Learning Style, Neurobiology, and Self-Directed Learning – Implications for Teachers & Learners

John Pelley, PhD
Texas Tech University HSC
john.pelley@ttuhsc.edu
www.ttuhsc.edu/SOM/success

“The purpose of an educational institution is to lead the students, who initially believe the educational institution is there to educate them, to the realization that they must educate themselves.”

“They must …learn how to learn [integratively]…”

From Willis Hurst, MD, Medscape
[and Pelley]

Goal today: Information and insights to aid curriculum and instructional design

• Curriculum design is about teacher responsibilities
• Instructional design is about learner responsibilities
  – Mature teachers care more about what the student needs to hear than what they need to say.

Main Points Today
1. Students need to transform themselves from receiver role to producer role.
   – Receiving information vs producing knowledge
2. The brain is wired to predispose thinking/learning “styles.”
   – Learning style is an insight for Deliberate Practice
3. Deliberate practice produces whole brain thinking.
   – Responsibility for learning lies with student

Getting In Touch With Your Thalamus

• Thalamus
  • base of brain
  • distributes all sensory information to higher centers
• Talk with a neighbor (1 min) about how you do your best thinking:
  Talk it out first or, Think it through first

Low Gain vs. High Gain

• Talk it out – “low gain” thalamic activity; seeking more input
  – Extraversion; low arousal level
  – Lower cerebral blood flow, augmentation of “evoked response,” lower doses of sedatives
• Think it through – “high gain” thalamic activity; reducing input
  – Introversion; high arousal level
  – Higher cerebral blood flow, reduction of “evoked response,” higher doses of sedatives
Why is it important to know how the brain works?

Answer: It affects “Mindset”


When do you feel smart?

• When you are learning
Or,
• When you are flawless in performance

Growth vs Fixed Mindset

Growth mindset – “When you are learning.”
• “You can always change how intelligent you are.”

Fixed Mindset – “When you are flawless in performance.”
• “You have a certain amount of intelligence and you can't change it.”

Growth Mindset

Through Deliberate Practice

• Myth: “Practice makes perfect.”
• Reality: “Practice makes permanent.”

Deliberate Practice: Practice correcting weaknesses.
• Reality: “Deliberate practice produces experts.”
• Deliberate practice requires self-awareness.
• Need to avoid automated behavior


Deliberate Practice Characteristics

• Designed to improve performance
• Applied to limitation in skill
• Personal insight essential
• Not work, not play – focused effort; demanding
• Not fun
• Most effective with experienced teacher
• 10,000 hours – Gladwell, “Outliers”

Mindset Comparison

Fixed Mindset
• Success based on innate ability
• Failure is dreaded, feared.
• Least likely to succeed

Growth Mindset
• Success based on hard work and learning (DP)
• Failure is a challenge to adapt.
• Most likely to succeed
Is Learning A Skill?
• Learning style as a preference
• Learning style as a component of experiential learning
• Experiential learning as critical thinking
• Experiential learning as whole brain learning

What Is Personality?
• Consistent behavior
• The way we think (psychology)
• The way we are wired (anatomy/physiology)

What Is Personality - Not?
• Limitation – only a preference
• Stereotype – all types have positive description
• Intelligence – Insight into thinking only

Myers-Briggs Personality Type
• Mental Model: Extraversion (E) vs. Introversion (I)*
  
  Sensing (S) vs. Intuition (N)*
  
  Thinking (T)* vs. Feeling (F)
  
  Judging (J) vs. Perceiving (P)*

*Pelley’s type
• Normal differences between people
• Persistent tendencies (choices)
  – Do not change once established
  – e.g. Folding your arms, throwing a ball, writing your name
• Comfort zone for thinking; requires less effort than the opposite
  – Use of opposite is a conscious effort

Sensing (S) vs. Intuition (N)
• What information do you give the most attention to?
• Sensing types give their attention to specifics
• Intuitive types give their attention to the big picture
• Everyone does both, but only one is preferred.
Test Taking Style

• **N style**
  – Rule out answer choices
  – Don’t fit pattern
  – Big picture learning establishes patterns

• **S style**
  – Seek answer that matches memorized knowledge
  – Re-read question to stimulate recall
  – Memorization learning requires recognition

Experiential Learning Model

1. **Concrete experience**
2. *Can it be used? [Act]*
3. **Observations and reflections**
4. *What does it mean? [Integrate]*
5. **Formation of abstract concepts and generalizations**
6. *What is it? [Recognize]*

The Learning Cycle

**David Kolb adapted by Zull**

Back To The Future

- **Temporal (back) processing** looks at
  – Facts, grouping, learned patterns
  – Preferred by sensing types

- **Frontal (future) processing** looks at
  – "Discovered" grouping, new patterns, inferences, evaluation of options
  – Preferred by intuitive types

If You Build Pre-frontal Skills, Temporal Memory Will Come.

- Back = fact memory
- Front = analytic (decision making) skill memory
- If you develop analytical skills, long-term memory will follow.
- Design instruction to use the “front.”

How Does Experience Make The Brain Grow?

- Decisions produce motor activity
- Motor activity becomes new concrete experience.
- Experience associated with emotion
- Anatomical changes at synaptic connections during sleep
Can You Find The Sittin' And Readin' Dendritic Tree?

- Sittin' and readin'
- Complete learning cycle; plus 7.5hrs sleep (minimum)
- Control left, LTP sensitized right
- The tree of long-term potentiated cells is markedly increased (hippocampus "rehearsal").
- Dendritic trees are "processing power."

Short Circuiting The Learning Cycle

- Continuous sensory input into temporal lobes, i.e. "sitting and reading"
- Minimal decision making
- Minimal motor activity
  - prevents dendritic growth
  - ensures memory loss

What Type Of Teaching Strategies Help To Produce Complete Learning Cycles?

- Prefrontal pauses
- Two-level Concept Maps
- Case Vignette Question Analysis

Prefrontal Pause

- Students turn to a neighbor and discuss a question.
  - 1-2 minutes
  - Related to content just taught
  - Usually short essay; can be MCQ
- Requires use of prefrontal area
- Emphasis is always on giving a rationale
  - It's that way in the notes isn't a rationale

Two-Level Concept Maps

- Usually derived from lecture outline
- Draw map and comment on it to provide summary or a look ahead.
- Students then use as study guide.
- Natural progression to remaining levels of complexity
  - About 2 weeks
  - Changes in reading style
- Described in SuccessTypes book at website
Case Vignette Question analysis

- Understanding the correct answer.
  - How you needed to study to rule-in the correct answer
- Understanding the wrong answers.
  - How you needed to study to rule-out the wrong answers
  - Rephrasing the question
- Each answer is studied in depth to establish conditions that rule out or accept
- Check SuccessTypes book at website

Recap

- Experiential learning "flows" through the cortex
  - Personality type reflects time allocation.
  - Always completed through action
- Experiential learning develops both:
  1. Cognitive memory
  2. Critical thinking skills
- Long-term memory is external evidence of dendritic tree growth.
- Analytic memory is external evidence of dendritic tree growth.

32