Video

• Count the number of passes between players in the white shirts.
• What did you see?
• Did anyone miss anything?
• What does that suggest about important information directly in front of them when their attention is directed elsewhere?
The Brain is the most complex thing ever studied in the universe.
Our brain constantly interacts with the environment in order to stay alive (maintain homeostasis)
Why do we need to know the brain?

Because:

Where does learning actually occur?
Why do we need to know the brain?

Knowing **how** and **why** the brain/mind works allows us to more effectively design instruction for better learning.
How DO We Know How The Brain Works?
Memory is distributed across the cortex
PET SCANS
Sex Differences: We Literally DO NOT PROBLEM SOLVE the same way
Males & Females ARE Different
Field examples of sex differences

- Girls do better in climbing school (learning knots, putting on harness) and are usually more patient in teams
- Boys better at belaying, not necessarily better at climbing; but routinely are better at navigation
- Differences in skills level and type vary by age group
SPECT SCANS

NORMAL

ADHD

ON ALCOHOL
Attention System Highly Engaged:
Violent Video
Neural Selection (use it or Lose it)
Neural Selection (use it or Lose it)
If You Use Only 10% of your brain
What would an X ray Show?
We Learn By

• Growing a memory

• Using the memory (dendritic spines) or losing it

• Consolidating the memory by Practicing Past Perfection (we’ll visit this later)
Cycles of Brain Growth

- Many cycles in early years
- 10-12 Years 14-16 Years
- 18-20 Years
- 21-24 Years

(From K. Fischer, 2000)
Optimal Performance During Brain Growth Spurt

• Optimal performance requires direct support/instruction vs instruction by book or computer.

• Independent student performance is at a lower level (suboptimal)... You don’t get best performance when they do the task independently w/o coaching

• Students can’t transfer from an optimal level in one area to a high performance level in a different area*
Incomplete Frontal Lobe Development In A Group

- What happens to judgment?
- What happens to anticipating how *others* will feel?
- What happens to anticipating how *they* will feel?
Incomplete Growth

- Impaired decision making
- More impulsive
- Less emotional control
- Lower ability to reason
- Lower ability to see consequences
- Lower ability to anticipate emotional impact
Examples of poor judgment display in adults (>18)

• Instructor (21) with entire instructor team traveling, beeches truck on a rock in the Winds
• Girls sunbathing without sunscreen at 10,000ft
• Instructor (21) boulder leaping because he has the skills
• Young adults ‘toughing it out’ when it starts to rain mid-activity
Myth & Facts about your Brain

**Facts**
- Neither sex is superior
- Brain automatically organizes information
- Memories are emotionally encoded
- Emotions & Memories are chemically based

**Myths**
- You use only 10%
- Right vs. Left Brain
- Smarter people have more brain wrinkles
- Intelligence is fixed (can be expressed as a single number)
RECENT FINDINGS

• Memory is distributed across the cortex

• **Overriding impulsive reactions is harder** in teens because frontal lobe isn’t fully functional

• **Teen brain doesn’t consider other’s emotions**

• Act of asking a question *changes* the memory

• Recalled information is reconstructed

• Female memory generally outperforms males
• In adolescence there is a major pruning of neurons that aren’t used

• Emotions are chemically based

• Memory is chemically based

• Old info. Is gradually lost but the gist or basic concepts remain …not the details
Brain Break # 1

• List two things that were new or personally interesting
• Write down one thing you’d like to know more about
• Stand up & Turn to your neighbor and share those things
Shouldn’t we teach the entire organism, since it’s the entire organism that learns?

Gessner Geyer 2001
• **We process information**

  **Physically:** *Touch, Movement, Visual-Imagery*

  **Semantically:** Reading or Hearing Words

  **Socially:** Group interactions (pairs or small groups)  
  Modeling

Dr. Barbara Given
Processing Information

- Attention
- Emotional Significance
- Motivation
- Working Memory
- LTM

Assessment(s)??
First Task:
The brain tries to detect patterns
First Task:
The brain tries to detect patterns
“I’m Not inattentive,-----you’re just boring.”

From Thom Hartmann
Attention Systems

- Systems are limited
- You (or student) can’t give full attention to multiple tasks = Divided attention
- Ex. Setting up rappels—multiple tasks, better handled sequentially (but you can get better when some become automatic)
What I hear I forget
What I see I remember
What I do I understand

Confucius
Attention!

• Grab & Maintain it!

• HOW ???
• Maintain attention by varying activities, & length
• Significant Physical movement about every 15 minutes
• Everything Counts
A Demonstration of Attention
Outcomes are influenced by **HOW** information is processed.
ADHD

- Approximately 70% is inherited

- About 30% results from head injury
  (any blow to the head: football, soccer, baseball, falling down etc.)

- It may NOT be outgrown*

* While many will catch up developmentally, others retain symptoms all their life
Staff Survey

• Miss place keys, items frequently
• Attracted to action
• Easily bored
• Taps foot, pencil, drums fingers
• Fidgets a lot, always in motion
• Easily distracted
• Capable of periods of intense concentration
• Bumps into things
• Interrupts others in conversation
• Impulsive
• Hard time waiting for turn
Attention Strategies:

Physical — manipulate objects, or move the whole body, pantomime, build, model, MUSIC (non-vocal)

Visual Imagery -- imagine a picture or object, draw, sketch

Semantic – Reflect, summarize, describe, explain, tell,
NOTE THE DIFFERENCES and then SIMILARITIES

Brain can recognize differences easily; similarities are difficult to tell apart

Social -- watch & then explain their partner’s procedures.

Sex Differences Girls are more attracted to activities where EMOTION can be expressed
Boys more attracted to ACTION, MOVEMENT
YOUR TURN: Brain Break # 2
Getting Their Attention

• In your group, Suggest your own way of getting and maintaining ATTENTION

• Be Prepared to share one of your ideas.
3 Major Motivational Questions

• Can I do this task?
• Do I WANT to do this task & WHY?
• What do I need to do to succeed at this task?
• *Lay out answers for all three BEFORE the task, or as they start it, and continue to reinforce during the task.*
Can I Do This Task?

Two Examples
Say the **COLOR** of the name **RED**
Blue  Green  Yellow  Silver
Pink  Purple  Orange  Gold  Red
White  Blue  Blue  Brown  Green
Yellow  Green  Gray  Blue  Red
Red  Pink  Brown  Purple  White
3 Innate Needs

- **Belonging**: A need to know others care about their well-being and success (*Avoid*: it’s NOT MY problem)

- **Autonomy**: A need to have a feeling that they are in charge of their own actions (They have some choice in the matter)

- **Competence**: A need to believe they are competent and their actions are related to that competence
Perceptions

BASED UPON:

• Environmental Info. + Body State Info.
• Interpreted through lens of Experience
John Turner,
Age 67

From:
Growing Old is
Not for Sissies II

By Etta Clark
Their Perception Is **Their** Reality

*Perception* of threat affects the ability to THINK & LEARN
Their Perception is their reality, that affects attention, motivation & memory
Brain Break # 3

• Turn to your neighbor, describe a situation where your student’s perception was different from yours on a wilderness task.

• Make a suggestion of how to change the student’s perception or change the lesson.
Emotions

- Enhance Learning
- Hinder Learning
All Thinking

Emotions
Emotions

- Fear
- Surprise
- Anger
- Disgust
- Happiness
- Love
- Sadness
Emotional Significance

- The Challenger blowing up, O.J.’s slow car chase?
- Do You Remember:
  - Your first lead with shaky pro?
  - What you did on your 21st birthday?
  - The first time you made love?
Staff Training

Staff learning policies first, field experience second = Lower personal investment by staff

Field training first, Policy second = dramatic improvement in staff investment

Policies: correlation between effort and personal investment
It is important to make the connections with someone first…

then consider the actual message  (Papanek & Greenleaf, 2005)

Rocking Richonda
Emotions & Memory

- Chemically made
- Quickly changed by threat/depression
- Negative state (chemicals) NOT rapidly dissipated
- New chemical state may last for hours to days (though students or staff may not show it)
Emotional Issues in the field

- Student (21) not willing to be corrected leads group on a 10 mile detour
- Student (19) hides fact he is injured, ends up being emergency evacuated with flesh-eating bacteria infection
- Youth Leader (26) unable to master self arrest skills undermines instructor leadership for the rest of the trip
To Increase Memory (\textit{learning}) using Emotion:

- Greater personal salience in tasks
- Personally-Physically involved
- Greater personal consequences
- Increased focused attention
- Moderate stress
Using Personal Emotion & Action

Emotion + Action = Stronger Memory

(more learning)

Emotion + Attention + Action = Memory/Learning
ACTION - Movement

- Complex Action
- High Valence
- Personal Judgment
- Immediate Feedback
- Personal Consequence
- Accelerated heart rate
- Elevated Respiration

Better Memory
Role of Brain Growth
In Youth

- **Amygdala** very active (high arousal)

- **Frontal lobe** (reasoning & control) barely active,
  ex. Limited in anticipating consequences

- **Lack of wisdom** (connections aren’t made because connections don’t exist)

- **Learned fear** (patterns created) that are not appropriate: they avoid social activities, heights, avoid different ethnic groups
Emotional Management

- Frontal lobes of brain last to mature, happens during late adolescence
- Emotional Controls are LEARNED SKILLS (a.k.a. Emotional Intelligence)
Greater Emotional Impact

Downshifting

Just Trying to Survive
Under a *Threat* (to their survival or well-being)

- **Person is too busy scanning & monitoring**
- **Attention systems easily overloaded**
  (example, a person cannot effectively monitor the patient and scene safety at the same time, or a person cannot monitor the patient and have a conversation at the same time)
- **Attention NATURALLY oriented to self**
YOUR ACTIONS affect the teaching/emotional climate & Profoundly impact student learning (memory) & thinking
Your Attitude

- Off hand remarks can have more impact on the student than the lesson.
- Instructor’s attitude affects students’ physiological ability to process information.
Your Turn: Brain Break # 4
Emotional Significance
w/ motivation & Perception

• Write down how YOU are feeling about this information

• Share with a partner an example when an instructor’s attitude affected students’ learning.

• How are you feeling emotionally RIGHT NOW about getting more information? (We can stop and discuss or go on).
“Starting the engines without a skilled driver” (Dahl)

- Puberty Based Development
- Experience Based Development

Attempting to guide behavior in ambiguous environments while trying to manage strongly conflicting feelings
Adolescence

“Starting the engines without a skilled driver” (Dahl)

- Puberty Based Development
  - Changes are frequent

- Experience Based Development
  - Experience is Nil

  Attempting to guide behavior in ambiguous environments
  while trying to manage strongly conflicting feelings

  “Survivor”

  Participants are essentially thrown into an adolescent reasoning session
Adult Status:

Requires developing self-control of Actions & Emotions

Experience, education, or age alone does not determine whether a person is an adult in respect to having appropriate judgment.
Value of Experience?

Not All Experience Is Equal
Learning is the Making of RETRIEVEABLE Memory
Use It or Lose It
3 Major Forms of Memory

• Sensory/Perceptual Memory
• Working/Short-term Memory (WM)
• Long Term Memory (LTM)
Working Memory

Temporary

Lasts 1 sec-1 minute

Old info shoved out by new
Working Memory

- It is what you are thinking about RIGHT NOW!
Memory is **NOT ACCURATE**

- Not like a video camera
- It's selective
- It blends old information with new
- Can create false memories (if reinforced)
WM Overload

- Too much, Too Fast

- Actively, mentally link it with other info.
Overload Leaves Only The GIST of the Idea
Long Term Memory

• More Permanent

• Recognition (no details available)

• Recall (more details available)
LTM is *Organized*

- **Retrieval:** is better when you know how it was organized (it doesn’t let you know)
- by **Categories:** such as names & Uses
- by **Time:** (vacations, field trip)
- by **Powerful Emotional Events:** (Flash bulb memory: Kennedy assassination, Diana’s funeral, Challenger blowing up)
- by **Procedures:** How to do something, like shift a gear, fly casting, tying a shoe, using chopsticks
SLEEP

Memory Needs to Consolidate

& many students don’t get enough sleep
Consolidation of Memory

• Semantic Task: Overnight (sleep)

• Physical Tasks: Approx. 6 hrs.

• New Learning may wipe out earlier learning on physical tasks (if too close together).
Developmental Differences
LTM for Complex SPT
(Multi-step Hands-on)

Steps recalled vs Days

Lecture

Hands-on

92%
60.4%
Movement & Memory: Basic Assumptions

- Movement appears to enhance later memory
- Movement creates physiological changes in attention
- Movement w/accelerated heart rate appears to correlate w/increased attention level
- Greater attention correlates w/ greater memory performance
Brain Break # 5

In your group:

• List what you think may be the most powerful thing you’ve learned in this session?
ELABORATION

• Builds LTM
• Modeling allows self-monitoring
• Modeling demonstrated they *COULD* do it!
• Becomes personal & emotionally involved
• Holds attention
Long-Term Memory Strategies

**Physical**—use movement, procedures, field investigations, small movement, produce a product

**Visual Imagery** – draw maps, draw pictures, label drawings, model, pantomime

**Semantic** – explain as they demonstrate, review after 5-7 items, **Review Past Perfection**

**Social** – small group work, model, review games

**Sex Differences** girls typically retain slightly more than boys
Review Strategies

- Personal elaborations
- Review Past Perfection
- Demonstrate or Teach others
- Same environment as test conditions
- Same cues
- Practice transfer
- Same level of difficulty—not easier!
We Learn By

- **Personal significance** (Emotional connection)
- **Belief we can do it** (Motivation)
- **Physical action + personal elaboration (explanation)** (attention & memory)

- Growing a memory
- **Use It or Lose It** (Using memory in dendritic spines or losing it)
- **Consolidating the memory by Practicing Past Perfection** (making the memory stable and accessible)
How to Improve Staff Management

Goal:
MAKE TRAINING AND WORK INTUITIVE

• Cognitively
• Spatially
• Sequentially
• Visually
• Generationally
Intervention Points

Attention

Emotional Significance

Working Memory

LTM

Motivation

Assessment(s)?

Where can we improve?
Choosing when to make it challenging

Specifically choose points of challenge and difficulty
- Minds-on
- Increases Ownership
- Increases Investment
- Increases Quality

Must have accountability on all tasks
- checklists
- reports
- peer review
Q & A
Attention
Attention

Capture it
Attention

Don’t Divide It
Help Your Students
Help Your Students

Build personal applications
Help Your Students

Find a personal, emotional connection
Motivate!

By instilling the belief that they can do it.
Motivate!
By addressing their needs to belong
& not look “dumb”
Motivate!

By developing the belief they have some control (autonomy)
Working Memory

Is rapidly overwhelmed
Working Memory

Especially in lecture talks
Working Memory

Saves the gist, not details
Working Memory

Saves MORE if you go SLOWER
Build LTM

By hands-on, paired w/explaining
Build LTM

Practicing PAST perfection
Build LTM

By using multiple forms of instruction
Build LTM

By students providing their own examples
Review & practice

With same style as the assessment
& the same cues
Review & practice

At the same level of difficulty
Review & practice

Transfer
Review & practice

With realistic problems
Assess

With a *variety* of methods
Assess

The material actually reviewed & practiced
Assess
In the same manner as final practices
And Finally....

Continue

To Grow and Learn
For when you stop,
Your brain stops growing too.
• Jeb Schenck
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• Jessie Cruickshank
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