ENGAGING THE TEEN BRAIN:

A Look Inside the SAAS Classroom

Tuesday, April 28, 2009

Welcome & Introduction

- **Mary Berry**, Counselor & Learning Support

- **Mike Haykin**, Director of Learning Support

Our Application of Brain-Based Research to Teaching

We extensively explore:

- Educational research
- Social-learning research
- Neurodevelopmental research

To Better Understand How We Can Improve…

We look closely at:

- Student performance in grades
- Test scores
- Retention
- College data

Not a Passing Fad

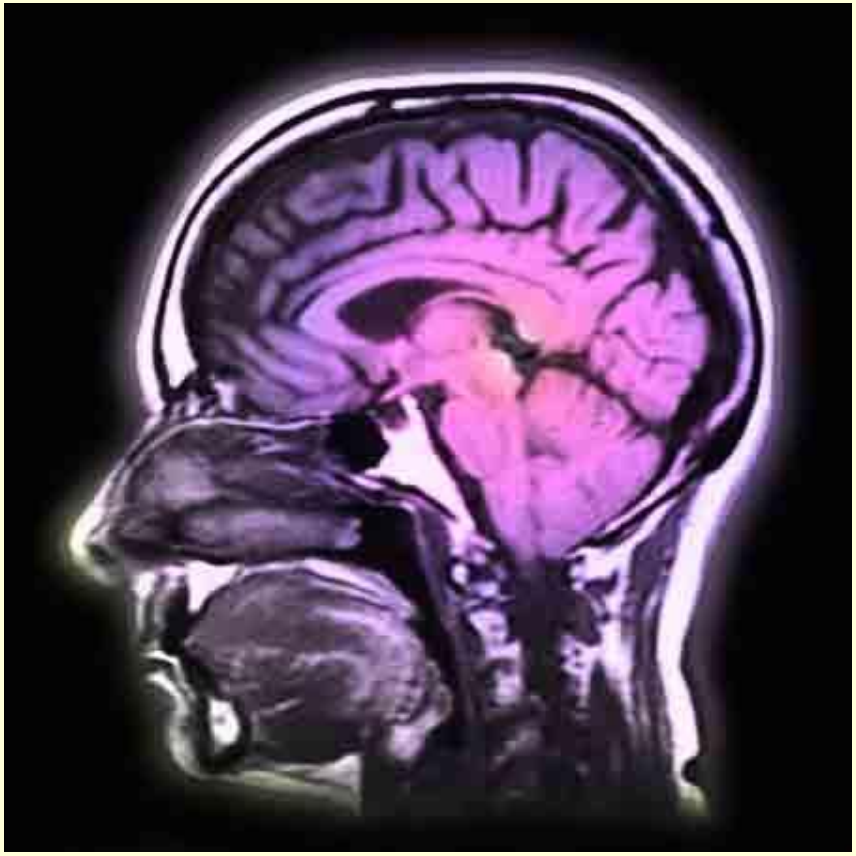
- Much brain research is fairly new.
- We are constantly interested in new ideas.
- New information and research will be synthesized with very large knowledge base about best practices in education.

Wanda Elder

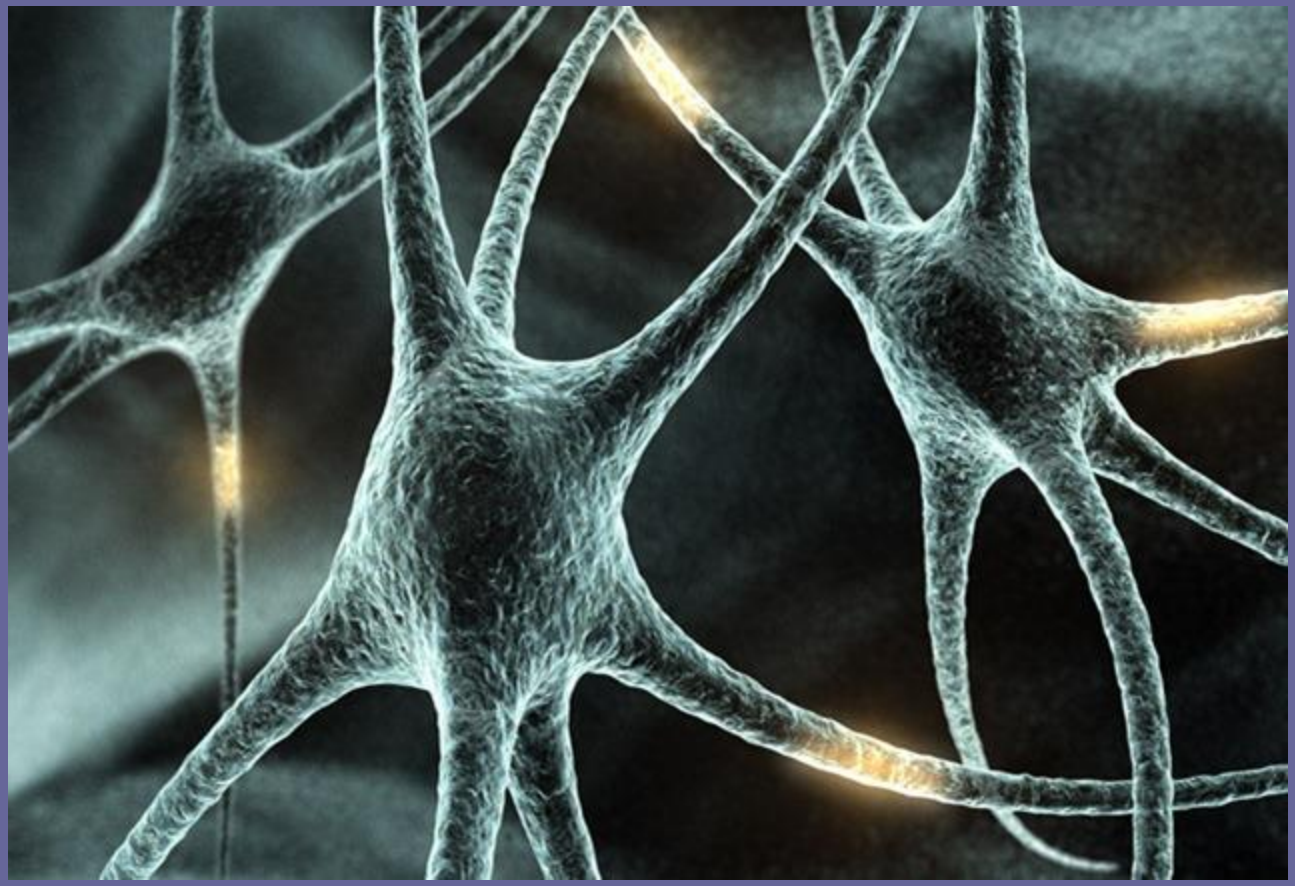
Learning Support Department

The Adolescent Brain: Change & Challenge

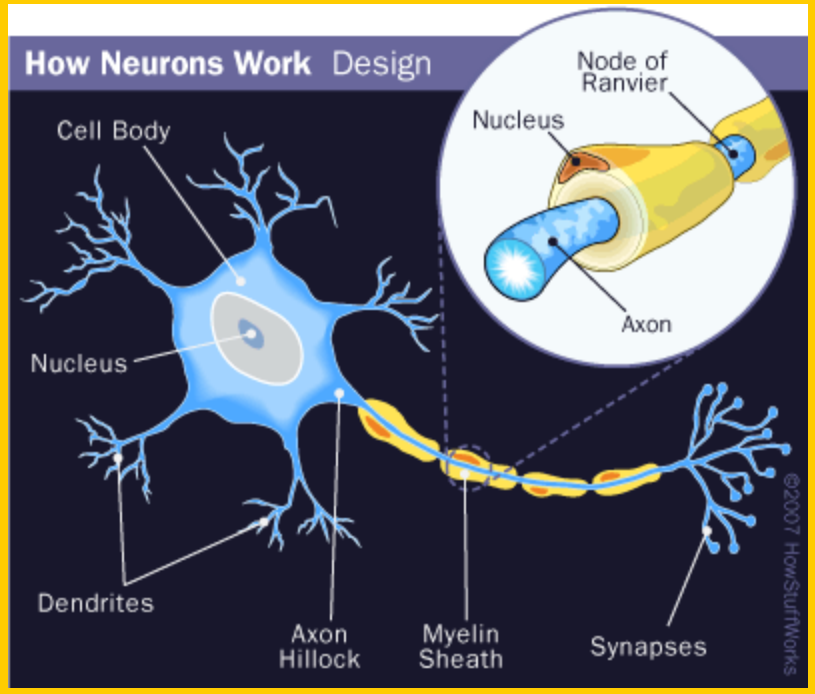
Magnetic Resonance Imaging (MRI)



Neurons



Neurons, Dendrites, & Synapses



Major Adolescent Brain Changes

Prefrontal cortex

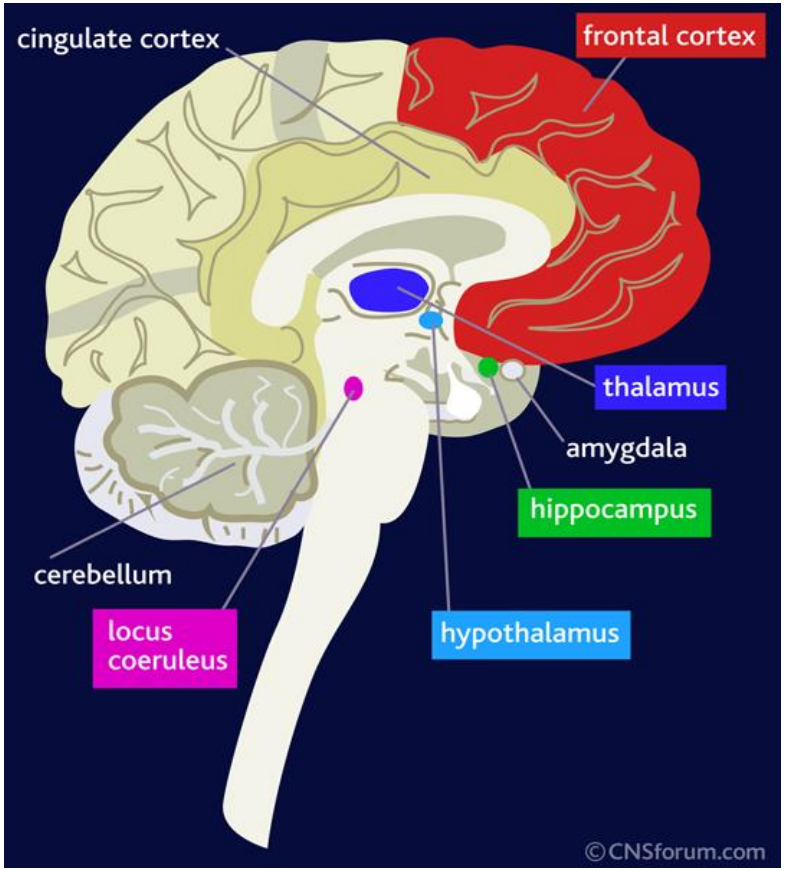
Corpus callosum

Amygdala

Dopamine

Sleep Cycles

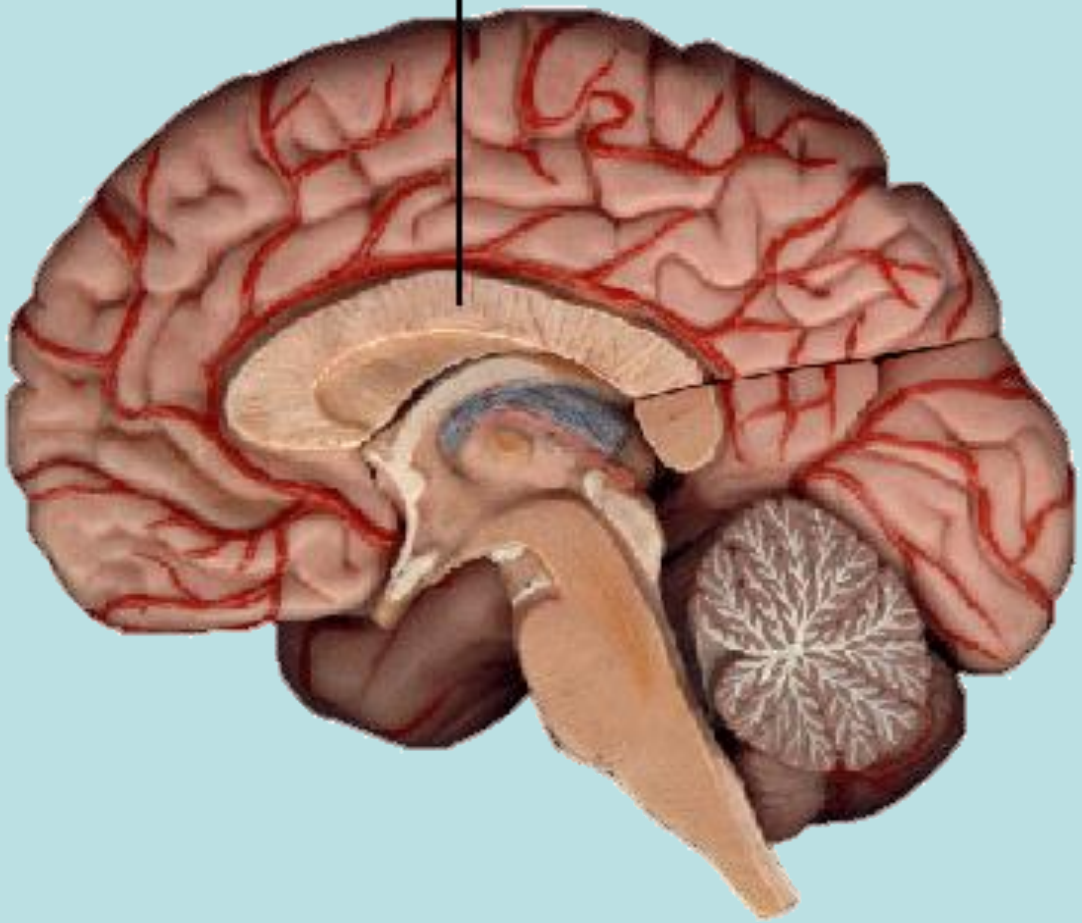
Prefrontal Cortex



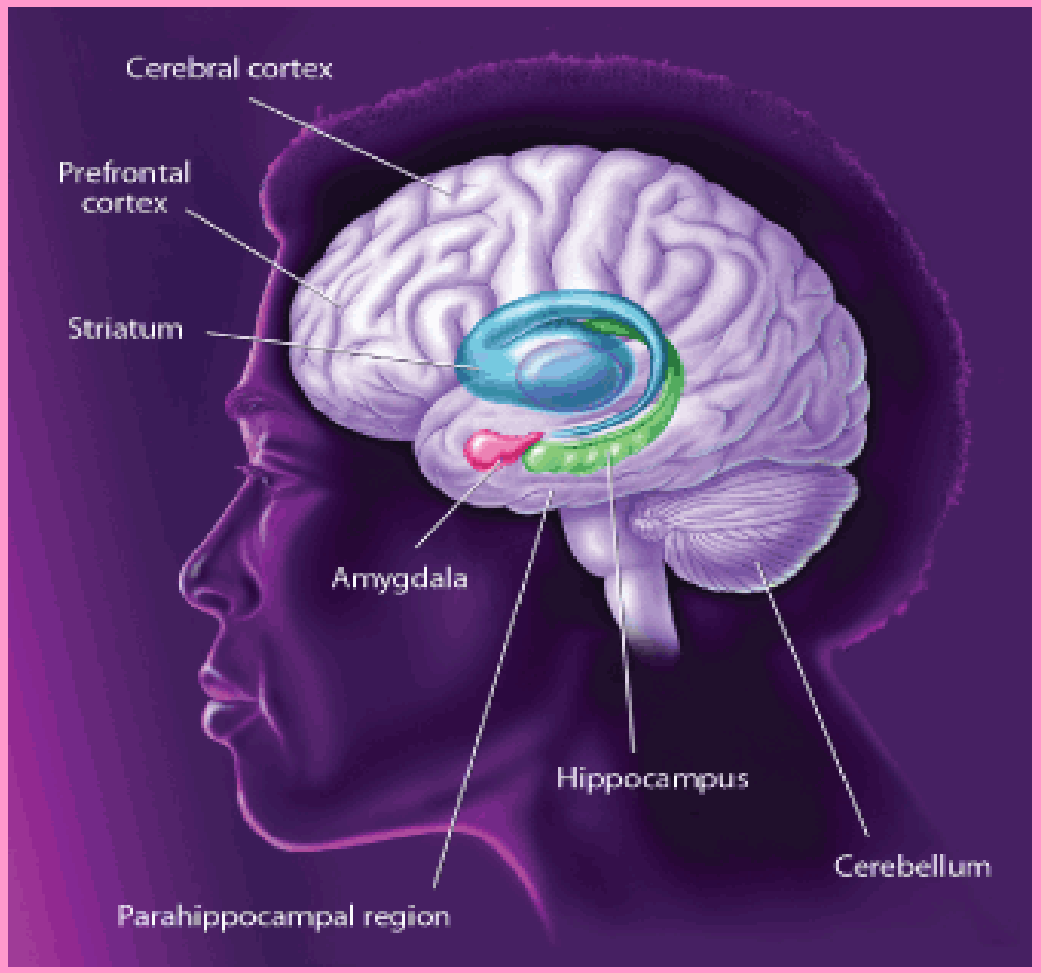
Prefrontal Cortex: **CEO of the brain**

- Judgment
- Decision-making
- Insight
- Empathy
- Impulse-control
- Organization of plans and ideas,
- Formation of strategies

Corpus Callosum

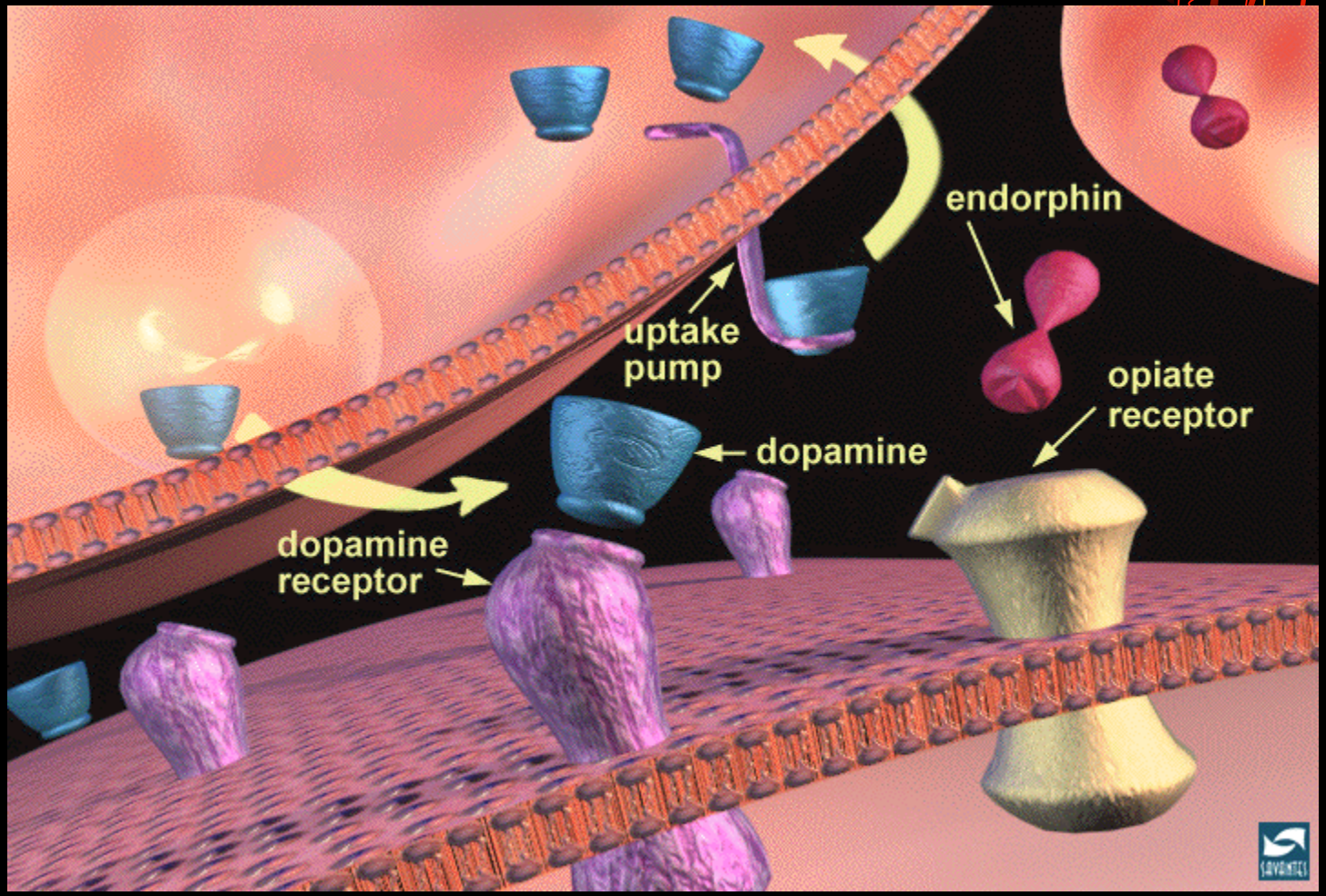


Amygdala

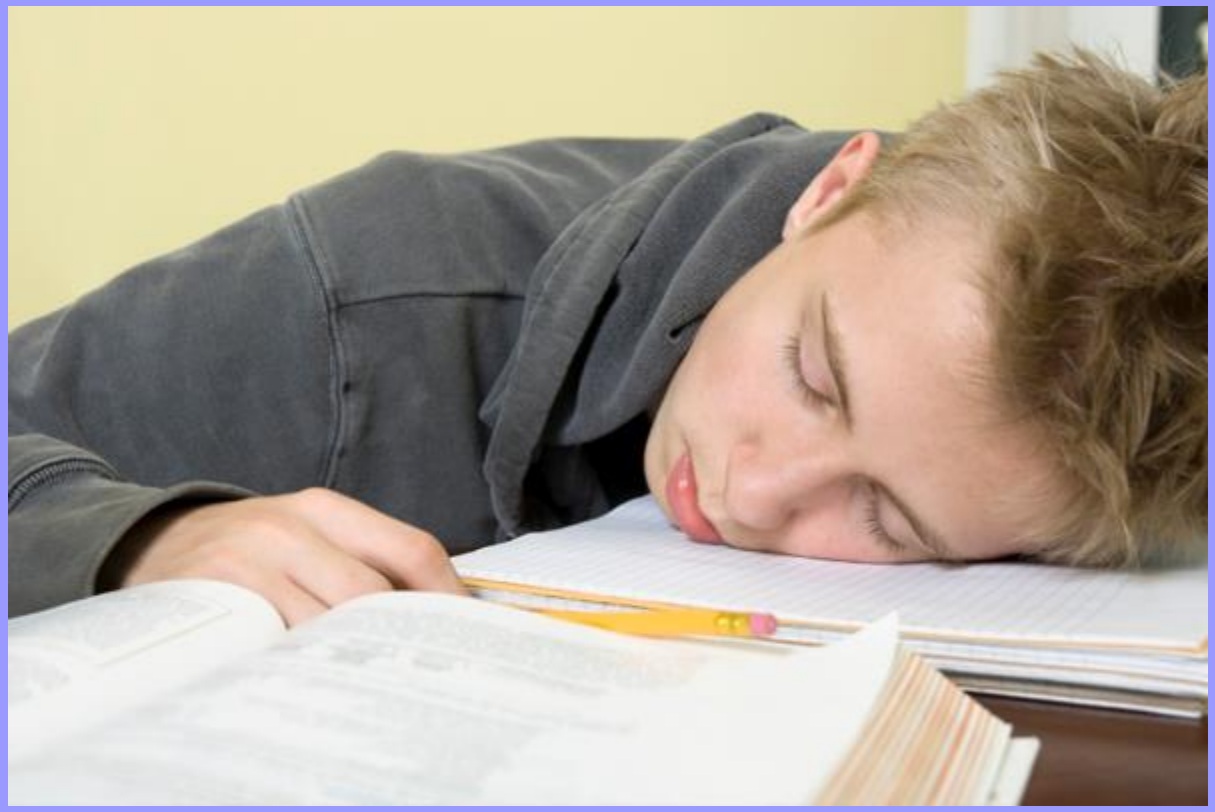


Cerebellum

Dopamine


endorphin
uptake pump
opiate receptor
dopamine
dopamine receptor

Sleep Patterns



Caveat

structure

v

function

v

behavior

Fred Strong, Dean of Faculty

&

Mike Haykin, Director of Learning Support

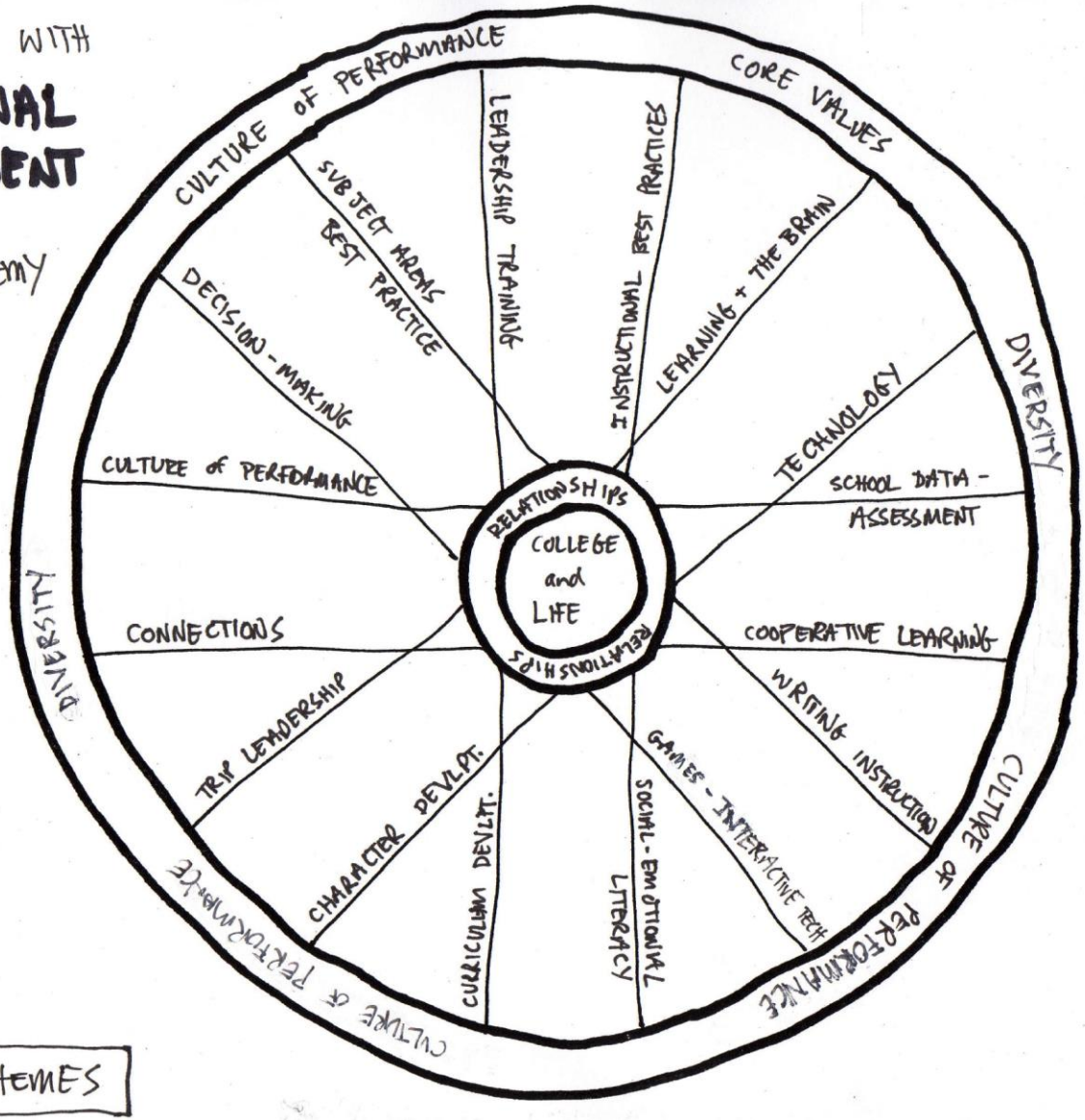
Professional Development Activity

@ Seattle Academy

WHAT'S UP WITH

PROFESSIONAL DEVELOPMENT @ SEATTLE ACADEMY

2008-09



21ST century

ANNUAL THEMES

'07-08 **RELATIONSHIPS** → '08-09 **INSTRUCTION** → '09-10 **CURRICULUM**

5/26/08
FS

The Culture of Performance

- Where Does It Appear?
- History
- Definition
- Examples
- In Relation to Brain Research

Where Does It Appear?

- English
- History
- Math
- Science
- Foreign Language
- Arts
- PE
- Learning Support
- Athletics
- Outdoor Program

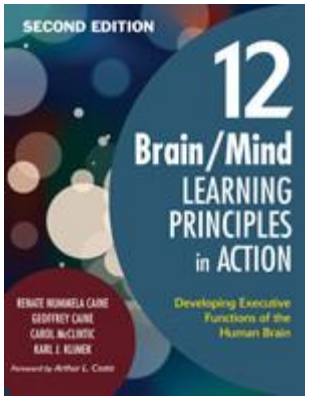
The Culture of Performance

- History
- Definition
- Examples
- In relation to brain research

Summary of Main Principles

Brain Research & Learning

Caines'12 Principles



1. All learning is physiological.
2. The brain is social.
3. The search for meaning is innate.
4. The search for meaning occurs through patterning.
5. Emotions are critical to patterning.
6. The brain processes parts and wholes simultaneously.
7. Learning involves both focused attention and peripheral perception.
8. Learning always involves conscious and unconscious processes.
9. Complex learning is enhanced by challenge and inhibited by threat.
10. Learning is developmental.
11. Memory involves both archiving individual facts and making sense of experience.
12. Each brain is uniquely organized.

Jensen's 10

- Malleable memories
- Emotional-physical state dependency, automated behaviors
- Reward dependency
- Brain plasticity
- Attention limits
- Perceptual influence
- Rough drafts of complex learning
- Input limitations
- Meaning is sought and created

Medina's 12

1. Exercise increases brain power;
2. Human brains evolved
3. Every brain is wired differently.
4. Attention depends on interest
5. We repeat to remember;
6. We remember to repeat;
7. Our brains need sufficient sleep;
8. Stressed brains learn differently.
9. Sensory stimulation promotes brain activity
10. Vision trumps all other senses
11. Male & female brains are different;
12. We are natural explorers.

David Johns at the Smartboard (via video)

Advanced Algebra

(10th grade)

April De Nonno

Your Learning Process: Two Views

English 11

The Assignment

- For this assignment, you will take two photographs that represent your learning process. The photographs can be of any objects, images, events, or situations.
- The pictures do not need to make logical sense to anyone else; they need only express something about the way you think, understand, process, feel, react, remember, formulate, integrate, etc. The pictures should make sense to you.

- **When two images are placed side-by-side (i.e., juxtaposed), they usually evoke one of the following relationships:**

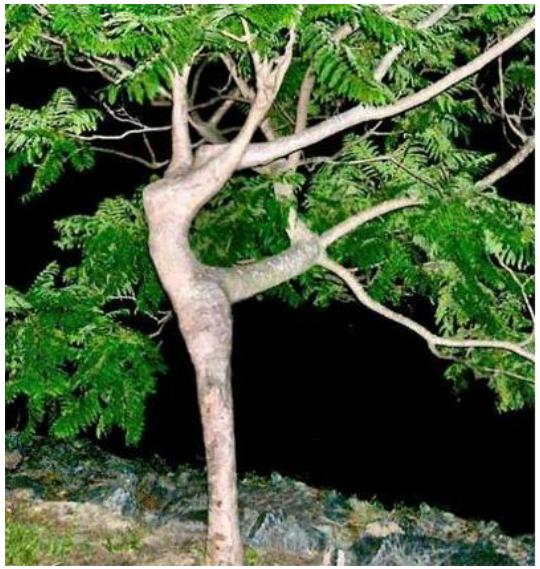
  - Compare/contrast
  - Cause/effect
  - Before/after (transformation)
  - One/two (increase; intensify)
  - First/second (chronological)
  - One thing/another thing (random relationship)

Four Examples of Student Work:

Juxtaposed Images

&

Personal Learning Styles



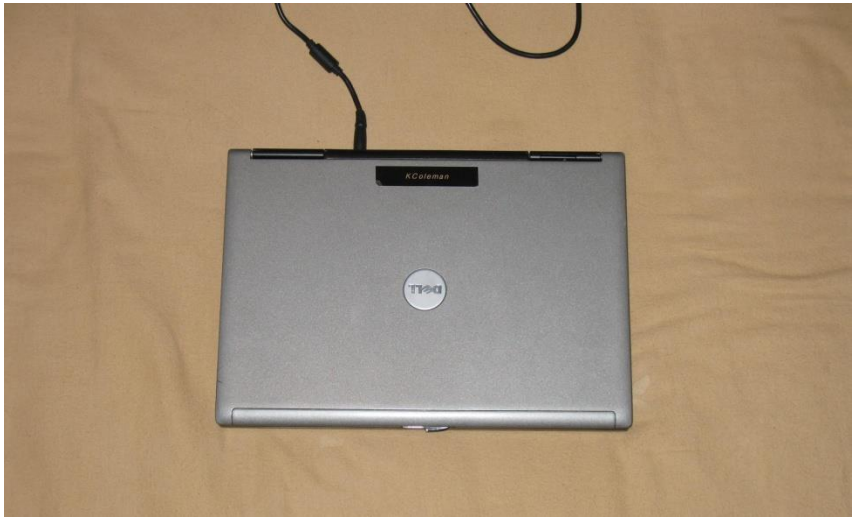
This tree represents my style of learning because I am a visual and kinesthetic learner. Instead of being in a classroom learning about it, I would rather be outside climbing it, touching it and seeing how it actually feels. When I actually get outside and do something, I am having fun discovering and learning and I'm not completely bored to DEATH. If you look closely at this tree it represents more than just the freedom of nature, it looks like a person dancing with their arms high in the air and their leg stretched out. In this way the tree represents my visual learning style.

Bass guitar represents another way that I learn. If I can hear something in a song I can remember it better than if a teacher is just talking at me. I am more of a musical person than anything else. Usually when I hear a song I can repeat it in my head over and over again, just like how a song gets stuck in your head and you can't get it out. If I can find the patterns and rhythm of words I am more likely to retain them, think about them and analyze them.

Though I change I do not let the person I am wander. Of the pictures I have taken this is the one I felt the strongest connection with. I have done better but this one is me. I could make comments about possible visual symbols and how they relate to me but that's not why I originally took the picture. I took it for the sole purpose that I feel this picture represents my existence as a human being with as much accuracy as a photo of me.

This picture is an expression of a certain part of me. In this picture the arch way of this Chateau symbolizes a connection between my world and the world around me. When I make connections with people or notice patterns everything starts to work for me. Connections with teachers for some undefined yet seemingly obvious reason make me want to excel in that class. I wish I had a solid explanation for why I can't excel when there are not connections but that may be one definition of ADD

These photos represent the way I learn because I don't really use books or notes or papers to learn, instead I use my computer for everything. The relationships between these two photos is one of cause and effect. Because I am unable to stay organized with paper and so have a hard time learning from it, I use the computer to learn and organize my work. The first photo represents the unorganized manner in which I lead my life and the forgetfulness I have towards work. This causes me problems in that I forget to do homework, lose it after I've done it, and can't find it one day and then see it the next in the same place.



The second photo represents the order and vast amount of knowledge the computer has. Without my computer, I would have a lot harder time learning and keeping my life in order. The first photo represents the slow "old" style of working with dictionaries and books, while the second represents the fast "new" way of working. While it is hard to organize in the real world using folders and filing cabinets, it is very easy for me to organize my work on the computer. While the first photo is kind of like the turning chaos that is threatening to encircle me, the second is the ray of hope that is keeping me from entering the abyss.

I took this first picture when I was in South Korea. It was taken a couple miles from Kyongsan, which is the fishing village I was born in. This picture is not related to my learning process at school, but it is more related to my understanding of who I am. I also visited the house where I was born and met the midwife who delivered me. This experience gave me a better understanding of who I am and where I came from. The midwife talked to me about my mother and how it was so hard for her to let me go. My mother was 16 when I was born and it is a burden that she has had to carry for 16 years.

This second picture represents my learning process because my favorite hobby is drawing. During some classes, I like to draw random things because I am bored, but at home, I spend much more time on my drawings. This is a picture that I drew during class and there isn't any real significance, but I have another picture that I spent about an hour on and then worked on shadows and details. The reason that it is part of my learning process is because I can express myself through my drawings better than I can do during class.

Gabe Cronin

Chemistry Class

(10th grade)

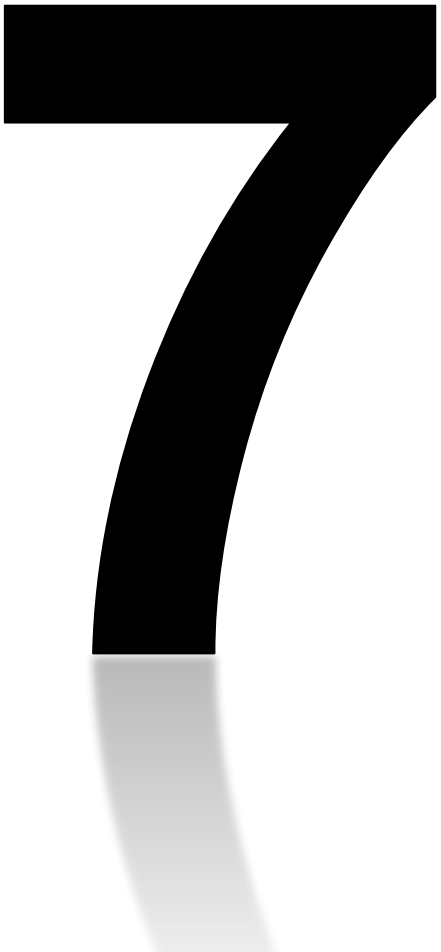
The Rules of the Game…

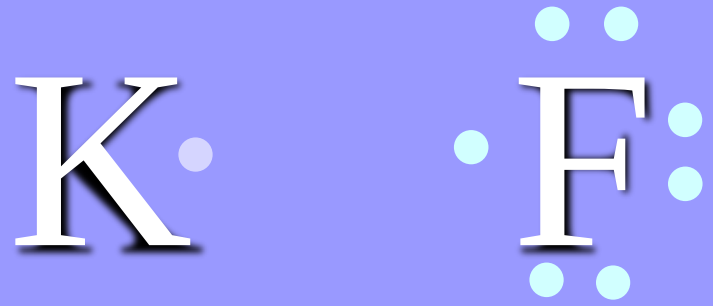
Atoms will try to reach 8 or reach 0 in the easiest/quickest way possible.

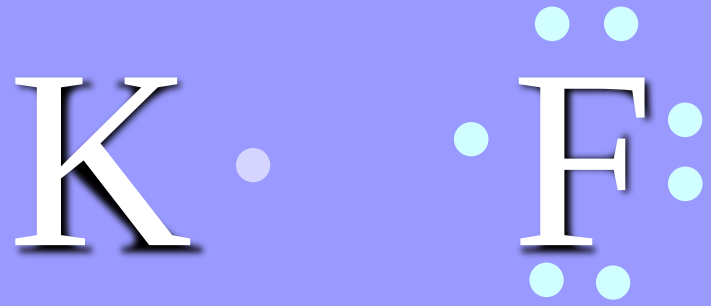
Atoms will try to reach 8 or reach 0 in the easiest/quickest way possible.

ATOM A

ATOM B




K
F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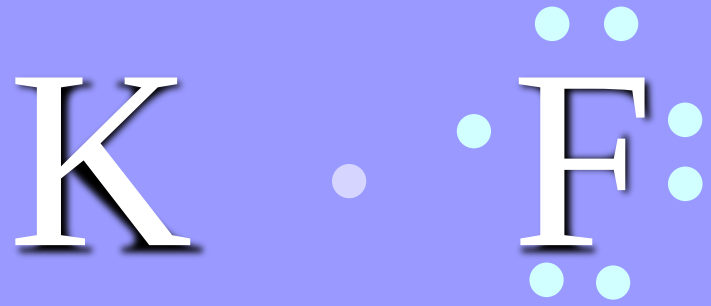
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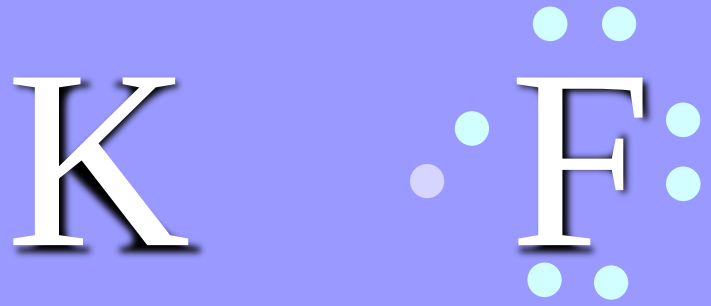
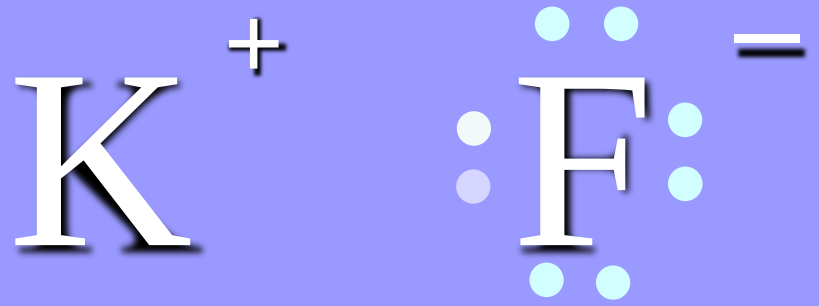

K
F


K
F

Ionic Bond



Atoms will try to reach 8 or reach 0 in the easiest/quickest way possible.

ATOM A

ATOM B

Atoms will try to reach 8 or reach 0 in the easiest/quickest way possible.

ATOM A

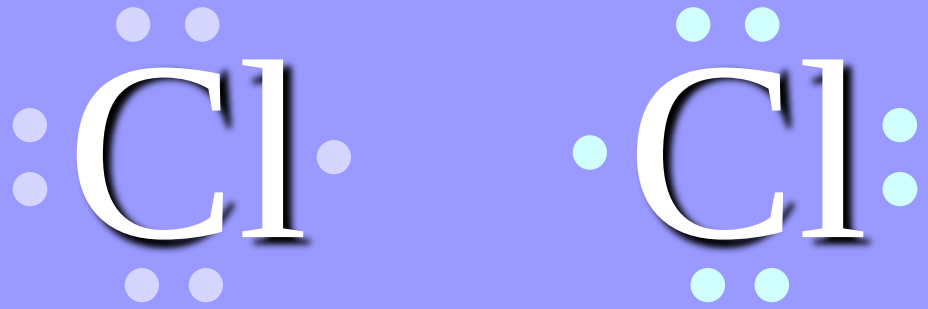
7

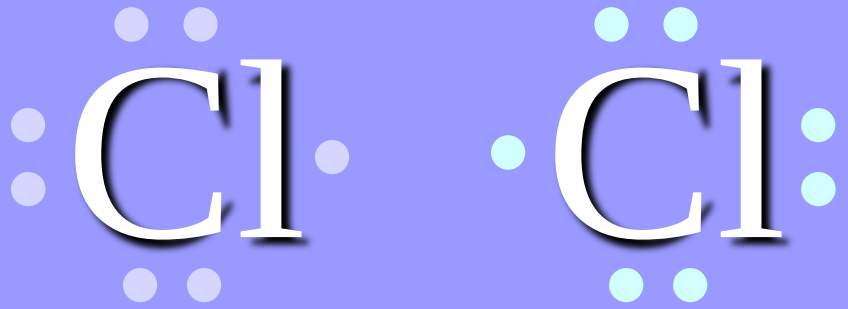
6+1

ATOM B

7

1+6


Cl
Cl

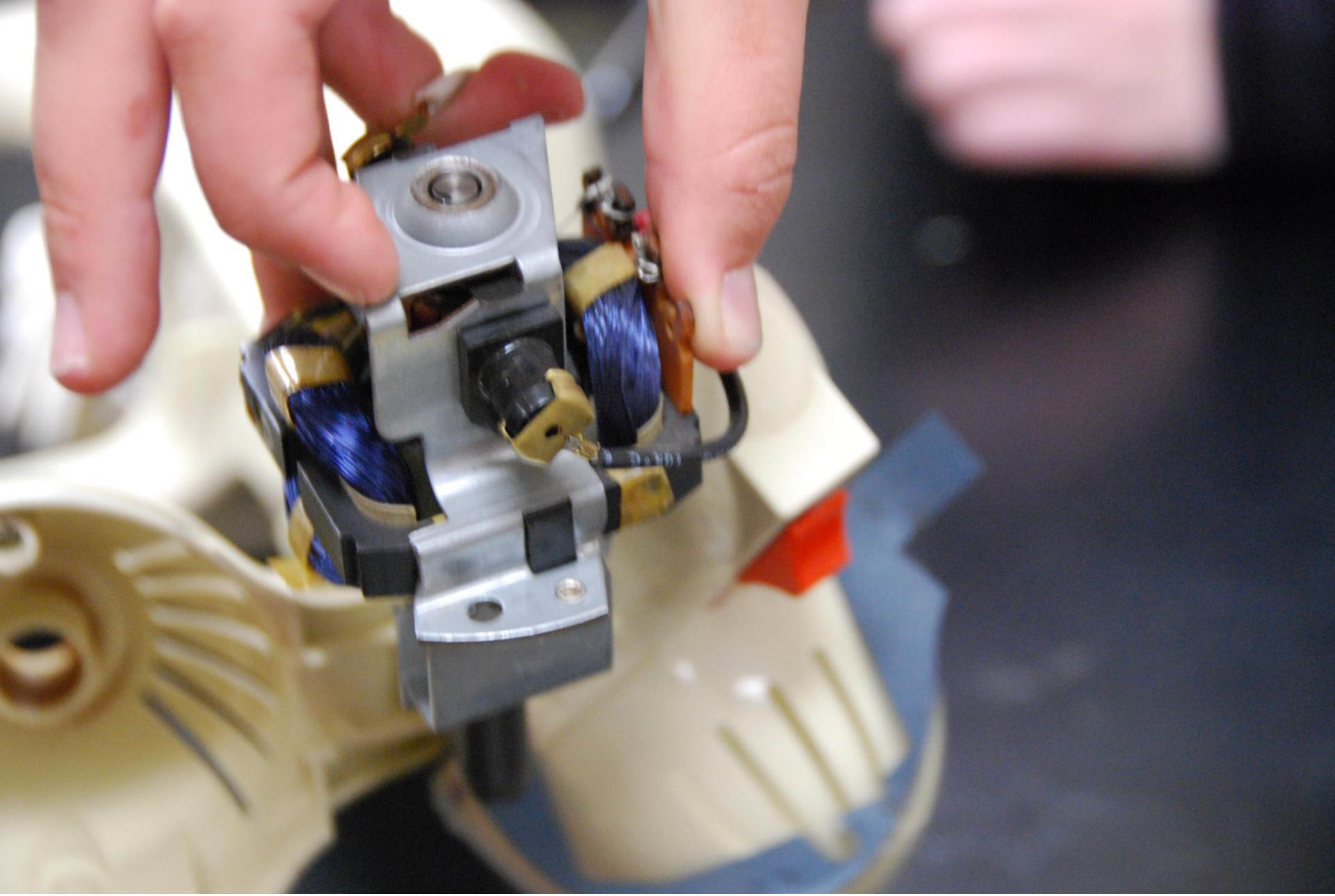

Cl
Cl


Cl
Cl


Cl Cl

Covalent Bond

The difference in method of bonding on an **atomic scale** leads to vastly different **macroscopic** properties, which influences construction of household appliances we use everyday!



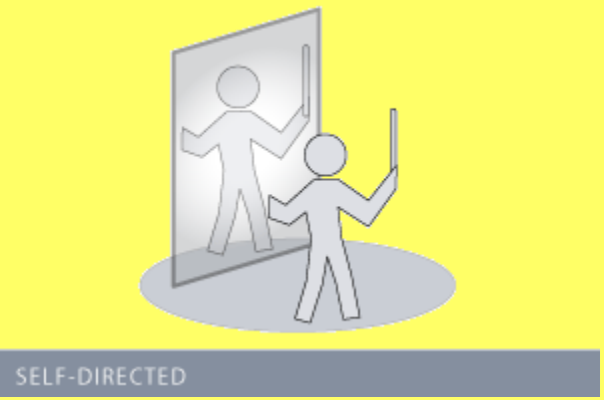

How Does Natur


ork:
crossword
et and

MIKE BERNIER

Middle & Upper School PE, Athletics

Importance of Metacognition



•knowing about knowing

•knowledge of your own thoughts and the factors that influence your thinking

•self-reflection

•self-responsibility

•initiative

•goal setting

•time management.

Miranda Roth
“Choose to Lose Project”

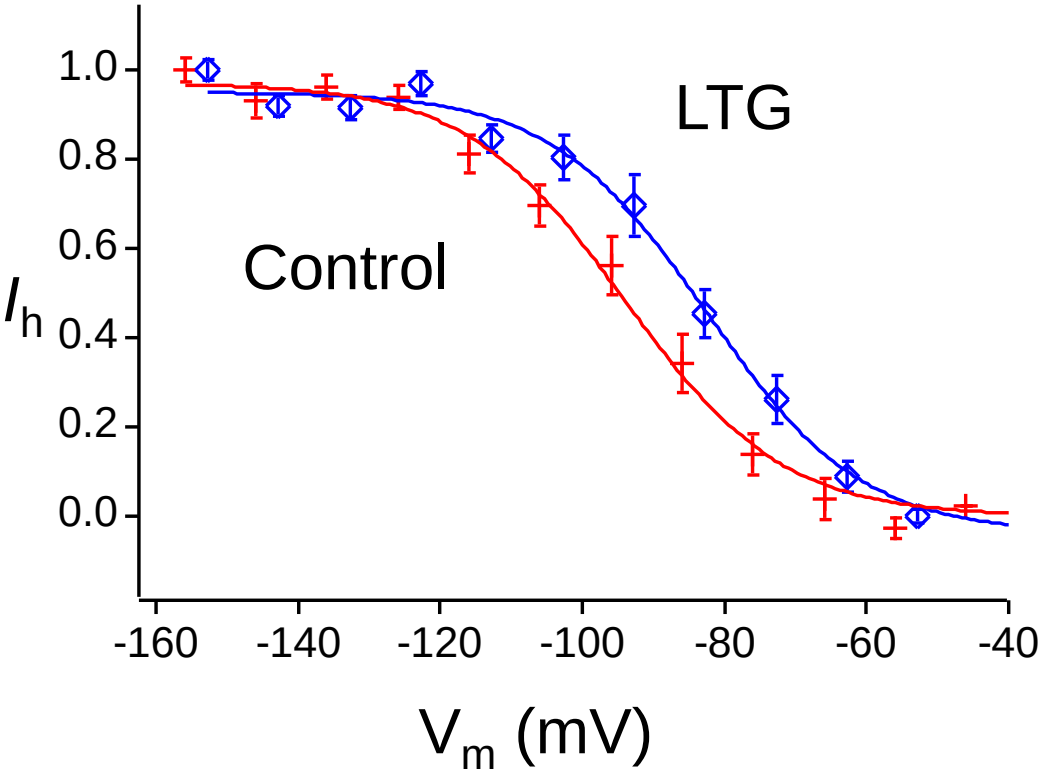
Human Biology
(8th grade)

How I became a neuroscientist

- Diagnosed with Juvenile Myoclonic Epilepsy at age 12
  - Doctors did not have the science to explain this condition
  - Medications used for treatment were discovered without knowledge of mechanism

Lamotrigine (LTG), a model system

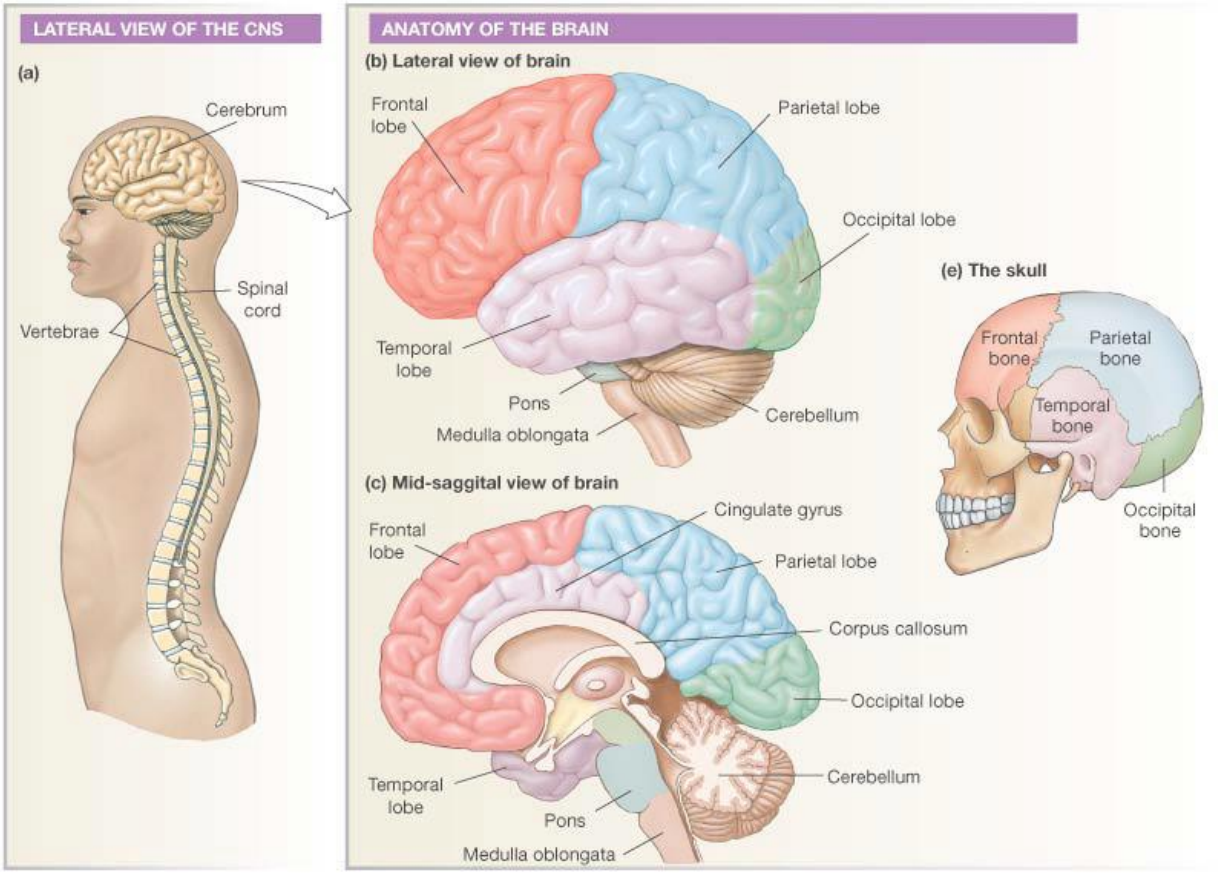
- LTG shifts h-channel activation in the depolarizing direction
- More I_h on at rest, decreases input resistance and EPSPs are attenuated
- How?



Poolos, Bullis & Roth, 2006

Providing students with tools to study themselves

- Neuroanatomy
- Neurology
- Mental Health



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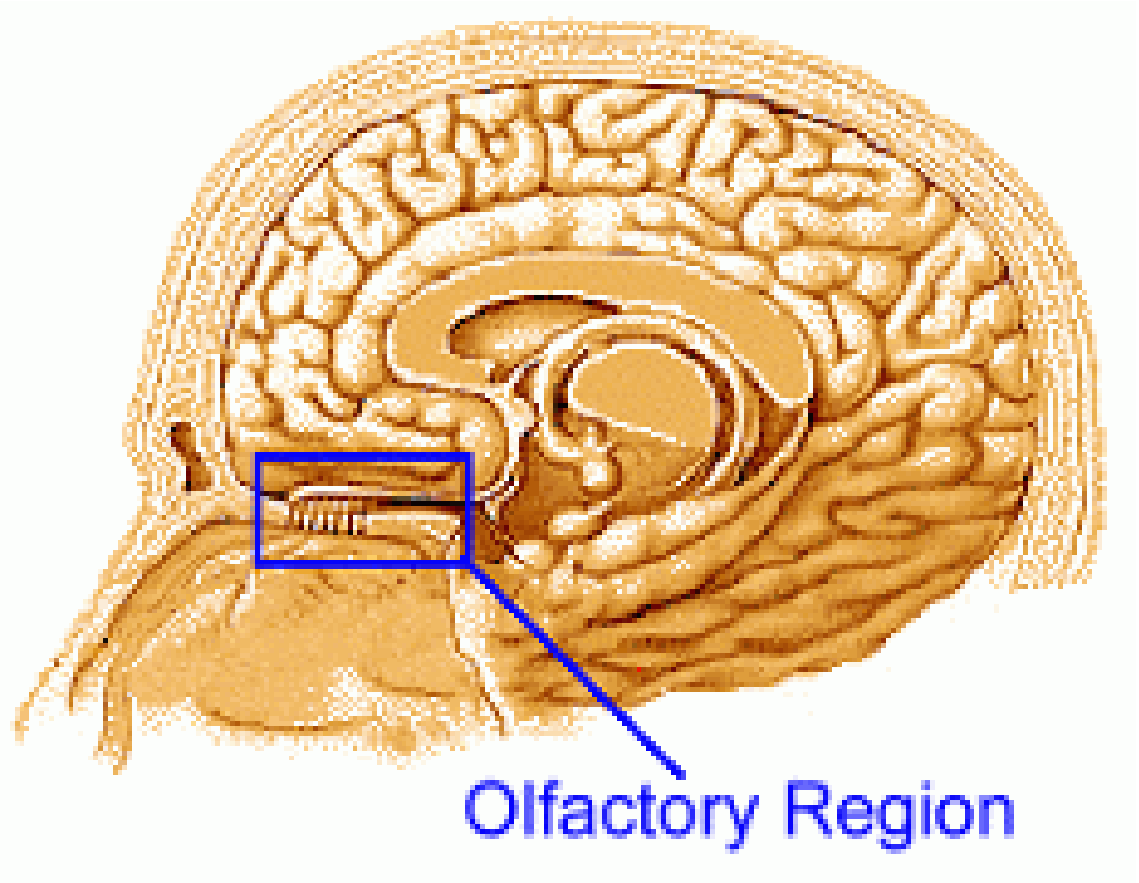
Choose to Lose Project!

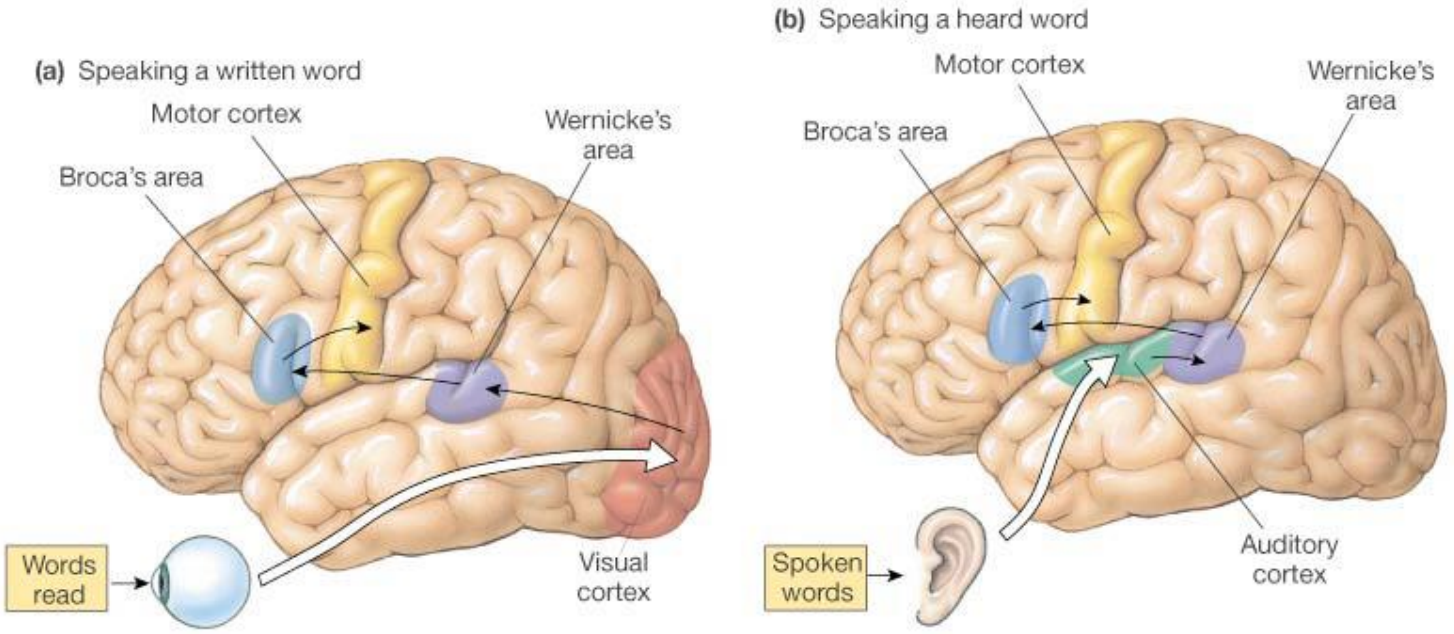
- Olfactory bulb (processing smells)



http://www.worsleyschool.net/science/files/nose/olfactory.gif

Choose to Lose Project!

- Broca's Area (speech perception)



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Acknowledgments

- The class of 2013
- George Burpee, Fred Strong & Kelly McKittrick

Gabe Cronin

Chemistry Class

(10th grade)

Learning Styles Project

Two Goals:

1) Identify the situations in which you learn best.
2) Learn to self advocate (metacognition).

Index of Learning Styles Questionnaire - Windows Internet Explorer
http://www.engr.ncsu.edu/learningstyles/ilsweb.html
File Edit View Favorites Tools Help
Links Moodle SAAS Home SAAS Info Dynamic Periodic Table Gmail ChemiCool FIRST Tech Challenge FIRST Tech Challenge - Welcome Forum FIRST Tech Challenge Robotics Academy
Index of Learning Styles Questionnaire

- **(a)** try it out.
- **(b)** think it through.

2. I would rather be considered
   - **(a)** realistic.
   - **(b)** innovative.

3. When I think about what I did yesterday, I am most likely to get
   - **(a)** a picture.
   - **(b)** words.

4. I tend to
   - **(a)** understand details of a subject but may be fuzzy about its overall structure.
   - **(b)** understand the overall structure but may be fuzzy about details.

5. When I am learning something new, it helps me to
   - **(a)** talk about it.
   - **(b)** think about it.

6. If I were a teacher, I would rather teach a course
   - **(a)** that deals with facts and real life situations.
   - **(b)** that deals with ideas and theories.

7. I prefer to get new information in
   - **(a)** pictures, diagrams, graphs, or maps.
   - **(b)** written directions or verbal information.

8. Once I understand
   - **(a)** all the parts, I understand the whole thing.
   - **(b)** the whole thing, I see how the parts fit.

ACTIVE REFLECTIVE

11 9 7 5 3 1 1 3 5 7 9 11

<-- -->

SENSING INTUITIVE

11 9 7 5 3 1 1 3 5 7 9 11

<-- -->

VISUAL VERBAL

11 9 7 5 3 1 1 3 5 7 9 11

<-- -->

SEQUENTIAL GLOBAL

11 9 7 5 3 1 1 3 5 7 9 11

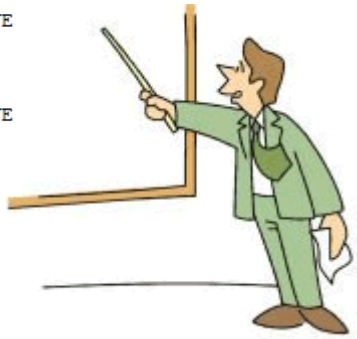
Which of these two students is more likely to succeed in my chemistry class?

http://www.geeksontheradio.com/mm/stationery/_H_Master/geek.jpg

http://www.eclectica.org/v1n3n4/grommet.jpg

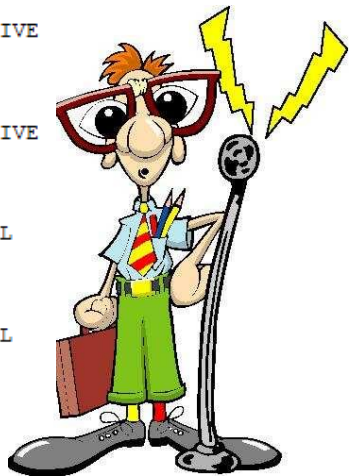
Given the results of their learning styles surveys shown here, along with the teachers, which of these two students is going to have an easier time in my chemistry class?

ACTIVE	11	9	7	5	3	1	1	(3)	5	7	9	11	REFLECTIVE
						<--	-->						
SENSING	11	9	7	(5)	3	1	1	3	5	7	9	11	INTUITIVE
				<--	-->								
VISUAL	11	9	(7)	5	3	1	1	3	5	7	9	11	VERBAL
						<--	-->						
SEQUENTIAL	11	9	7	(5)	3	1	1	3	5	7	9	11	GLOBAL



ACTIVE	11	9	7	5	3	1	1	3	(5)	7	9	11	REFLECTIVE
						<--	-->						
SENSING	11	9	(7)	5	3	1	1	3	5	7	9	11	INTUITIVE
						<--	-->						
VISUAL	11	9	(7)	5	3	1	1	3	5	7	9	11	VERBAL
						<--	-->						
SEQUENTIAL	11	9	7	5	(3)	1	1	3	5	7	9	11	GLOBAL

ACTIVE	11	9	7	(5)	3	1	1	3	5	7	9	11	REFLECTIVE
						<--	-->						
SENSING	11	9	7	5	3	1	1	3	5	(7)	9	11	INTUITIVE
						<--	-->						
VISUAL	11	9	7	5	3	1	1	(3)	5	7	9	11	VERBAL
						<--	-->						
SEQUENTIAL	11	9	7	5	3	1	1	3	5	7	(9)	11	GLOBAL



Wanda Elder

Learning & the Brain Class

(12th grade elective)

Learning & the Brain Class

- **Topics**

- smell and taste, touch, sound, and vision
- attention & consciousness.
- motor skills & movement
- memory
- emotion
- language
- social learning, development, and behavior
- care and feeding of the brain

Parenting the Teen Brain

- Just because teens can be viewed as less than fully mature neurologically, they should not be treated as incompetent nor be denied opportunities to make autonomous decisions, or unduely or unfairly restricted.


HOW IS IT POSSIBLE FOR TWO PEOPLE TO BE SO CONSISTENTLY WRONG ABOUT EVERYTHING?

For Parents:

1. **Get lots of sleep.**
2. **Feed your brain.**
3. **Body exercise is brain exercise. It reduces stress & anxiety.**
4. **There's no such thing as multitasking.**
5. **Learn what you love.**
6. **Learn now what you want to remember for the rest of your life.**
7. **Harness the power of risk-taking.**

Questions & Answers

The Whole Group

Thanks for Coming!

S