Slide 1

Teaching with the Brain in Mind
eric@jensenlearning.com

POOR STUDENTS, RICH TEACHING — MINDSETS FOR CHANGE — ERIC JENSEN

Teaching with the brain in mind — 2nd

POOR STUDENTS, RICHER TEACHING — MINDSETS THAT RAISE STUDENT ACHIEVEMENT — ERIC JENSEN

Slide 2

Start Taking Charge of Managing Your Student's Brain

Physical Activity Alters Brain Chemistry

Key
= Lie Down
= Stand
= Walk
= Cycle
= Run

Dopamine — high > / normal / < low — Activity Level — Suboo and Akiyama (2003)

Norepin-ephrine — 150 / 100 / 50 / 0% / -50 — % Increase vs. Sitting — Gillberg et al (1986)

Heart Rate — 150 / 100 / 50 / 0% / -50 — % Increase vs. Sitting — Gillberg et al (1986)

Slide 3
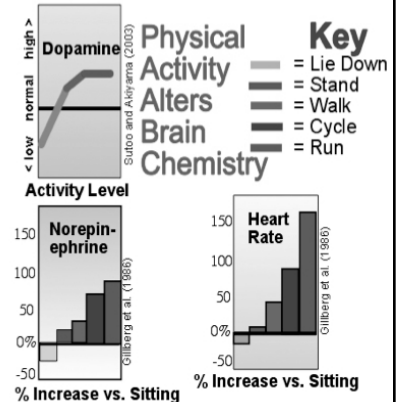
What is Brain-Based Teaching?

It's **E-S-P!**

It's the Purposeful

E _____
of effective

S _____
derived from

P _____
of how the brain works

Slide 4

Getting and Keeping Attention	Changing Student Behaviors

| Building Better Cognitive Capacity | Learning & Memory |
| | Core Mind/Brain Principles for Teaching |

Slide 5

1. Attentional bias: get us to pay attention & care about your topic
2. Meaning-making: create the relevant links
3. Emotional & body-mind intensity: make it emotional and physical
4 . Repetition: Use 3-4X over 3-5 days

You Can Accelerate Memory-Building With Multiple Strategies

Slide 6

14 Core Brain/Mind Principles

High certainty
Multiple, peer-reviewed studies with clear applications at school.
Reasonable certainty
The conclusions may be intuitively "true." But there are only scattered studies.
Insufficient evidence
Poor quality and quantity of studies. Evidence may be too new, missing or dead wrong. These are NOT used.

Key Principles 1-7

1. Uniqueness
2. Labels & Properties
3. Emotions
4. Attentional & Input Limitations
5. Adaptive & Flexible
6. Rough Drafts
7. Prediction

Key Principles 8 – 14

8. Environments Matter
9. Body-Mind Integration
10. Malleable Memories
11. Perception, Not Reality, Matters
12. Social Conditions
13. Developmental Stages
14. Meaning-making

Understanding Effect Sizes

Effect size is a standardized measure of the *relative size of the gain (or loss) of an intervention.*

0.00 or less = Negative effect
0.00 – 0.20 = Negligible, unclear effects
0.20 – 0.50 = Small-moderate effects
0.50 – 0.75 = Strong effects
0.75 – 2.00 = Extreme positive effects

A 0.50 is one school year of gains and 1.0 is 2 years. These are just one way of understanding the value of educational/classroom factors..

Key Principle

1. Uniqueness

Students share 99.5% of the same DNA, but we have unique brains because of unique life experiences and gene-expression.

Can You Connect Brain Uniqueness to the Classroom?

Do the following students behave and perform academically any different than others?

❑ **Those with autistic spectrum disorders?**

❑ **Those with abusive parents?**

❑ **Those who grow up in poverty?**

❑ **Those who use drugs?**

❑ **Those with stress disorders?**

❑ **Those with foster care experiences?**

❑ **Those with a family member in prison?**

Interpreting the Research:
How Important is Understanding and Adapting to: Uniqueness? ☑

Prior ability = 1.04

Students report of likely grade they will get = 1.44

Teacher does micro-teaching teaching (sm. groups) = 0.88

Comprehensive targeted interventions = 0.77

Source: Hattie, JA (2010) Visible Learning for Teachers

Feedback to student = 0.73

Effects of Chronic Stress on Your Students Include:

☐ Greater impulsivity (blurts, talking back, less reflection, more scattered)

☐ Symptoms like AD/HD symptoms (poor memory, impulsivity & achronica)

☐ Might be upset, angry or argumentative

☐ Apathy or indifferent; can be seemingly disinterested in achievement

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ACTION STEPS

✓ _____

_____

✓ _____

_____

✓ _____

_____

Key Principle

2. Labels & Properties

Our brain's natural quest is to sort, group and classify (labels) and to understand functional, relevant (properties).

The label is the brain "box" that our brain puts jeans into; such as clothes, fabrics, fun, etc.

The properties are the defining features such as the fit, brand, size, style, color and price).

Interpreting the Research:
Using Appropriate Labels for Content Has a Solid Effect Size

Teacher clarity = **0.77**

Vocabulary = **0.95**

Teacher uses problem-solving teaching = **0.61**

Mastery process for teaching = **0.58**

Source: Marzano, (2001) and Hattie, JA (2010) Visible Learning for Teachers

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Interpreting the Research:
Labels on Students Can Either Help or Destroy their Identity

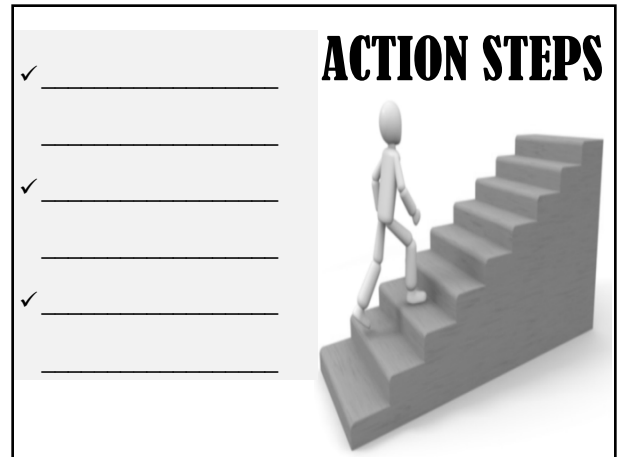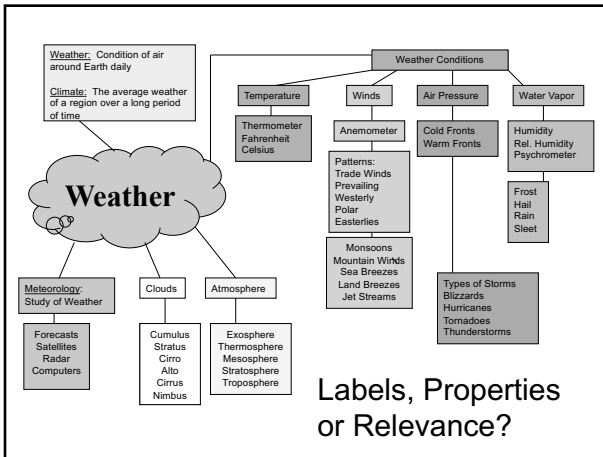Teachers who use no labels on their students = **0.61**

Do you call students any of these?
"Troublemakers, Low kids, Problem-kids or Minorities"
OR, do you call them…
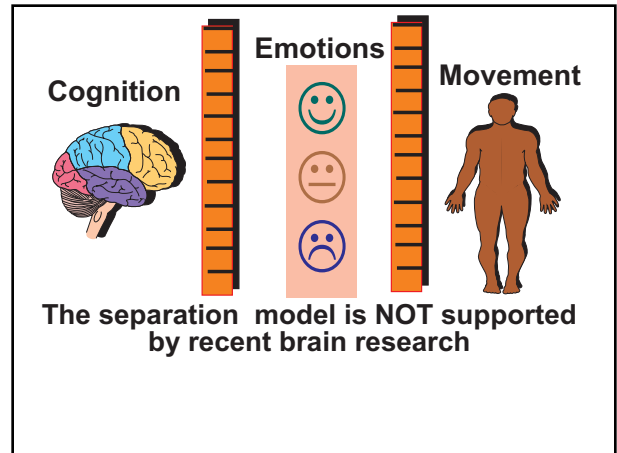"Scholars, up and coming or "MY students"

Source: Hattie, JA (2009) Visible Learning for Teachers

Labels, Properties or Relevance?

ACTION STEPS

- ✓ _____
- _____
- ✓ _____
- _____
- ✓ _____
- _____

Key Principle

3. Emotional

Cognition and emotions have over a 70% overlap. We usually (not always) do what we *feel like doing.*

Cognition   **Emotions**   Movement

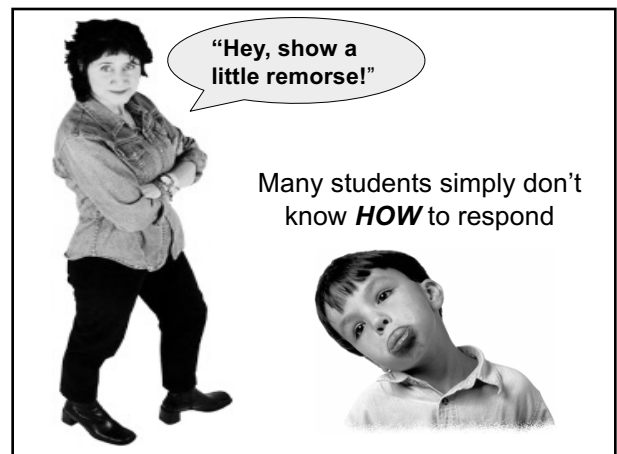**The separation model is NOT supported by recent brain research**

Interpreting the Research:
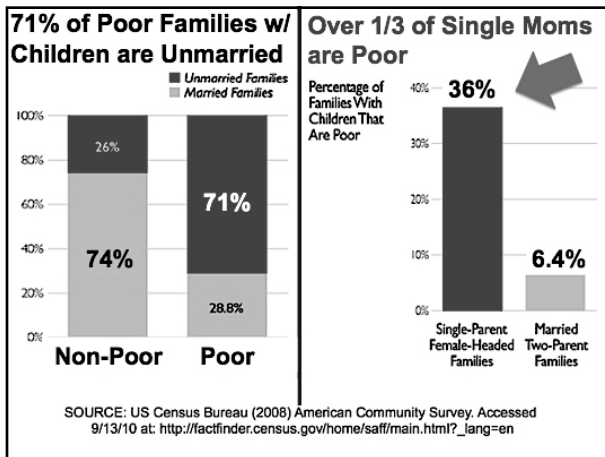How Important is Understanding and Adapting to: Emotions?   ☑

Teacher Student relationships = **0.72**

Classroom behavioral climate = **0.80**

Teacher 'in sync' with student states = **1.42**

Source: Classroom Management That Works
by Robert J. Marzano, Jana S. Marzano and Debra J. Pickering (2003) and Hattie, JA (2010) Visible Learning for Teachers

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"Hey, show a little remorse!"

Many students simply don't know *HOW* to respond

71% of Poor Families w/ Children are Unmarried

Unmarried Families
Married Families

- 26% (Non-Poor, Married)
- 74% (Non-Poor, Unmarried)
- 71% (Poor, Unmarried)
- 28.8% (Poor, Married)

Non-Poor | Poor

Over 1/3 of Single Moms are Poor

Percentage of Families With Children That Are Poor

- 36% — Single-Parent Female-Headed Families
- 6.4% — Married Two-Parent Families

SOURCE: US Census Bureau (2008) American Community Survey. Accessed 9/13/10 at: http://factfinder.census.gov/home/saff/main.html?_lang=en

Paul Ekman, Emotions Pioneer

Named as one of the 100 most influential people in the world (Time)

✓ **Innate emotions**
✓ **Micro-expressions**
✓ **Movie consultant**

emotions revealed
RECOGNIZING FACES AND FEELINGS TO IMPROVE COMMUNICATION AND EMOTIONAL LIFE
Paul Ekman
WITH A NEW CHAPTER ON EMOTIONS AND LYING

Stop Assuming that Your Students Already Know How to Behave; Most Don't Know!
Teach the Blue Box Skills Daily

TEACH:
- ✧ Humility
- ✧ Forgiveness
- ✧ Empathy
- ✧ Optimism

HARD-WIRED…
- ✓ Sadness
- ✓ Joy
- ✓ Disgust
- ✓ Anger
- ✓ Fear

TEACH:
- ✧ Kindness
- ✧ Patience
- ✧ Gratitude
- ✧ Compassion

Ekman, P (2016). What 149 Scientists Who Study Emotion Agree About. Perspectives on Psychological Science 11, 31-34

Cognition and Emotions Overlap

Source: Rainville P, Bechara A, Naqvi N, Damasio AR. (2006)

Emotional Processes | **80% Emotions AND Cognition** | Cognitive Processes

20% Emotions & Body

20% Highest Reason

How Much Input Does the Amygdala Have to the Rest of the Brain?

Young MP, Scannell JW. (1994) Analysis of connectivity: neural systems in the cerebral cortex. Rev Neurosci. 5: 227

AMYGDALA

P.S. Emotions matter!

Fight, Flight or Freeze?

Once the amygdala is activated in class, it takes *at least 30 – 90 minutes* to calm down for quality learning.

Amygdala

Threats, insults, put-downs and sarcasm activate the amygdala

Emotional Positivity Means Making School Time a Great Experience

- Positive behaviors come from strong parenting and teaching
- Home and classroom examples include:

verbal affirmations, smiles, physical gestures, head nodding, positive comments, positive music, celebrations, use of name or pre-set celebration rituals

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Caregiver Feedback and Emotional Responses Vary by Family SES

$$$ Upper income caregivers average a 6-1 ratio of **6 positives** to **1 reprimand**

$$ Middle income caregivers average **2-1**

$ Lower income caregivers average **1-2**

Hart and Risley (1995)

ACTION STEPS

- ✓ Put yourself in a great state to teach.
- ✓ Learn to identify key emotional states.
- ✓ Always have a target state in mind for your learning goals.
- ✓ Influence student states.
- ✓ Teach them how to manage their own states. Help them track progress.

How to Trigger Positive Emotions

_____

_____

_____

_____

_____

Key Principle

4. Attentional & Input Limitations

Our brain is designed to limit the attention and quantity of new input per minute.

Two Types of Attention
Which Were You Expecting to See?

"Reflexive"
Hard-Wired in DNA
Manage Risks/Rewards

The student brain responds impulsively to environmental contrasts in sound, movement, lighting, emotions, or tactile input.

"Self-Regulated"
Learned & Earned
For Goal Acquisition

The student learns to suppress behaviorally irrelevant input to play a sport, an instrument, read a book, design, build, write or solve a problem.

Interpreting the Research:
How Important is Understanding and Adapting to: Attention & Input Limitations? ☑

Teacher "with it" effect in class = **1.2**

Spaced learning over time (vs. massed learning stacked) = 0.71

Classroom behavioral interventions = 0.80

Source: Hattie, JA (2010) Visible Learning for Teachers


To Get Student Attention…

START

✓ Re-directs
✓ Social nudges
✓ Novelty
✓ Curiosity/Anticipation
✓ Students up front
✓ Goal acquisition
✓ Urgency
✓ Interdependency

Building Attentional Skills

• Fast wr_____ practice
• Design, building or fine-motor handiwork with extended processes
• Well-coached sp_____
• Extreme high interest r_____
• Playing a m_____ in_____
• "What's different?" activities

When You Teach, Do This

Limit time! Go **4-8 minutes at grades K-5**, then **5-10 minutes at grades 6-8** and **8-12 minutes at 9-12.**

		8-12 min.
	5-10 min.	
4-8 min.		
K-5	**6-8**	**9-12**
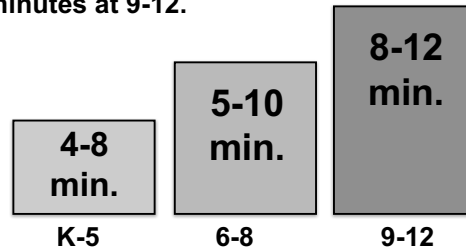
Effects of Various Lecture Densities on Student Achievement at University Science Class

• Experiment: 3 lectures, 50 min. each by same instructor, using the same 50% base of info. Details added to groups 1 and 2.
• **#1 Group: High Density** (new information 90%, w/ 10% review time)
• **#2 Group: Medium Density** (70% new information, with 30% of time for review)
• **#3 Group: Low Density** (50% new information, 50% of time for processing and review)
• **Conducted at UTSA**, with technical information

Better Directions

1. **Use set-up, buy-in or framing**
2. **Time deadline**
3. **Trigger word**
4. **Directions 1 at a time**
5. **Check for readiness**
6. **Give trigger word**

How I Will Better Manage Attention

_____

_____

_____

_____

_____

ACTION STEPS

- ✓ Get attention and buy-in before you teach.
- ✓ Watch for signs that the attention is wandering.
- ✓ Use a series of tools to help keep attention on track.
- ✓ Tools include curiosity, redirects, questions, partner work and more.
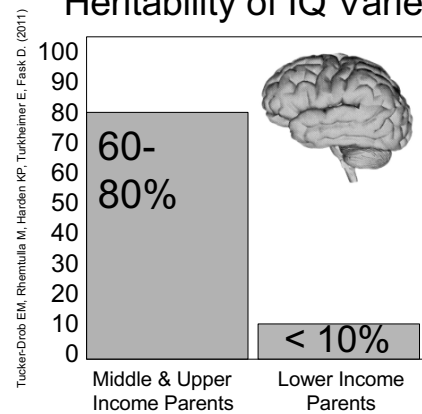- ✓ Take energy breaks every 10-20 minutes.

Key Principle

5. Adaptive & Flexible

Our brains are not static
or fixed. They are constantly
changing in over a dozen
ways.

Heritability of IQ Varies

Tucker-Drob EM, Rhemtulla M, Harden KP, Turkheimer E, Fask D. (2011)

60-80%

< 10%

Middle & Upper Income Parents	Lower Income Parents

What Determines Our Destiny?

NEW!

30-40%	30%	30-40%
Genes	Gene/Environment Interaction	Environment

What Actually Changes in Our Brains?

neurogenesis
cell size
cell connectivity
new cell survival
gene expression

neural plasticity

chemical levels
activity distribution
blood flow
glucose metabolism
neural growth factors

Title 1 Effect Sizes

Unless students make 1.5+ years of academic progress for every school year, they may drop out.

0.00 or less = Negative effect
0.00 – 0.20 = Mild, unclear effects
0.20 – 0.50 = Small-noticeable effects
0.50 – 0.75 = Mod. Effects (1.0-1.50)
0.75 – 2.00 = Strong Effects (1.50+)

Olejnik, S., & Algina, J. (2000). Measures of effect size for comparative studies: Applications, interpretations, and limitations. *Contemporary Educational Psychology, 25,* 241–286.

What Are the Range of Effects Sizes of Two Core Factors on Student Achievement?

❖ **The effect size of SES is 0.29 – 0.76**
(pg. 61 from, Hattie, 2009, **Ranking of 32nd out of 138** factors) and Sirin, 2005, pg. 438. on 101,157 students.

❖ **The effect size of 90% of teachers is from 0.32 – 0.98.**
(Wenglisky, 2002. Education Policy Archives Analysis)

❖ **Teacher effect size is even greater at a Title 1 school**
Math = +1.4-1.7) and Reading = +1.6-3.7),
Konstantopoulos, Nye & Hedges, 2004)

Effect on Student Achievement: 1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0

SES 0.76 ↕ 0.29

Effective Teachers 0.98 ↕ 0.32 Struggling Teachers
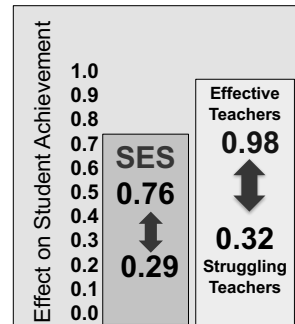
Neuroplasticity = Brain Changes

Unassisted (maladaptive)

Trauma, brain disorders, addictions of all types, aging, abuse, neglect, toxins, malnutrition and medications
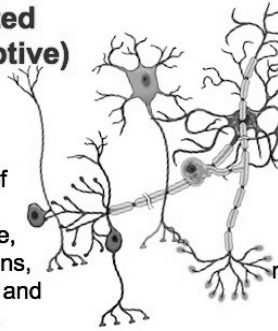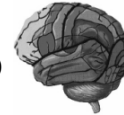
Intentional (adaptive)

Cognitive training, pharmacology, skills training, non-invasive stimulation, nutrition, exercise, enrichment and neurofeedback
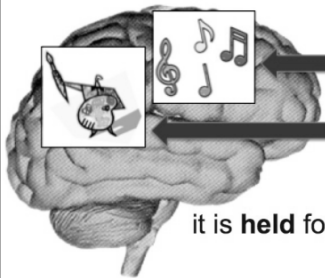
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2 Brief Memory Types

SHORT-TERM
Can you HOLD and **RECALL** the content in your head (as is) for seconds or minutes?

WORKING
Can you recall, hold and then **MANIPULATE** the content in your head for seconds or minutes?

What is in Our Working Memory?

The content is…
sounds, called a "phonological loop"
OR
pictures, or visual-spatial "sketchpad"
AND
it is **held** for seconds or moments
AND
it is **manipulated** or processed by our brain

Meta-Analysis on Working Memory Effect Sizes

➢ **Elementary effect size = 1.41**
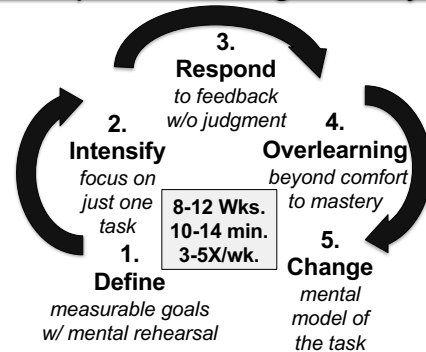
➢ **Secondary effect size = 0.72 – 1.18**

Au J, Buschkuehl M, Duncan GJ, Jaeggi SM (2015). Psychon Bull Rev, 2015.
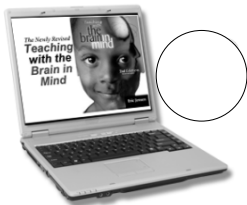
9

Key Brain-Changing Factors

☐ **Buy-in/Relevance**
☐ **Meaningful Goals/Evidence of Learning**
☐ **Interdependency**
☐ **Quick Initial Learning Curve**
☐ **Increasing Challenge & Complexity**
☐ **Quality Feedback**
☐ **Go 10-14'a day / 3-5X/wk. for 8-12 Wks.**

Use "Deliberate Practice" to Improve Working Memory

3. Respond
to feedback w/o judgment

2. Intensify
focus on just one task

4. Overlearning
beyond comfort to mastery

8-12 Wks. 10-14 min. 3-5X/wk.

1. Define
measurable goals w/ mental rehearsal

5. Change
mental model of the task

Where Can You Get More Tools to Build Your Student's Working Memory?

YES!

Jensenlearning.com/workingmemory

Building Attentional Skills

• Partner and teamwork on rapid, detailed le_____ projects
• Theater, drama or dance le____
• Specialized c_____ programs that focus on skill-building such as those at:
• **www.scilearn.com/free-trial**

Cognitive Capacity Can Be Built

ACTION STEPS

✓ Assume every student can and will change
✓ Focus class on building cognitive capacity and social-emotional skills
✓ Mentally, hold high expectations for all
✓ Use focused, deliberate practice every day
✓ Enrich the brain with neurogenesis

How I Will Better Manage Attention

_____

_____

_____

_____

_____

Key Principle

6. Rough Drafts

Our brain rarely gets it right the first time. Instead we make sketchy rough drafts of new learning.

Our Brain as a "Gist" Gatherer

We rarely get new and complex explicit learning right the first time. Instead, we gather the "gist" and make "rough drafts." This is not what most teachers hope to happen. Nor is it what we test for.
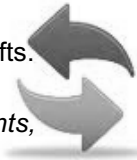

The Power of Feedback

One of the most powerful "top 10" influences on student achievement corrects rough drafts.

Ultimately, expert teachers get more feedback from their students, provide more and empower students to use it more.

Feedback works because it allows the brain to make useful changes.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81- 112.

Why Feedback and Error-Correction?

We have a brain which is designed to *rarely get it right the first time.* Instead, it makes "rough drafts" of the new learning. These are held until there's a reason to *drop or upgrade and save.*

"S-E-A" Feedback = 0.74

✓ **Strategy:**
"Did I use (or switch to) the best strategy to succeed?"

✓ **Effort:**
"Did I use enough effort?"

✓ **Attitude:**
"Have I used positive self-talk and the growth mindset for this task?"

Marzano, (1998) A Theory-Based Meta-Analysis of Research on Instruction.

Attribution Says…

Attribution Says…
When you "attribute" cause and effect, the effect size is huge

➢ Link the behavior to *something you have done in the past*
➢ Link the behavior to *a probable future outcome*, so you have a strong reason for today's effort

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Add Attribution to "S-E-A" Feedback and Get 1.42

- "I loved how you tried many ***strategies*** on that problem until you got it. *That may help you get into the college you want.*"
- "I like that you refused to give up. That extra ***effort*** *may help you reach that goal of yours.*"
- "Before you began, you thought you could succeed. Bet that positive ***attitude*** *helps you get the job interview you want.*"

3M Feedback = 1.13

✓ **Mark:**
 "Where am I at right now?"

✓ **Map:**
 "Where am I going ?"

✓ **Method:**
 "What do I do next to reach my goal?"

Wiliam, D. & Thompson, M. (2007) "Integrating Assessment with Instruction: What will it take to Make it Work?" In The Future of Assessment: Shaping Teaching and Learning, edited by C.A. Dwyer. Mahwah, NJ.: Lawrence Erlbaum Associates.

What 4th - 12th Graders Can Do to Boost their Learning

✓ **Work closer with a partner**
✓ **Review work and talk it over**
✓ **Summarize the learning daily**
✓ **Preview learning before class**
✓ **Ask more Qs in class**
✓ **Create a mind map/graphic organizer of the content**
✓ **Ask teacher for specific help**
✓ **Look up difficult things online**
✓ **Find and use study guides**

Interpreting the Research:
How Important is Understanding and Adapting to: Rough Drafts? ☑

Worked examples = 0.57

Formative evaluations = 0.90

Reciprocal teaching = .74

Feedback = 0.73 – 1.13

Source: Hattie, JA (2010) Visible Learning for Teachers

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ACTION STEPS

✓ Stop assuming that students should get new learning the 1st time.
✓ Assume your students made a rough draft and did not really "get it."
✓ Use feedback tools to discover where the mistakes are.
✓ Empower students to use tools such as a rubric to self-check.

How I Will Ensure Best Feedback?

_____

_____

_____

_____

_____

Teaching with the Brain in Mind
eric@jensenlearning.com
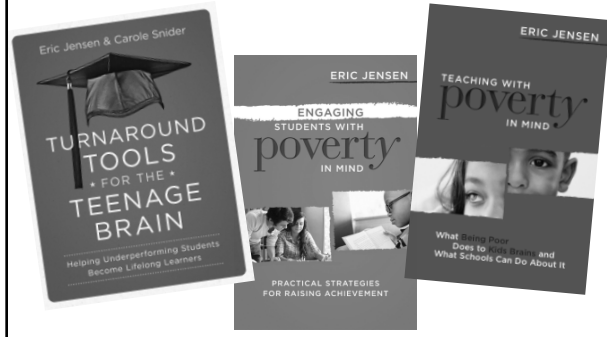
Key Principle

7. Prediction

Labels and properties help us form RULES, which helps us produce better PREDICTIONS (to help us survive and thrive).

Predictions Include…

- ✓ Predictions of success or failure in the near future
- ✓ Predictions of college or no college
- ✓ Guesses you make about how a student will do academically
- ✓ Assumptions about whether the student will graduate (or not)
- ✓ Assumptions you make about the cognitive capacity of a student

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Interpreting the Research:
How Important is Understanding and Adapting to Prediction?   ☑

Student's prediction of the likely grade they'll get = **1.44**

Teacher's expectations = **1.03**

Teacher's ability to predict and act quickly on potential problems = **1.42**

Source: Hattie, JA (2010) Visible Learning for Teachers

Write Your Prediction Here

_____

_____

_____

_____

How Key are High Expectations for Student Achievement?

Teacher expectations of student success are a staggering 1.03 effect size. Expect more, and get more!

Coe, R. (2002). It's the effect size, stupid: What effect size is and why it is important. Paper presented at the Annual Conference of the British Educational Research Association, University of Exeter, England.

Does Strong Teaching Matter?

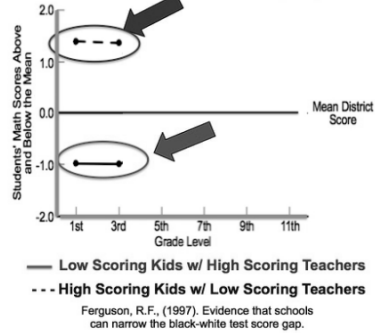"If a student had a good teacher *(one standard deviation of quality above the mean AYP)* as opposed to an average teacher *for five years in a row,* the increased learning would be sufficient to close entirely the average gap *between a typical low-income student and a higher-income student* (i.e. one not on free or reduced lunch)."

Hanushek, E.(2005). The Economics of School Quality, German Economic Review 6(3): 269–286

What Would it Take to Close the Grade-Level Gap at School?

Mean

2.1%	13.6%	34.1%	34.1%	13.6%	2.1%
-3	-2	-1	+1	+2	+3

1 SD = effect size 1.0
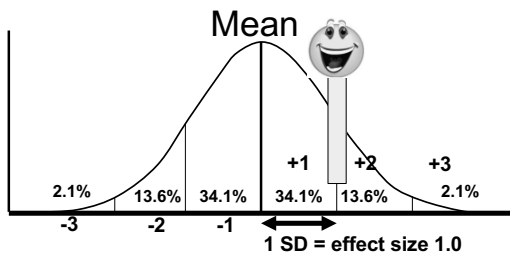
The mean is the average; an effect size of 1.0 = 34 point percentile change in scores

Which Group of Kids Are the "Low Kids"?

Students' Math Scores Above and Below the Mean

Mean District Score

Grade Level: 1st 3rd 5th 7th 9th 11th

—— Low Scoring Kids w/ High Scoring Teachers
- - - High Scoring Kids w/ Low Scoring Teachers

Ferguson, R.F., (1997). Evidence that schools can narrow the black-white test score gap.

Two Groups of Students in 1st- 3rd Grade, Each Group Over 1 Full SD From the Mean

Key Factors that Affirm Hope

1. Supportive Rel_____
2. Repeated Suc_____
3. Pos_____ R_____ models
4. Af_____ by Authorities
5. Setting and getting _____
6. Compelling personal vi_____
7. Perception that it's getting b_____
8. Faith and stories of those who've m____ i__
9. Having a vo_____ and sharing it
10. Do ser_____ wo_____ as a class

How I Can Begin Greater Hope

_____

_____

_____

_____

_____

ACTION STEPS

- ✓ Insist students make predictions about the source, the process, the odds or the outcome.
- ✓ Increase the stakes of the prediction to keep it interesting; they write it down or share it.
- ✓ Ensure students have a chance to find out if they got it right and, if needed, change mindset.
- ✓ *Predict good things!*

Interpreting the Research:
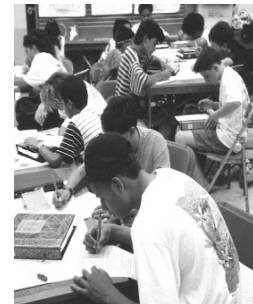How Important is Understanding and Adapting to: Environment? ☑

Classroom behavioral climate = 0.80

Overall classroom climate = 0.56

Teacher style = 0.42

School size = 0.43

Home Environment = 0.57

Source: Hattie, JA (2010) Visible Learning for Teachers

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1. Humidity levels, drinking water avail.
2. Acoustic quality in classrooms
3. Wall colors, decorations, mobile
4. Temperature of room
5. Aesthetics... plants, flowers, view
6. Flexible seating w/multiple options
7. New, up-to-date buildings
8. Fewer students per sq./ft.
9. Olfactory: aromas, non-toxic smells
10. Lighting; well-lit classrooms

Positive Classroom Climate is Critical to Your Success

- Hope
- Optimism
- Relationships
- Engagement
- Mindset
- Respect

How to Help Your Students Develop Joy and Optimism

Nobel Laureate psychologist Daniel Kahneman says four things have a far greater impact on making people happy than money. They are:

- Control over what you're doing
- Progress in what you're pursuing
- Connections to other people
- Having purpose and meaning

This Will Make You Smarter (2012, John Brockman)

ACTION STEPS

- ✓ _____
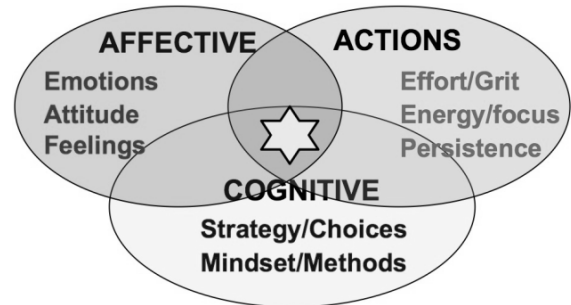 _____
- ✓ _____
  _____
- ✓ _____
  _____

Key Principle

9. Body-Mind Connection

Our body influences our brain and our brain influences our body. But they are far more connected than that.

These Systems Can Help You Focus on Student Achievement

AFFECTIVE
Emotions
Attitude
Feelings

ACTIONS
Effort/Grit
Energy/focus
Persistence

COGNITIVE
Strategy/Choices
Mindset/Methods

Interpreting the Research:
How Important is Understanding and Adapting to: Body/Mind States? ☑

Student disposition to learn = 0.61

Classroom behavioral climate = 0.80

Overall classroom climate = 0.56

Teacher style = 0.42

Source: Hattie, JA (2010) Visible Learning for Teachers

Neurogenesis

Occurs in three known areas, each with a role in learning.

Caudate Nucleus

Hippocampus

Olfactory Bulb
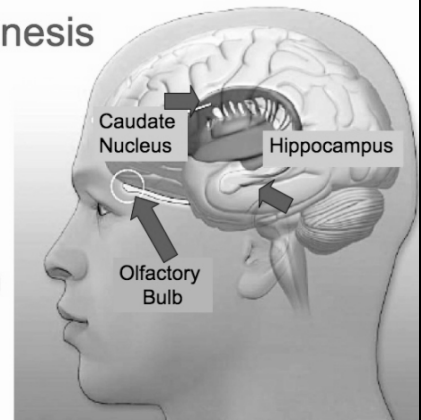
Neurogenesis Builders

✧ **Exercise (voluntary, gross motor, 3-5x/w.)**
✧ **Tough cognitive work**
✧ **Strong social networks**
✧ **Thoughtful nutrition**
✧ **Low-moderate stress w/ moderate-high challenge**

Why Use Gesturing for Learning?

Gesturing typically forces your brain to choose: 1) directionality, shapes, 2) relevancy, 3) sequencing, and 4) interactions. We may construct new concepts for our knowledge or make an abstraction more concrete. It's a thinking tool.

Goldin-Meadow, S., Cook, SW, and Mitchell, ZA (2009)

Kinesthetic Math Works 3X Better: Use Gestures!

Kids asked to physically gesture their math problems are nearly *three times* more likely than non-gesturers to remember what they've learned. In the study, *90% of students* who had learned algebraic concepts using gestures remembered them 3 weeks later vs. 33% of speech-only students. And 90% of students who had learned by gesture alone *with NO speech* at all recalled what they'd been taught.

(Cook, SW, et al., 2007)

Strategies for Engagement

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

ACTION STEPS

✓ _____

  _____

✓ _____

  _____

✓ _____

  _____

Key Principle

10. Malleable Memories

This principle reminds us that our memories are a process, not a fixed thing. Memories can and are often altered or lost.

Interpreting the Research:
How Important is Understanding and Adapting to: Malleable Memory? ☑

Pioneers in Malleable Memories
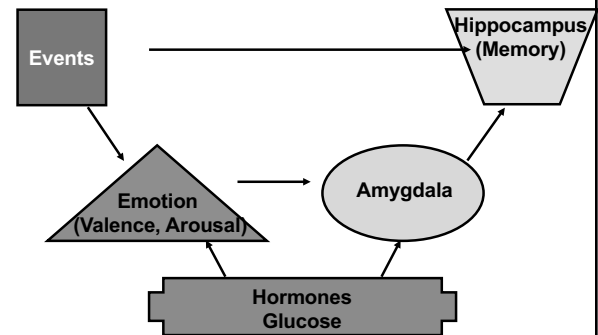
Daniel Schacter   Elizabeth Loftus

Mnemonics = 1.09

Meta-cognitive strategies = 0.69

Working Memory = 0.90

Source: Hattie Biggs & Purdie, 1996. Hattie, JA (2010) Visible Learning for Teachers

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Emotions Release Hormones Which Can Affect Our Memory

Events → Emotion (Valence, Arousal) → Amygdala → Hippocampus (Memory)

Hormones Glucose

Strong Agents Supporting Our Long-term Memory

✓ Self quiz/questioning
✓ Create strong relevance/buy-in
✓ Movement
✓ Emotions
✓ Gesturing
✓ Repetition
✓ Multi-sensory
✓ Spaced (vs. massed)
✓ Coherence

ACTION STEPS

✓ _____

_____

✓ _____

_____

✓ _____

_____

Key Principle

11. Perception, Not Reality, Matters

Our brain only knows what it receives perceptually and is easily fooled. Our prior knowledge is a huge factor in determining what we see, hear, feel, taste and touch.

Perceptions…

➢ Are shaped by your **brain** more than your vision
➢ Influence your **judgments**
➢ Are biased by **your past** experiences
➢ Are the key to higher expectations
➢ Regulate your **mindsets**
➢ Are susceptible to **confirmation bias**
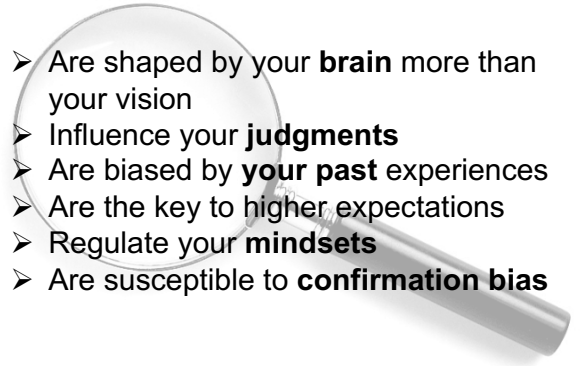
Perceptions at School - Students May Think That:

❑ A task is harder or easier than it really is
❑ Any student who talks back to you is either bad, a problem kid or from a bad family
❑ Another person intentionally (vs. by accident) tried to harm them
❑ They do not belong in school, either academically or socially
❑ The student was late to class (and it was his fault)

ACTION STEPS

✓ _____

_____

✓ _____

_____

✓ _____

_____

Key Principle

12. Social Conditions

Humans are highly social and our learning, behaviors and memories are often bound up in social experiences.

Separation is an Illusion; You are Mathematically Connected to Anyone within Just 6 Relationships

Dhammadhikari AS, (2013). Six degrees of separation: use of social network analysis to better understand outbreaks of nosocomial transmission of extensively drug-resistant tuberculosis. J Infect Dis. 207, 1-3.
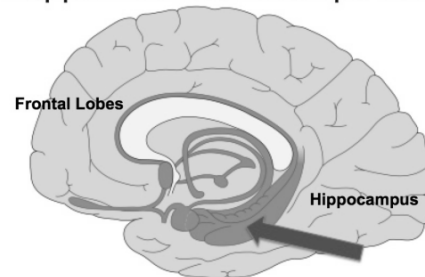

Social Conditions Influence Us

- Stress levels
- Cognition
- Mood and affect
- Status
- Immune systems
- Self-concept
- Brain Development

Chronic or acute exposure to these effects may create significant brain changes (Cacioppo et al. 2001).

Chronic Stress Shrinks Hippocampus; Supportive Relationships Heal It

Frontal Lobes

Hippocampus

(Hanson, Chandra, Wolfe & Pollak, 2011), (Luby, et al., 2012; Luby, et al., 2013).

The 50-50 Rule in Action

Social Time

- ✓ Team time
- ✓ Study buddy/ Partner time
- ✓ Impromptu partner time
- ✓ Using learning stations
- ✓ Project work w/ others

Individual Time

- ✓ Journaling
- ✓ Quiz/test-taking
- ✓ Setting & Managing goals
- ✓ Writing time
- ✓ Reflection
- ✓ Seatwork
- ✓ Listening to Teacher

Interpreting the Research:
How Important is Understanding and Adapting to: Social Conditions? ☑

Cooperative learning= 0.59

Teacher student relationship = 0.72

Peer influences = 0.53

Peer tutoring= 0.50

Sm. groups = 0.49

Source: Hattie, JA (2010) Visible Learning for Teachers

19

ACTION STEPS

✓ _____

_____

✓ _____

_____

✓ _____

_____

Key Principle

13. Developmental Stages

As our bodies grow and age, so do our brains. Opportunities and susceptibilities are present throughout our life.

K-2 level
1. Relationship building

Grades 3-5
1. Relationships
2. Affiliation

Grades 6-12
1. Relationships
2. Affiliation
3. Status-building

Invest Time in Your Students Differently as Their Social Brain Matures

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Interpreting the Research:
How Important is Adapting to a: Developmental Approach?

☑

Piagetian approach for Pre-K thru 3 = 1.28

Source: Hattie, JA (2010) Visible Learning for Teachers

Buy-In is Developmental

K-5 STUDENTS:
Use the "bigger kid" challenge, simple reward, teacher enthusiasm, curiosity, affirmation, friendship-maker, be gross and use mystery.

GRADE 6-12 STUDENTS:
Be edgy/risky, use peer pressure, challenge, stair-step the activity, cooperative, status-builder, experimental and use relationship.

ACTION STEPS

✓ _____

_____

✓ _____

_____

✓ _____

_____

Key Principle

14. Meaning-making

Every perception, sensation and conclusion is usually associated with another related experience. This may create meaning. When that doesn't happen, we often seek it elsewhere.

How Does Our Brain Make Meaning? When…

- ➢ new meaning fits with existing meaning
- ➢ we create or master (draw, build, develop, learn or describe) something on our own
- ➢ we can put something in greater context
- ➢ we discover that it answers an important question or deep need for us (relevancy)
- ➢ we name it a "desirable", such as a goal, key process or something of value

ACTION STEPS

✓ _____

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✓ _____

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✓ _____

_____

These 14 Principles Support an Understanding for the Scientific Basis for Learning

Each principle is well supported by peer-reviewed studies. Base your strategies you develop and use on principles. There is no sequential order or hierarchy of importance to them.

Decision + Action Step = Results

Predict What Will Be Different in Your Daily Work.
NEXT STEP? _____

_____

_____

How to Support Your Own Success with Online Apps

1. Create advance weekly emails to send to yourself in advance: **www.futureme.org**
2. Earn money by reaching goals from those who don't reach theirs. **www.pactapp.com**
3. Inspire yourself with your choices of both the carrot (and stick). **www.stickk.com**