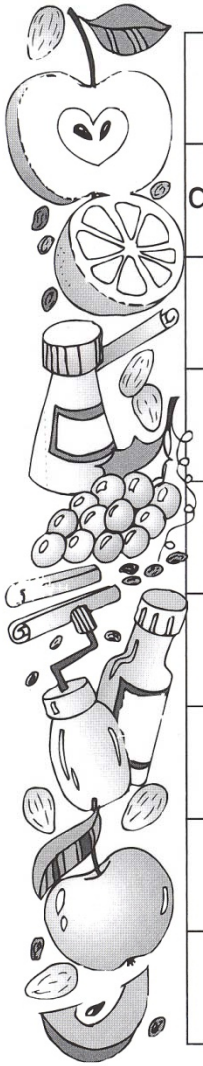


- After 13 weeks, about 45% of those taking supplements gained 15 or more points in non-verbal IQ
- Vitamins boosted IQ a minimum of 6 pt. with an average of 11 pt. And a maximum of 21 pt.
- 615 8th and 10th graders (Kings College, London)

Foods Can Feed the Brain and Body!

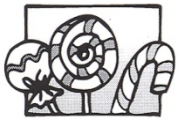
- Read Your Miracle Brain by Jean Carper
- Key Brain Power Foods
- Spinach
- Blueberries
- Salmon
- Olive Oil
- Peanut Butter
- Raisins
- Kale
- Strawberries
- Cranberries
- Omega-3 fish
- Garlic
- Vinegar

Taste the Learning Chart



Taste or Food Source	Possible Influence on Behavior or Mood
Carbohydrates	Release endorphins: quiet, tranquil mood. Too much at lunch, and the children will nod off. Save these for afternoon snack time.
Protein	Delivers energy jolt to the system. Feeds the brain. Good for morning snack time.
Vanilla	Calm, reflective mood enhancer
Peppermint	Attention-grabber; may help retrieve information from memory
Ginger or Cinnamon	Calms nausea; enhances creativity
Apple	Natural sweet for energy, with a scent that promotes creativity
Orange	Energy jolt with a color and scent that make a complete "alertness" package
Almond	Enormous protein boost with a scent that is relaxing as well. Good snack for precooperative group lesson.

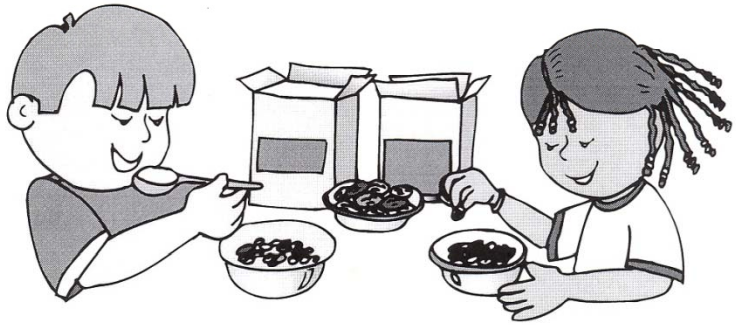
Dr. Linda Karges-Bone, " Beyond Hands-On"



Quiet Time Cereal Snack: A High Carbohydrate Relaxer

Rationale: Use this snack as a prelude to reading a story aloud to the children. The subtle flavors, texture or chewing and nutrients will relax them. See the suggestions for scent and color on pages 31 and 54 for use in read-aloud areas.

Techniques: Children should mix this snack in a large sealable, plastic bag.



Mix two cups (480 ml) each of the following: square-shaped, whole grain cereal, fruit-filled cereal squares, puffed rice cereal, oat ring cereal.

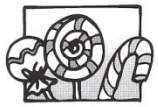
Note: None of the cereals should have added sugar or frosting. Use generic store brands for a wholesome but less expensive cereal.

(Optional) Add 1 cup (240 ml) toasted coconut and peanut pieces. Shake well.

Serve: The snack should be served in white paper cups that the children have decorated with scenes from "what they think the story will be about." Share the title of the book, then pass out markers and crayons. While the "helpers" mix the snack, others can design their cups.

Extension: Extend this activity by using the Reading Reflection Page (page 83) after reading the story aloud.

Dr. Linda Karges-Bone, "Hands-On"



Apple, Almond, Raisin Salad

Rationale: The taste, scent, texture and color of this treat deliver a "wake up" call to the brain. It is an excellent morning snack, designed to build up the learning curve during the critical morning hours of instruction. However, this activity also provides practice in mathematical concepts of estimating and problem solving. Use the Problem-Solving Work Area sheet on page 79 to assess children's performance in this task.

Ingredients:

- sliced red and green apples (skins on)*
- 1/4 cup (60 ml) of raisins for each child
- 1 cup (240 ml) of slivered almonds
- 1 tsp. (5 ml) cinnamon or ginger

*You will need one apple for every three children.

Task:

Children should wash their hands and the work table area first.

Working in pairs, children mix the ingredients in a large mixing bowl.

Children in first grade or higher can also measure all ingredients from the boxes or bags.

Sprinkle the mixture with cinnamon or ginger and stir well.

Concept: Hand out paper cups and challenge the children to figure out how to *equally* divide the mixture so that every person can try the snack.

Inquiry Questions:

What should you do first?
Can you think of any tools that might help you?
What do we mean by *equal*?
How can we work together to do this?
Can you think of a different way to figure this out?

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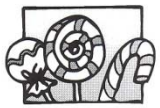
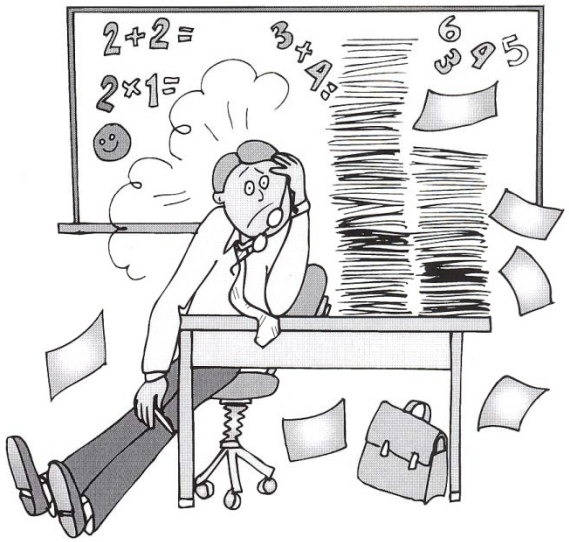
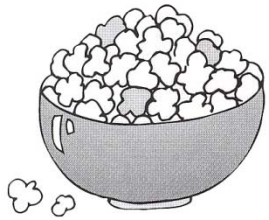
Ideas for Teachers or Parents

The Personal Touch



Children need lots of high protein, color-rich foods to feed their growing brains. As adults, we need less growth and more nurturing. Taste is often an antithesis of nurturing. We focus on cravings, such as the need for chocolate or caffeine and ignore the power of taste to nurture us as care givers of children. Here are some simple, yet effective "taste the learning" or better still, "taste the nurturing" ideas for adults.





- ✔ For a quick pep up: ginger or lemon tea with honey
- ✔ For a headache: peppermint tea
- ✔ For a sore throat: thyme tea heavily laced with honey
- ✔ For nausea: ginger ale or ginger capsules, wintergreen lozenges
- ✔ For quick energy: dried pineapple and nuts
- ✔ Low-fat snack: popcorn sprinkled with onion and garlic powder
- ✔ To prevent colds: vitamin C capsules, cranberry juice
- ✔ Stress-buster: chamomile tea, tea sprinkled with rosemary, celery juice for neuralgia

Dr. Linda Karges-Bone, "Hands-On"

Brain Break

- **Drink Water**
- **Stand Up …**
  - **Reach your right hand behind your back**
  - **Lift your left foot up behind you**
  - **Touch your hand to your foot while balancing on your opposite foot**

  … alternate sides.

Why it works …

It increases blood flow and also increases communication between the two hemispheres of the brain.

The Brains of Boys and Girls…
Is there really a difference?

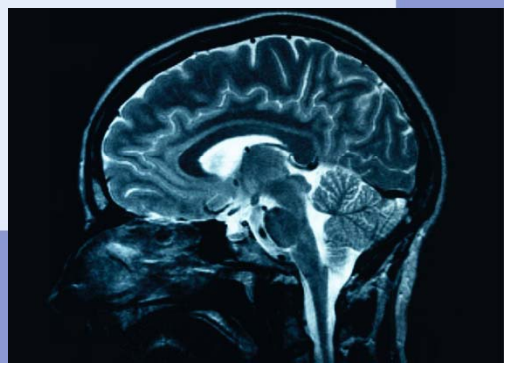
Boys and Girls: Predispositions

- **Boy babies are more interested in a mobile than in a young woman's face. The boys are typically more interested in moving objects.**
- **Girls draw pictures of people, pets, flowers, trees, rainbows and boys draw objects in action or pictures relating to action (cars, airplanes)**
- **Boys prefer trucks to play with a girls prefer dolls and stuffed animals.**

Boys and Girls: Achievement Explanations

- The brains of boys and girls differ in important ways:
  - Genetically programmed
  - Present at Birth

- The brain develops differently
- The brain is wired differently
- Girls and boys have different learning styles
- The structure and function of the brain is different between boys and girls



Boys and Girls: Achievement Behaviors

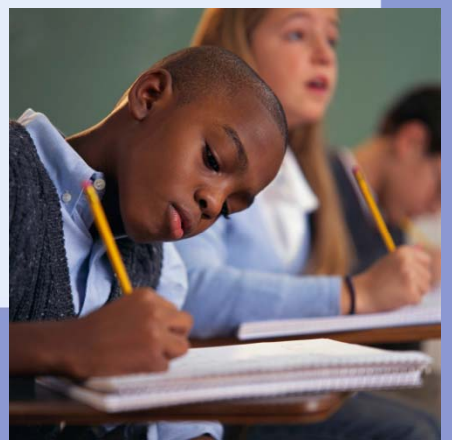
- **Female brains are predisposed to excel in language, auditory skills, fine motor skills and attention to detail**
- **The female brain is more decentralized**
- **The female brain is more integrated**
- **The female brain integrates more thoughts and emotions**

Boys and Girls: Achievement Behaviors

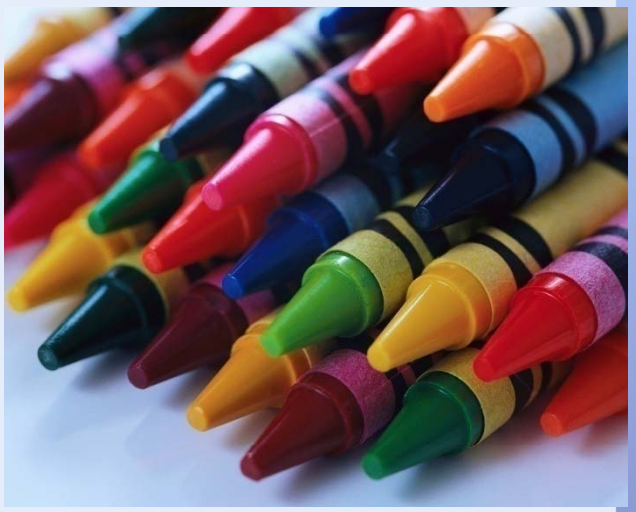
- Girls tend to have higher standards in the classroom
- Girls are generally more attentive in class and more willing to learn
- Girls tend to prefer fiction reading, while boys tend to prefer non-fiction

Boys and Girls Achievement Behaviors

- **Boys are typically more aggressive and impulsive**
- **Boys show more adaptability to traditional approaches: memorization, repetition, and abstraction.**
- **Boys tend to be more classroom risk- takers**
- **Boys tend to have more negative attitudes toward reading and writing.**



Why is it important to consider the gender and brain research in the learning process?



- **30 years ago, kindergarten was about:**
  - **finger-painting**
  - **socialization**
  - **singing and playing**
  - **acclimating children to school**

- **Today, Kindergarten is about:**
  - **academic focus: reading, writing, math**

Many boys' brains are not ready for this. Gender and brain research approaches help us to understand and achieve the new educational goals.

Nuts and Bolts: Brain Gender Differences

Part of Brain	Differences	Impact
Amygdala (responsible for primal automatic responses-"fear button")	Larger in boys	Boys are more aggressive and impulsive
Basal Ganglia (function is to initiate, coordinate and terminate voluntary movements)	More active in females	Deeper thoughts, actions and relationships, coordinated movements
Brocca's Area (associated with the production of fluent spoken and written language)	Highly active in females	Language and articulation

Nuts and Bolts:
Brain Gender Differences

Part of Brain	Differences	Impact
Cerebellum (controls balance and coordination and is where learned movements are stored)	Larger and stronger connections in females	Fine-motor skills more refined in females
Cerebral Cortex (outer deeply folded surface of the cerebrum that processes conscious sensory, thought, decision and motor functions)	More active in females and uses more volume	Females can more easily multitask
Corpus Callosum (responsible for the communication between the two hemispheres of brain)	20% larger in females	Coordinate both sides of the brain

Nuts and Bolts:
Brain Gender Differences

Part of Brain	Differences	Impact
Frontal Lobe (responsible for problem solving, decision-making, and initiating actions)	More active in females and matures faster	Females have better impulse control and a better capacity to make decisions and to take into account values, morals, etc..
Hippocampus (play a key role in the formation and retrieval of long-term memories)	Larger and more active in females	Females have a better ability to hold onto memories
Hypothalamus (often called the brain's brain. Connected to everything body, temp, hunger and thirst, arousal, (fight/flight)	Denser in males	Males have more constant sex drives (13 times more than females)

Nuts and Bolts:
Brain Gender Differences

Part of Brain	Differences	Impact
Left Hemisphere	Bigger in the female brain	Better at language (men speak an avg. of 3,000 words a day; females 12,000)
Occipital Lobe (focusing on various elements of vision-shape, depth, color and movement)	Tunnel View (males) Radar View (females)	Direct Focus Holistic Focus
Parietal Lobe (contains the primary sensory cortex through which sensations, like touch and pressure are felt)	More active in females	Females have more tactile sensitivity

Nuts and Bolts:
Brain Gender Differences

Part of Brain	Differences	Impact
Right hemisphere	Bigger in boys	Superior in spatial relationships
Temporal Lobe (sensory lobes that focus on hearing, smell, taste, language and music perception)	12% larger in females	Superiority at communication tasks
Wernicke Area (language comprehension)	More active in females	Superior at definitions and vocabulary

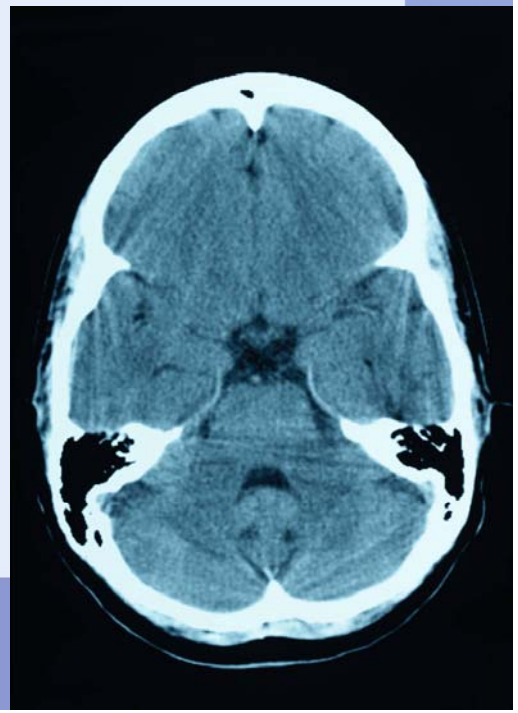
American Psychiatric Association (2003)

- In the last 10 years, increase of 800% in prescribed Ritalin, Adderall and Concerta for boys
- More than 75% of this population needs discipline, structure and limits
- Boys respond better to clear rules, simple orders and direct language

Female Brain is More Active

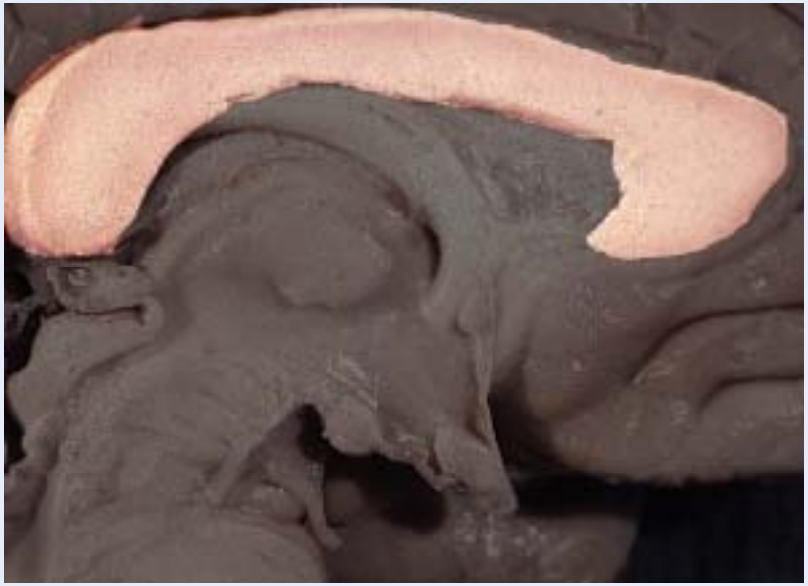
- **Male brain is larger in volume and weighs more. Men have more neurons (3-4 billion more) but men lose three times more neurons than women.**

- **Reasons:**
  - **Female brain is more active and never rests**
  - **Male brain takes many "mental naps"**

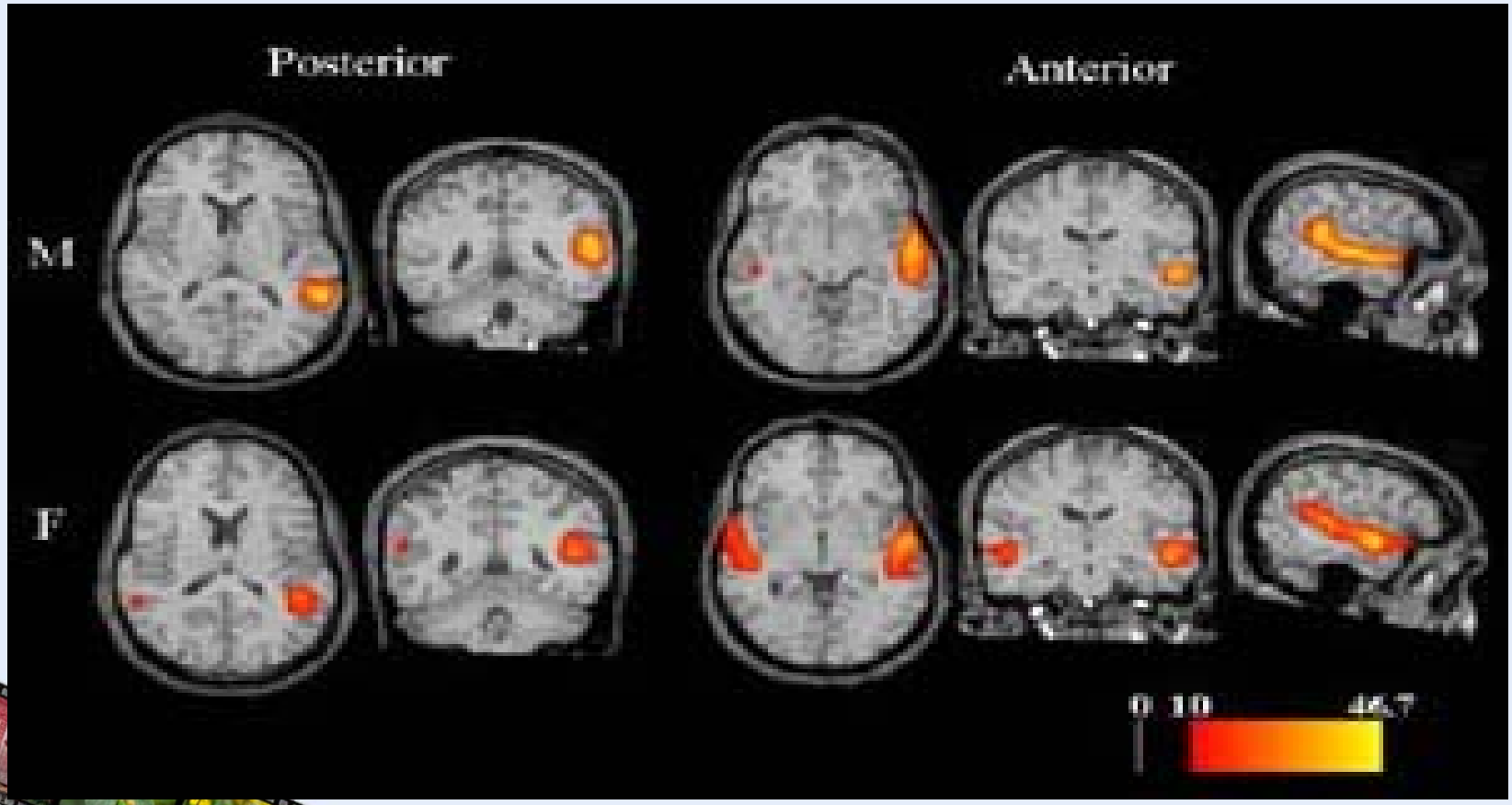


There are gender differences in our brains

- **Women's brains have up to 15% more cell density in the frontal lobe and the corpus callosum in women's brains is 14 times larger than in men.**
- **It disseminates information from the cerebral cortex on one side of the brain to the same region the other side.**
- **Men's brain weigh more.**



Male/Female Brains “listening”



Hormones and the Brain

- **Male have 20 times more testosterone than females**

  - **Boys more aggressive and have more impulsive behavior**
  - **Drive for social power, ambition and independence**
  - **Spatial skills are greater; score higher in mathematics**
  - **More sensitive to erotic stimuli**
  - **Greater abstract and logical thinking**

Hormones and the Brain

- **Female hormone estrogen, progesterone and oxytocin**

- Low aggression
- Low competition
- High compassion and empathy
- Self-reliance
- Bonding capacity
- Maternal nurturing,
verbal-emotive connection

Dopamine and Serotonin

- **Females require serotonin to relax…they find this in chocolate, in feeling unique and loved, in social acceptance and friendship**

- **Males require dopamine which activates them…they find this in active sports and competition, they like challenges and thrive on recognition**

Behavior Gender Differences

- Females are master of language mechanics and verbal fluency
- Girls excel-computational math problems
- Boys excel-reasoning math problems
- Males show superiority in spatial relationships
- Girls hear better than boys
- Girls are more concerned with pleasing adults
- Girls tend to get depressed more
- Boys thrive on competition, girls thrive on cooperation
- Girls interpret facial expressions better than males
- Girls are more attentive in class and more willing to learn
- Boys present the majority of discipline problems in schools

Gender Learning-
A Balanced Approach

- Cooperation and Competition
- Verbal and Spatial Lessons
- Persuasion and Consequences
- Female and Male Teachers
- Gross and Fine Motor Development
- General and Specific Instructions
- Group and Independent Work

Conclusions

- **Boys and Girls are not the same**
- **Each child is unique and complex**
- **Two main principles in child development (age and gender)**
- **Recognize our differences, celebrate them…nurture what nature has given us!**

For more information:

See publications and studies by:

Dr. Jesus Amaya

Dr. Michael Gurian

Please Stand Up for the Next Section of Four Slides

Brain Teaser

In this puzzle, a word fragment is given, and you must think of an English word that contains the fragment -- that is, you must form a word by adding letters to the beginning and/or the end of the fragment. You may not add letters to the middle of the fragment, nor may you rearrange the letters given.

ageme

ANSWER

Solution #1

encouragement

Solution #2

engagement

Solution #3

management

Brain Compatible Classrooms

To develop skills that can be used on a consistent basis, students need an environment that:

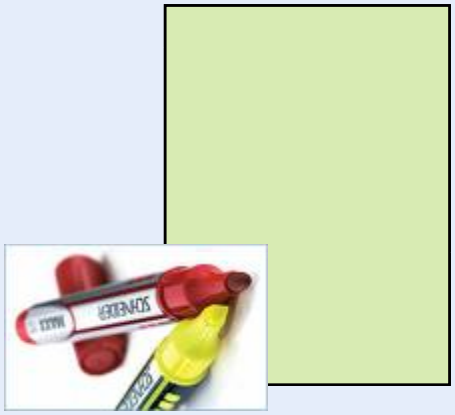
- Is free of threat
- **Has meaning they can identify**
- Offers choices in how to achieve the goal
- **Allows adequate time to practice**
- Is enriched for modeling how to do and use the skill
- **Offers opportunities for collaboration to enhance understanding**
- Gives immediate feedback to help determine if they're on the track
- **Brings a sense of mastery demonstrating that they have a mental program for the skill**

[men read traditional font]

[women read bold words]

15 Second Journaling

Grab a piece of paper and a scented marker.



For the next 15 seconds, write what you were just learning about while standing.

Twelve design principles based on brain-based research

- Rich, stimulating environments using student created materials and products are evident on bulletin boards and display areas.
- Places for group learning like tables and desks grouped together, to stimulate social skills and cooperative work groups. Have comfortable furniture and couches available for casual discussion areas. Carpeted and areas with large pillows who prefer not the work at a desk or table.
- Link indoor and outdoor spaces so students can move about using their motor cortex for more brain oxygenation.
- Safe places for students to be where threat is reduced, particularly in large urban settings.
- Variety of places that provide different lighting, and nooks and crannies. Many elementary children prefer the floor and under tables to work with a partner.
- Change displays in the classroom regularly to provide a stimulating situations for brain development. Have students create stage sets where they can act out scenes from their readings or demonstrate a science principle or act out a dialogue between historical figures.

- Have multiple resources available. Provide educational, physical and a variety of setting within the classroom so that learning activities can be integrated easily. Computers areas, wet areas, experimental science areas should be in close proximity to one another. Multiple functions of learning is our goal.

- Flexibility: This common principle of the past is relevant. The 'teachable moment" must be recognized and capitalized upon. Dimensions of flexibility are evident in other principles.

- Active and passive places: Students need quiet areas for reflection and retreat from others to use intrapersonal intelligences.

- Personal space: Students need a home base, a desk, a locker area. All this allows learners to express their unique identity.

- The community at large as an optimal learning environment: Teachers need to find ways to fully use city space and natural space to use as a primary learning setting. Technology, distance learning, community and business partnerships, all need to be explored by educational institutions.

- Enrichment: **T**he brain can grow new connections at any age. Challenging, complex experiences with appropriate feedback are best. Cognitive skills develop better with music and motor skills. (D'Arcangelo)

Optimizing learning through different mediums:

- Music: Music can lower stress, boost learning when used 3 different ways:

  as a carrier - using melody or beat to encode content,

  as arousal - to calm down or energize,

  as a primer - to prepare specific pathways for learning content (impacts the immune system, and is an energy source for the brain).

- Art: Art is an important part of brain-based education in that it provides many learners with avenues of expression and emotional conduits for learning and retaining information. Art is important in technology to aesthetically create pleasing power point presentations and multi-media displays to showcase work. Multicultural awareness is improved through the study of art. Due to the diverse power of art, some educators think the "arts" should be named as the fourth "R."

- Diverse forms of assessment: Maintaining portfolios is important for reflective improvement and self-assessment. These help teachers, parents and students observe demonstrated growth over time. Teachers also need to maintain appropriate content mastery through regular testing programs. And, demonstrations, writing and art are ways of assessing students' progress, as are pre and post surveys and tests useful in assessing students' progress. Both verbal and written self-assessments are important parts of proving academic growth, and interdisciplinary and cross-curricular projects provide realistic assessment tools. In essence, students should be exposed to multiple assessment methods. (Jensen)

The Arts, Especially Music Can Increase SAT Scores!

- **In 2000, the College Board reported that SAT takers who had experience in music performance scored 55 points higher on the *Verbal* portion of the test and 38 points higher on the *Math* portion.**
- **2000 Average SAT Verbal…..477(No Arts)**
- **2000 Average SAT Verbal….532 (Arts)**

Jenni's Classroom

- **ABC Bean Bags – movement; music; connection with body parts**
- **ABC Yoga – body movement to 'air-write' the letters; props for hat, belt and shoe line to emphasize location for letter formation**

"Why Don't You Use Sound To" Chart

Task	Instruments or Sound Makers to Try			
Signal a Transition	whistle	cymbals	bell	song or tune
Get Children's Attention	maracas	tambourine	beat a drum	clapping
Background for Center Time	nature sounds	classical music	instrumental	
Sound Effects for a Story or Puppet	shake cups of beans/rice	drums	whistle	bells
Teach Counting Skills	beat a drum	triangles	bells	drop marbles on tin pan
Following Directions	marching tunes	Hap Plamer/Raffi/ other teaching tapes		
Auditory Discrimination	bells	triangles	drum beats	tambourine

Dr. Linda Karges-Bone, "Hands On"

Tracy's Classroom

- **Music to learn math facts**
- **Scented markers**
- **Yellow index cards**

Lesson plans
8 steps to support children in learning:

1. Motivation (Schema – something the child already knows). KWL charts are good, use music (song, rhyme, chant) or a visual aid, set a challenge, or a stimulating technique.

2. Focus (get the child's attention). Can tie this into classroom management, use "pick a stick" to ask a question, use deep breathing.

Here's a mnemonic device…

"SPF"

- **Schema**
- **Prevents**
- **Forgetting**

Don't forget your SPF when you are learning new material!

3. Acquisition (In all subject areas there must be listening, speaking, reading, and writing). Use graphic organizers, colors, scent. Have children use yellow or orange paper to make flash cards—not white paper. Many teachers begin a lesson with acquisition and it shouldn't be the first step to a lesson—first is motivation and then focus. Also, introduce only 1 piece of new learning per lesson. Multiple new facts are okay BUT they must be chunked within the context of ONE BIG NEW CONCEPT to make sense to the brain.

One way to see if you really infuse the brain in learning is to see how many of these are used in a single lesson.

Discovery? Inquiry? Games? Experiments? Research? Drills?
Hands-On? Arts integration? Play? Creating an object?
Using a textbook? Technology-driven? Discussion? Practice? Writing?

In acquisition there are risks:

*** Too little content**
*** Making assumptions about what students already know**
*** Relying on text when there are students who cannot absorb text**
*** Not allowing students to process during acquisition (not enough wait time or just give the students the answer)**

4. Retention (Practice) and

5. Recall (Review). This can be done together. Write a procedure that will allow students to "play with" the new information, questions, quick skill builders, memory games. Teachers build retention through repetition. The brain likes chunking and layering. Students need numerous exposures to terms/vocabulary words. In order to retain and truly learn the information that is being taught, all students need to SAY IT! SHOW IT! And DO IT!

Teachers can help students by going to http://teach.fcps.net/trt10/PowerPoint.htm to create a jeopardy game, download a music file.

BRAIN TIP – put citrus scented dryer sheets in your classroom to reduce stress. Put vanilla on cotton balls and place around your classroom for anti-anxiety. Use apple or cinnamon air fresheners for creativity.

Brain Smart Schools read at least 15 minutes aloud to their students every day. Each 9 weeks each grade level chooses a book to read. This is a free and powerful way to raise comprehension and fluency skills school-wide. When a child completes K-5 in that school, the child has heard 20+ award winning books. Research shows that after 3rd grade, only ½ the teachers read aloud to students.

BRAIN TIP – Give a test on purple paper or use a purple pen when correcting a test on white paper. The purple paper reduces student test anxiety. The purple pen "softens the blow" as students see red pen as too aggressive.

Carol's Classroom

Movement integrated into recall of concepts reinforces memory…

- **Stand with arms stretched out to represent different math concepts … line, line segment, ray, point, parallel lines, etc.**

RECALL TRANSFORMS OUR MEMORIES

When we Remember

our brain takes the memory apart,

Updates the memory,

Brings the memory to consciousness

Then makes new proteins for a new structure for the memory as it goes back into long-term storage.

6. Generalization/Application – Students need to apply to skill in a safe, secure atmosphere.

This is the student's chance to show how much they know before an assessment. The burden here is on the teacher to observe/analyze/correct the learner. For example, if a child incorrectly learns a step in solving a math problem, the teacher needs to correct the learner before it is "hard-wired." Don't forget to "apply" the SPF (Schema, prevents, forgetting).

Materials matter when students are learning…

*** Chart paper**
*** CD player**
*** treats, consumables**
*** overhead/screen**
*** white board**
*** equipment for experiments**
*** scented markers**
*** manipulatives**
*** calculators**
*** video clips**
*** craft materials**
***books**

7. Performance (do it!) Assessment – Brain research shows that within a grade level there should be communication so students don't have several tests on the same day.

8. Feedback – You, the teacher are "feeding" information/skills to the students and the children "feedback" what they have learned/acquired. Try to correct and return homework and tests quickly to students and focus on the positive!

Class Life

There is emerging evidence that a three-pronged approach to class life is having a significant impact on children's learning. Physical exercises and brain gym mixed with regular sips of water make children brighter, happier and more motivated. A clear strategy to incorporate these simple practices in school can have profound implications for children's learning.

This article first appeared in *Teaching Expertise*, April 2004.

Techniques Used by Teachers at Brookshire Elementary

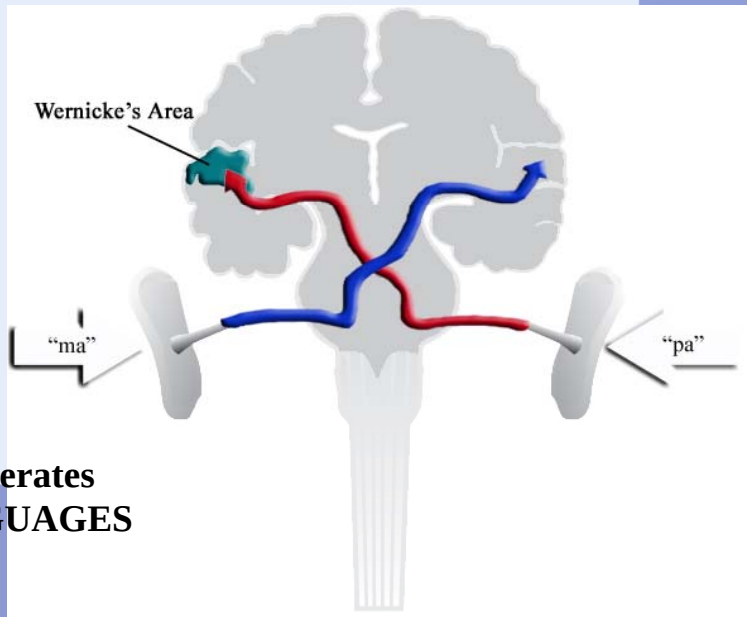
- **The brain likes chunking and layering. In a lesson students need to say it, show it, do it. We must make learning memorable when teaching.**
- **Take breaks during a lesson to move (head, shoulders, knees, toes or Simon Says and have students hop, skip, jump). This reduces cortisol/stress. Also a child who is physically inactive has a smaller prefrontal cortex.**
- **When introducing sight words or number or coins, etc.. I use orange or yellow paper to get the student's attention.**
- **When introducing a new concept, I hide citrus scented dryer sheets in the classroom. The orange scent encourages creative thinking. It reduces stress and stimulates the brain.**
- **I buy scented markers and stickers for my students. It stimulates creativity. Also, I make home-made play-doh with cinnamon or ginger to stimulate the brain/creativity.**
- **Play classical music in the classroom.**
- **Correct papers using a purple marker. Purple "softens the blow" for students who have incorrect answers. Also if a student isn't do well (behavior issues, academic issues, etc..) I send home a note on purple paper for the parents.**
- **If students are feeling anxious, I give them a piece of dark chocolate (Hershey kiss). It raises their level of dopamine.**
- **I give my students apple or orange juice 20 minutes before a math task. The scent and taste will linger as they attend to their work. I also give it to them before their unit science test. The brain needs glucose to regulate blood sugar. There is a study (I believe American Journal of Clinical Nutrition) where subjects who drank juice did twice as well as those who didn't. The subjects performed better on memory based tests.**
- **Body pegs for the days of the week: I start at the head and work my way down.**
- **In my math class, we have been learning about line segments, rays, and lines. We stand, and with our arms straight out, indicate one of those by making a fist, two fists, or hand/hands straight. For instance, a line segment with have two fists, a line would be both hands straight out.**
- **When I first began teaching I was having some transitioning difficulties. There were a couple of brain-based techniques that worked nicely for my kiddoes. Something that I have done for some kiddoes was put on a specific shirt when teaching a target subject. The kiddoes enjoyed it and it also signaled their brains and made them aware that a specific subject was going to begin. I have also used a squeaker (such as a dog toy) to notify students about the beginning of an activity. This seemed to help diminish the verbal, in addition to making transition times a happy time and not a chaotic time. The mere sight of the shirt and/or squeaky frog in time shaped their behavior and helped with transitioning.**
- **Graphic Organizers, music - songs to remember concepts and ideas**
- **We do ABC yoga. I have the kids make letters in the sky during our 5 minute yoga breaks.**
- **using different colored highlighters/markers to accent learning of specific material**
- **sitting in different places around the room to teach different skills**
- **placing visual cues/prompts in specific location of room**
- **using specific smells in the room to alert/calm the kids**
- **using different music to transition students or as background noise**
- **having students work in cooperative groups**
- **incorporating movement in learning a new skill**
- **taking a 'brain break' every 15-20 minutes**
- **Dark chocolate or mints**
- **Body/room pegs**
- **Photographic memory**

Candice's Classroom

Provide an audio output that the students can orally repeat and/or listen to, and provide students a PVC 'phone'

- **allow their voice to travel into their <u>right</u> ear when working with language – "it is most advantageous to listen predominantly with your right ear when you want to learn a language.**

That is because your right ear is directly connected with your left brain, the center for language abilities."



How the Tomatis Method Accelerates LEARNING FOREIGN LANGUAGES

by Jan Gerritsen, Ph.D.

- **allow a voice to travel into the left ear for emotional content.**

“Men and women are able to accurately identify and recall more than 70% of emotional words with their left ear, compared to only 58 % with the right. The left ear is controlled by the right side of the brain, the so-called emotional side, and triggers much better responses.”

“Psst, always whisper into her left ear, Tom”
INDEPENDENT ON SUNDAY, THE, Feb 11, 2007 by Roger Dobson

Angela's Classroom

Change of appearance

- **Utilize a change in clothing – a visual state change can instantly refocus a student's attention and assist with recall.**
- **Utilize a sound to symbolize a transition – emotionally charged events are better remembered than emotionally neutral events.**

Boone's Classroom

Testing Environment

- **Wear yellow to alert the brain.**
- **Provide mints to alert the brain.**
- **Provide water - dehydration causes a loss of attentiveness and lethargy; dehydration causes higher salt levels in the blood which in turn raises blood pressure and stress.**
- **Provide safe and comfortable environment - Threats biologically impair a student's ability to learn.**

Healthy Tips to Maximize Brain Power

Good student health is vital to student learning and test taking. Here are some tips for helping your students do their best on the FCAT!

<u>The Days Before the Test</u>

- Elementary school students need 10-11 hours of sleep each night. Because sleep loss adds up over many days, encourage your students to get a good night's sleep throughout the days leading up to FCAT. Students will have improved focus on test day if they are well rested.
- Breakfast is important! Remind students to eat breakfast on each day of the test. Encourage them to choose hearty breakfasts like eggs, bagels, or oatmeal instead of sugary cereals, toaster pastries, or other sweet options. A breakfast high in sugar could cause them to feel hungry during the test as their blood sugar drops. A breakfast high in protein or complex carbohydrates will keep them full longer and allow them to concentrate on their test, instead of their stomach.

On Test Day

- Encourage the students to socialize in the morning or do fun activities to break the tension. Before the test, remind the students that you, their principal, and their parents believe in them.
- Remind your students to sip water before the test and during breaks. Water is the preferred fuel for the brain. A dehydrated student will be sluggish, but an over hydrated student will need to use the restroom during the test.
- Before the test booklets are handed out, have your students stand up at their desks. Lead them through 1-2 minutes of light stretches (jumping jacks, toe touches, etc.) before they sit down. This will help get their blood pumping and their brains alert.
- During break time, provide a healthy snack for your students. Good examples include cheese, milk, peanut butter crackers, sunflower seeds, pretzels, applesauce, whole wheat fig cookies, drinkable yogurt, whole grain granola bars, or fresh fruits. If solicited in advance, parents are sometimes willing to donate these items for test day.
- To help the students recharge, use one or more of the following “brain break” ideas to do with the students during break time.

After the Test

- Your students would benefit from recess time or a structured physical activity period outside each day after testing is finished at your school. If you are unable to go outside, try some more brain breaks or active games with the students in the classroom. Their brains will need some down time to recharge before another day of testing.
- When the test days are over, celebrate the end of FCAT testing with your students. Be sure to tell them that you are proud of how hard they worked! A class celebration will be a good stress reliever for both you and them.

Brain-Based Techniques Implemented the Classroom

Technique	Results	How this relates to the brain
water bottles, more bathroom breaks	Most students have a water bottle from which to drink freely. With increased hydration, the students needed more bathroom breaks. I don't have thirsty students anymore! They can also tell me why it's important to drink water.	According to Jensen, research has shown that dehydration causes higher salt levels in the blood which in turn raises blood pressure and stress. Also, since the brain is made up of more water than any other organ in the body, dehydration takes a toll quickly. It causes a loss of attentiveness, and lethargy (26).
morning snack	We have a small snack, drinks, and they are ready to listen. No complaints about hunger anymore!	Jensen suggests eating certain types of food for optimal learning like fruits and vegetables, nuts, and lean meats (25). While we did not eat these types of foods, we know that the brain needs energy and children need to be comfortable in order to learn.
provide breaks between activities	We started taking our bathroom break in the middle of our reading time rather than before or after. When we moved on after the break, they were more focused and ready to work.	According to Jensen, movement can help focus attention (44). He also suggests providing processing time after teaching in order for students to solidify learning. This, however, pertains more to down time when external stimuli is shut down and allows the brain to make associations (47).
change schedule to fit students' needs	I decided to schedule work time when they were ready to work, and rest time when they were ready to rest. After lunch, we have centers or instructional time. After snack, we have rest time. Everybody's happy!	Jensen says everyone has natural attentional highs and lows throughout the day. Teachers should take advantage of these cycles rather than fight them. (44 - 45).
have positive interactions with students	I try to personally greet each student when they arrive in the morning, and I am more aware of what I say to students.	Threats biologically impair a student's ability to learn. In his book, Jensen points out that there are three areas of threats: threats from outside class, threats from other students, and threats from the teacher. The teacher can control threats from him or herself and threats from other students (59).
improved transitions	The children now have a set routine they follow during transitions, and I ALWAYS warn them 5 minutes ahead of time.	Like threats, stress also biologically impairs a student's ability to learn. Knowing what to expect and establishing a routine helps reduce stress.
rearranged the room	The furniture was rearranged to provide more space, and to more comfortably seat students. I added a small table for my groaner, which made table time much easier for him.	The new arrangement reduced stress by allowing students to have more personal space, and see the front of the room without having to turn their chairs around.
vary learning activities	We used musical instruments to find beats in words, cut apart sentence strips and used our bodies to order words in sentences, played rhyming games, and cut back on activities with less active student involvement.	"We remember that which is most emotionally laden," says Jensen. Emotions stimulate our brains to recall things better. Choosing activities which are new, or require students to engage their emotions, facilitates learning (79-80). Novel activities also attract attention.

What Brain-Based Strategies Were Used in this Presentation?

- **Presentation Style – active involvement in the learning process is vital to the formation of new neural connections [slide show; video clips; involvement through writing and performing]**
- **Aroma – sense of smell can be an immediate trigger of certain memories [citrus background scent; markers]**
- **Music – set a particular mood or mental state; emotionally charged events are better remembered [background noise; transitions]**
- **Visual State Change – visual information can have a profound effect on long-term learning [concrete objects; posters; props]**

What Brain-Based Strategies Were Used in this Presentation?

- **<u>Brain Breaks</u> – deep breaths and movement help deliver richly oxygenated blood to the brain to keep it fully alert and functioning optimally [cross lateral brain activities to activate both hemispheres]**
- **<u>Standing</u> – increases blood flow and actually improves the brain's ability to pay attention b/c it stimulates the body's adrenal glands (adrenaline enhances memory)**
- **<u>Just for Fun!</u> – spark laughter to increase amount of oxygen in the blood and reduce the sense of threat**

What Brain-Based Strategies Were Used in this Presentation?

- **Water – prevent dehydration; improve cognition and attention**
- **Mints – increases alertness or attention**
- **Patterns – connecting to background knowledge to create an interconnection between pieces of information and ultimately create meaning [dog association; item association to brain specs]**
- **Color – initiates different responses [blue slides=creativity, reflection, relaxation/yellow paper=excitement, creativity, alertness]**

What Brain-Based Strategies Were Used in this Presentation?

- **<u>Environment</u> - Create and maintain an environment that encourages risk taking, alive with celebration and wonder, and where the learner feels psychologically safe.**
- **<u>Cooperative Learning</u> – communicating; when students have to talk to others about information, they retain the information longer and more efficiently**

Brain Break

- **Drink Water**
- **Stand Up …**
  - **Hold both hands out at your side**
  - **Point with your right pointer finger**
  - **Hold you left hand open with palm up**
  - **Place your pointer finger in the palm of the person to the right of you**

  … when the word "Gotcha" is said, try to pull your finger out of the palm of your neighbor before that person closes their palm AND close your left palm trying to grab the finger of the person to your left

Why this works …

- **It's a community builder**
- **It wakes up the audience**
- **It provides all the benefits of cross lateral motion**

It's a lot of fun!

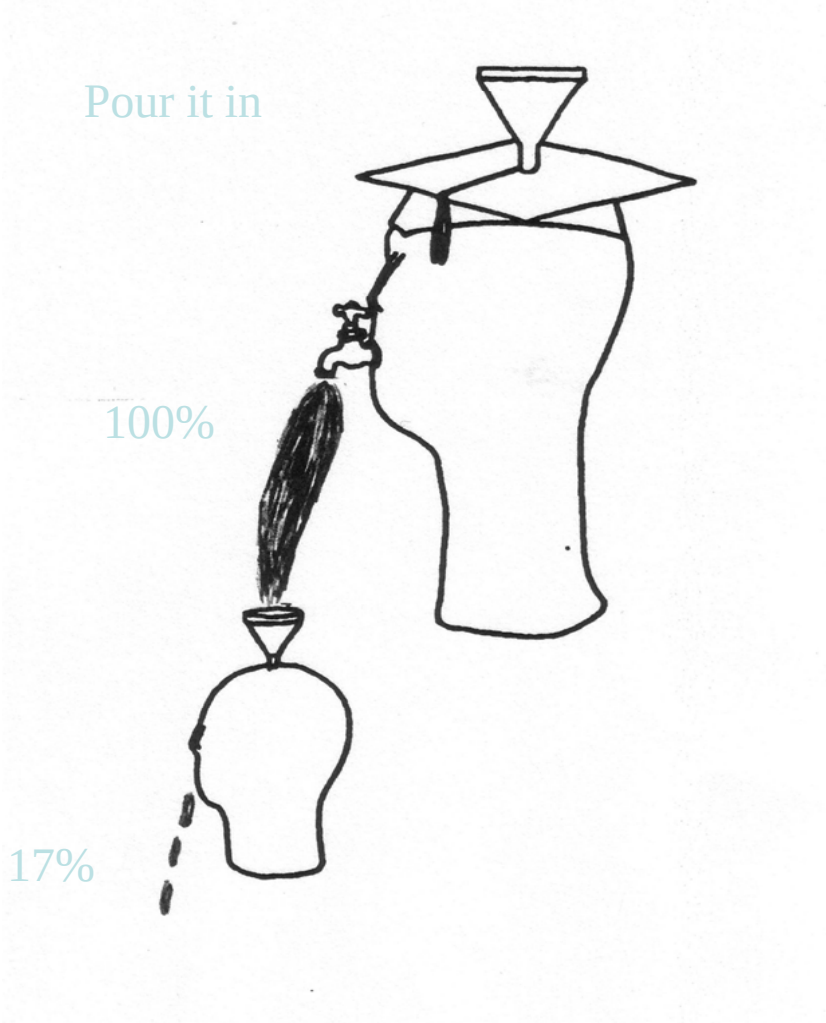
Brain Based Learning is not a new concept.

Tell me and I forget. Show me and I remember.
Involve me and I understand.

-Chinese proverb

Data on Teaching (avg faculty member)

- Students pay attention to only 50% of the average lecture
- Students recall 42% of the information immediately after a lecture
- Students recall 17% of the information one week later



Lila Smith 1975

The Grand Ah-ha!

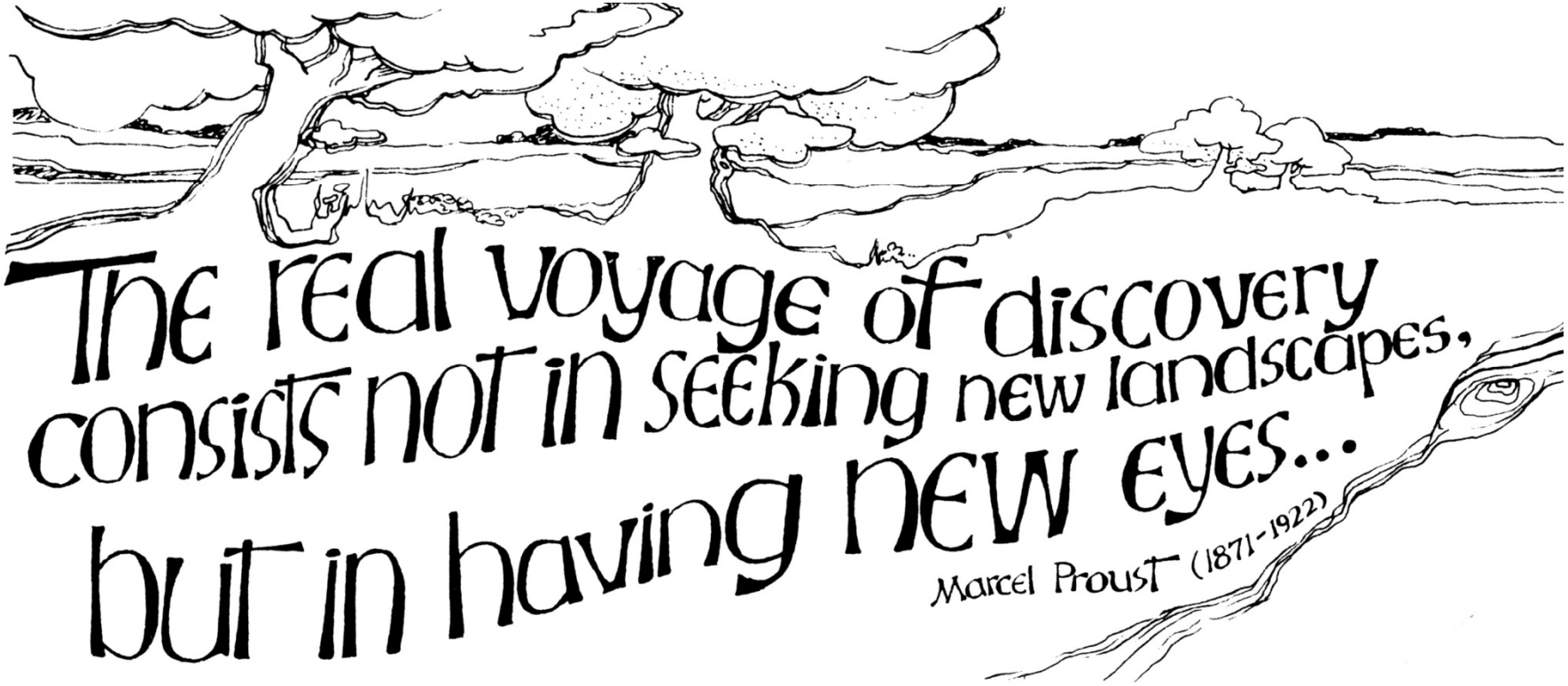
1. The scientific, brain-based principles *can be applied* as thoughtful classroom strategies.

2. These strategies *will support* (not impair) your efforts to improve student achievement.

(Hooray!)

How Might Brain-Based Research Influence Your Teaching?

- What changes might you make?
- What are you already doing that fits the research?
- What would you like to know more about?



Reflection time…

What Have You Learned?

What's Your Next Step?

Questions Or Comments

1 piece of paper + 1 marker per person

Write a question or comment on your piece of paper.

Fold your paper into a paper airplane.

1 – 2 – 3 …"Blast Off!"

Catch a flying airplane

RESOURCES

Two ways to keep current are to subscribe to free annual catalogs and to bookmark relevant web sites that constantly make new materials on brain-compatible teaching and accelerated learning available.

Here are some useful resources:

JENSEN LEARNING CORPORATION has a website at www.jensenlearning.com and offers information from Eric Jensen

THE KAGAN CATALOG is available from www.KaganOnline.com

THE TRAINER'S WAREHOUSE CATALOG is available from www.trainerswarehouse.com or by telephoning (800) 299-3770.

THE ZEPHYR CATALOG is available from www.zephyrpress.com or by telephoning (800) 232-2187

Links

Jensen Learning Corporation www.jensenlearning.com

The Latest on How the Brain Works
http://findarticles.com/p/articles/mi_qa3617/is_199704/ai_n8771871

Westmark School - Multiple Intelligences, Learning Styles, Brain Development
http://westmark.pvt.k12.ca.us/reading.html

Teaching Kids about the Brain

Neuroscience for Kids http://faculty.washington.edu/chudler/neurok.html

Dana Alliance Neuroscience Education Resources http://www.dana.org/

Mind Over Matter - Grades 5-9 - Learn how drugs affect the brain
http://teens.drugabuse.gov/mom/index.asp

Books

Teaching with the brain in mind - Eric Jensen

Brain-Based Learning & Teaching - Eric Jensen

The Learning Brain - Eric Jensen

Introduction to Brain Compatible Learning - Eric Jensen

Brain Compatible Strategies - Eric Jensen

Magic Trees of the Mind - Marian Diamond

Your Child's Growing Mind - A guide to learning and brain development from birth through adolescence - Jane Healy

Making Connections - Teaching & the Human Brain - Renate Nummela Caine & Geoffrey Caine

How the Brain Learns - with learning manual - David Sousa

Music

Build Your Baby's Brain - Through the Power of Music

Music for Mothers-to-be - Lullabies for Mother and Child

WEBSITE for Dr. Linda Karges-Bone: http://www.educationinsite.com/

PDS WEBSITES:
https://www.ocps.net/es/hr/PDS/initiatives/Pages/BrainBasedLearning.aspx

http://www.ascd.org/portal/site/ascd/menuitem.12471550933c56bddeb3ffdb62108a0c/

http://www.21learn.org/arch/articles/caine_principles.html

http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/

http://www.21learn.org/arch/articles/caine_interview.html

http://www.montgomeryschoolsmd.org/departments/isa/resources/indexbrain.html

http://members.shaw.ca/priscillatheroux/brain.html

RESOURCES

Becoming a “Wiz” at Brain-Based Teaching – Marilee Sprenger
Begin with the Brain – Martha Kaufeldt
Beyond Hands-On – Dr. Linda Karges-Bone
Brain-Based Activities for Young Learners – Ellen Booth Church
Brain Compatible Strategies – Eric Jensen
Brain Food for Kids – Nicola Graimes
Classroom Activators – Jerry Evanski, EdD
Different Brains, Different Learners – Eric Jensen
How the Brain Learns – David A. Sousa
Learning Smarter – Eric Jensen & Michael Dabney
Making Connections: Teaching and the Human Brain – Caine & Caine
More Than Pink & Blue – Dr. Linda Karges-Bone
Music with the Brain in Mind – Eric Jensen
The Big Book of the Brain – John Farndon
The Brain – Seymour Simon
The Brain-Compatible Classroom – Laura Erlauer
The Great Brain Book – Hp Newquist, Scholastic Reference
The Leadership Brain – David A. Sousa
Thinking On Your Feet – Jean Blaydes **
Tools for Engagement – Eric Jensen
What Every Teach Should Know About Learning, Memory
and the Brain – Donna Walker Tileston