

# Critical Thinking and the Use of Internet Tools:

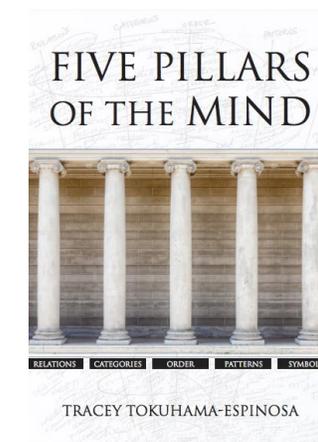
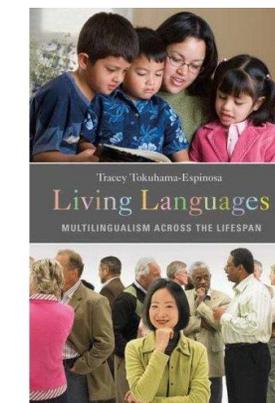
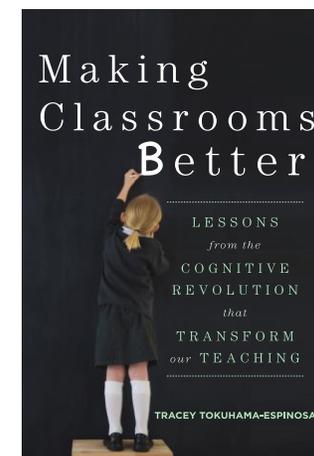
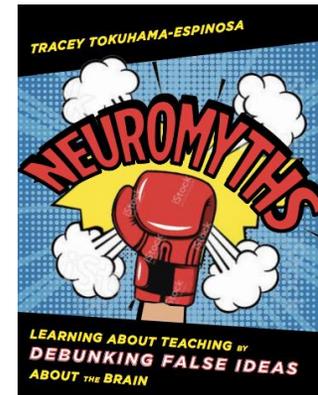
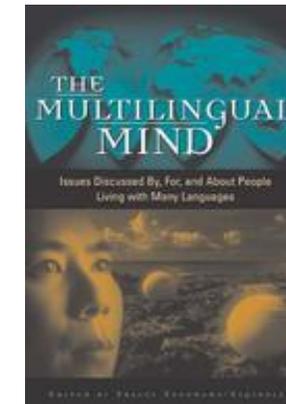
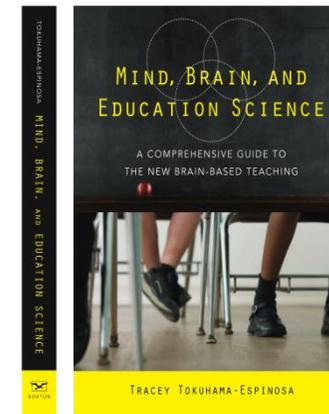
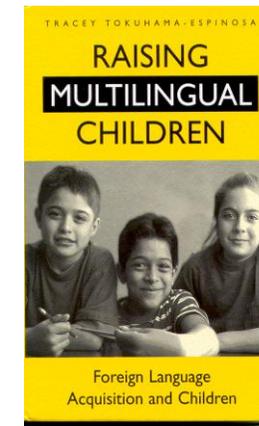
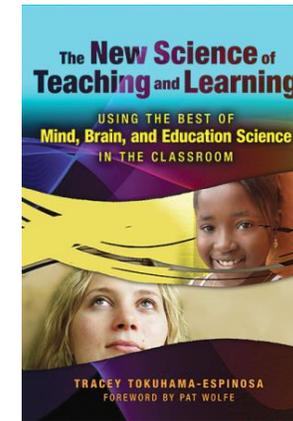
## When a search serves research and when a search promotes neuromyths

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# Tracey Tokuhama-Espinosa, Ph.D.

- **Professor, Harvard University Extension School:** Psych 1609 “The **Neuroscience of Learning:** Introduction to Mind, Brain, Health and Education science”
- **OECD: Member of the expert panel** on *Teachers New Pedagogical Knowledge* based on contributions from Technology and Neuroscience
- Latin American Social Science Research Faculty, Ecuador: **Educational Researcher and Professor**
- Interdisciplinary researcher in **neuroscience, cognitive psychology and education** (cultural anthropology and linguistics).
- **Associate Editor of the Nature Partner Journal Science of Learning**
- **Boston University:** BA, BS, *magna cum laude*; **Harvard University:** Master's in International Educational Development; **Capella University:** Ph.D. In Professional Studies in Education (*Mind, Brain and Education Science*)
- **Former Director of the Teaching and Learning Institute** at the *Universidad San Francisco de Quito* Ecuador
- **Former Dean of Education** at the *Universidad de las Américas*, Quito, Ecuador
- **Teacher at all levels of education** (K-University, continuing education) with more than 29 years of experience in 34 countries.



# Today

- The Teacher as Researcher Model (“teach a person to fish”)
- How to find “good” information for teachers
- Hints
- Common Neuromyths that Teachers Believe



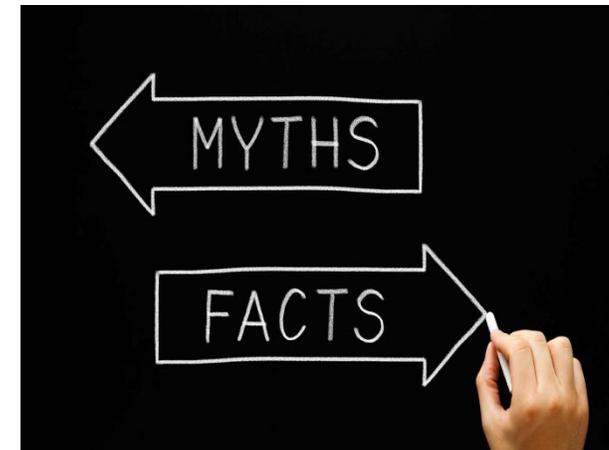
# “One-minute paper”

I know...	I want to know, would like to know...
	

- Left side: What you **KNOW** about the “**the brain and learning**”
- Right side: What you **WANT to know** (or think might be a **myth**).

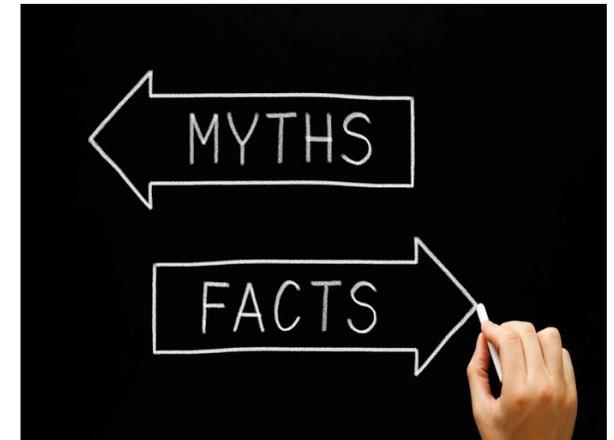
# Myths about Intelligence

- **Intelligence is fixed at birth (and not fluid).**
- Mental capacity is hereditary and cannot be changed by the environment or experience.
- **Boys are naturally better at math and girls are naturally better at language.**



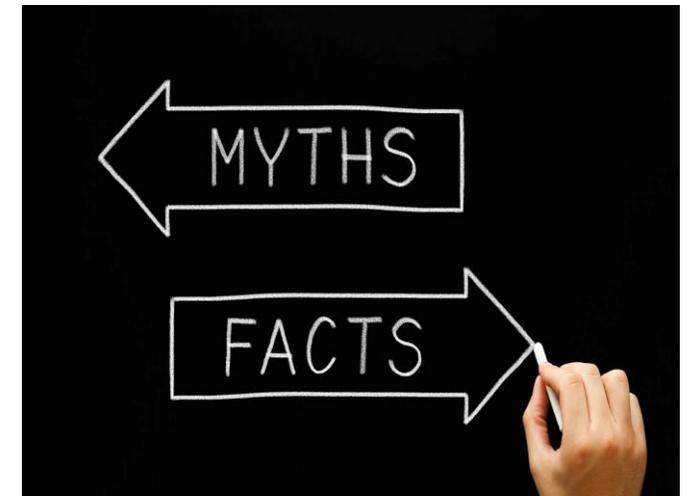
# Myths about development and the environment

- Everything important about the brain is determined by the age of three.
- **Using the Internet makes you smarter/dumber.**
- **Violent video games have no effect on behavior.**
- Humans are born with a “blank slate” and they will learn is knowledge is simply provided.



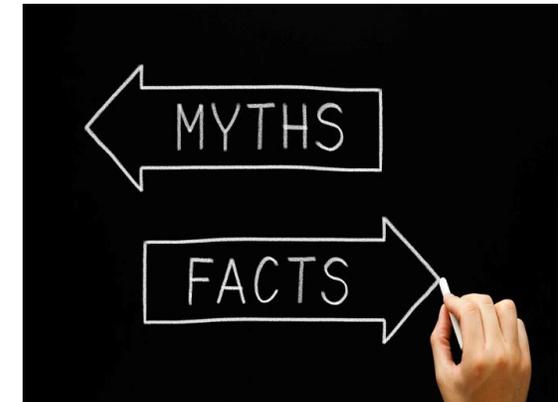
# Myths about brain architecture

- **Most people use about 10% of their brains.**
- Brain parts work in isolation from one another
- **Some people are more “right” brained and others are more “left” brained.**



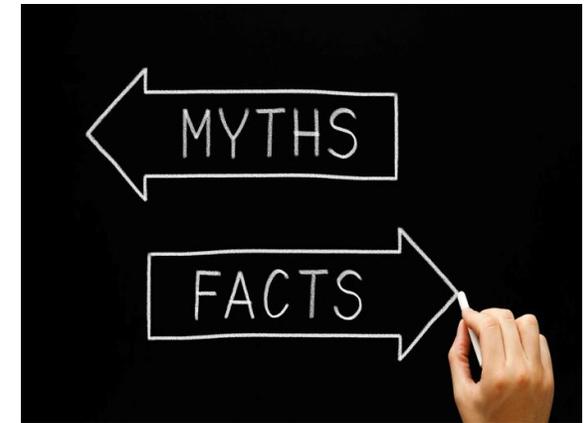
# Myths about memory

- Memory is like an objective recording of a situation and reality exists in an abstract form for all to perceive.
- **The brain has unlimited capacity for memory.**
- Memorization is unnecessary for learning (and unwanted in modern education).
- The brain remembers everything it has ever experienced; forgetting is due to bad encoding.



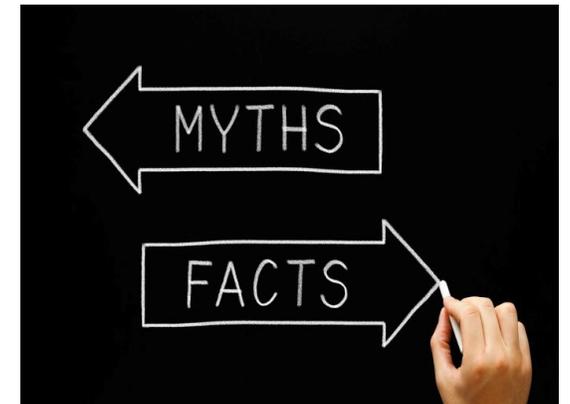
# Myths about brain activity

- **People can multi-task (and women are better than men at multi-tasking).**
- When you sleep, your brain shuts down.
- People who are “brain dead” are still conscious.



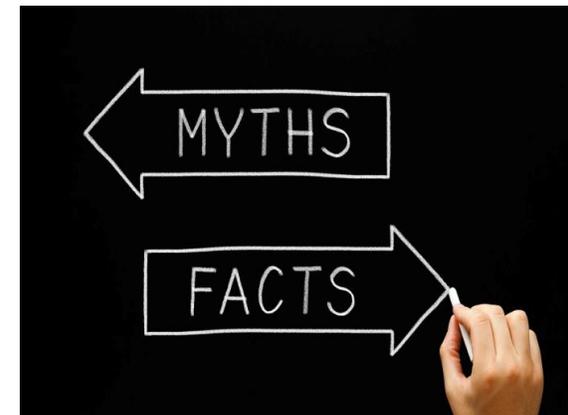
# Myths about teaching and learning

- Individuals learn better when they receive information in their preferred **learning styles**.
- The Theory of Multiple Intelligence is validated by neuroscience research.
- High-stakes testing are an accurate measure of what a student knows.

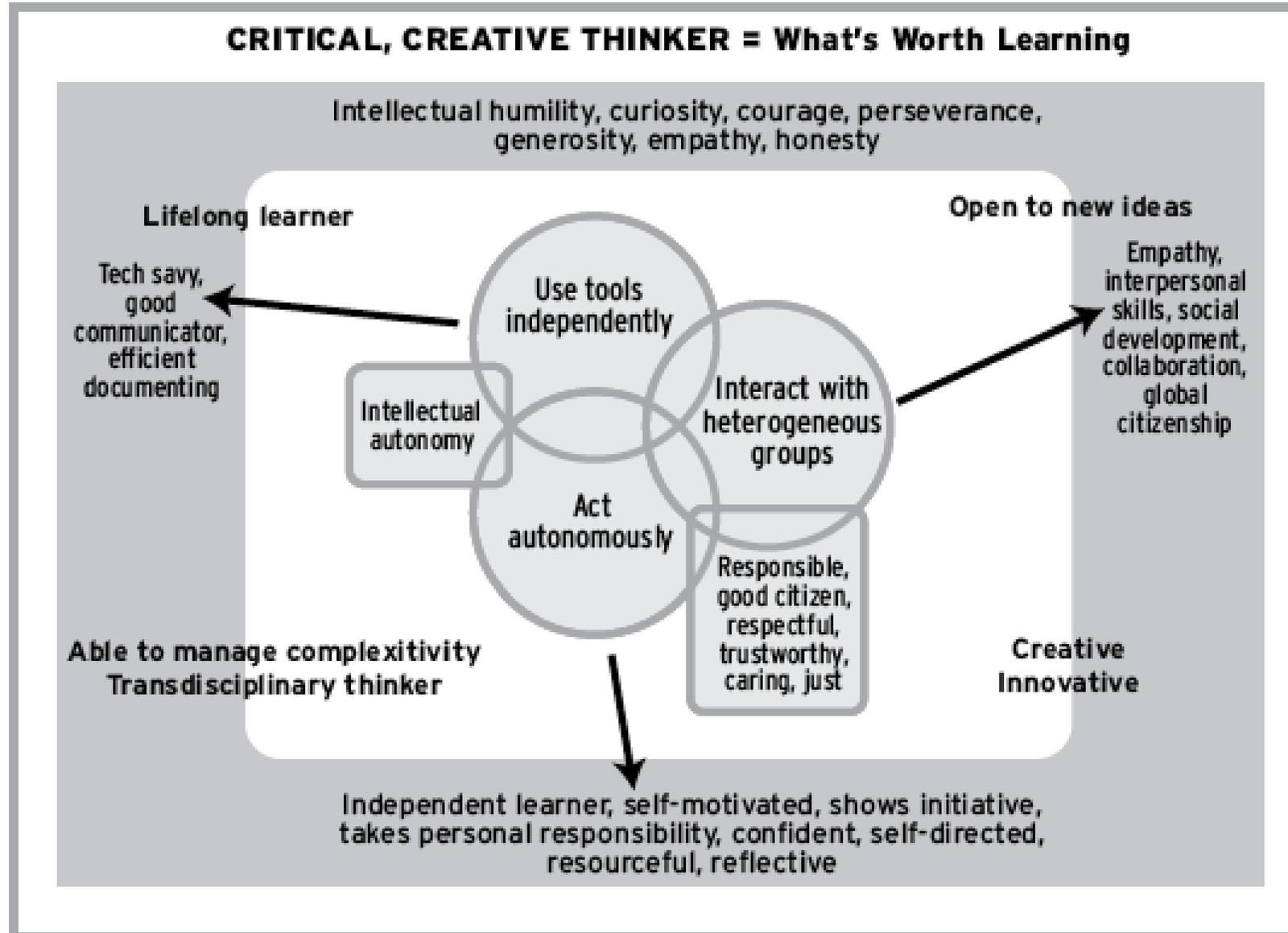


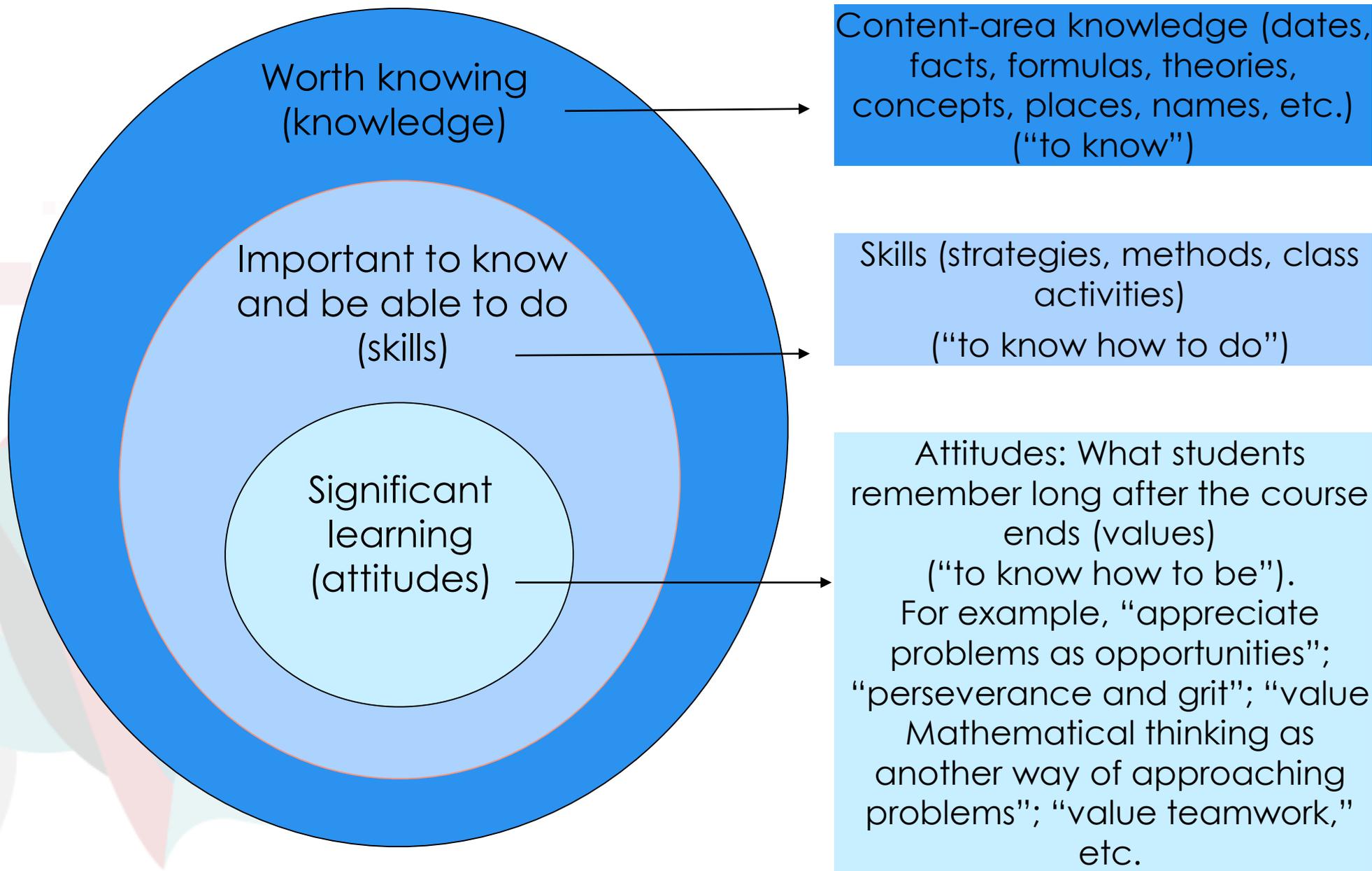
# Myths about language, bilingualism and multilingualism

- **Children are sponges and learn foreign languages effortlessly.**
- **There are critical periods for learning a new language.**
- Languages are located in the left hemisphere of the brain.
- Children must acquire their native language first before learning a second language.



# Desirable (21st Century) Skills: *how* versus *what* to teach





# The enemy of correct teacher attitudes: Unidentified prejudices

- Teacher prejudices about intelligence influence student learning (Hattie, 2009; 2012).

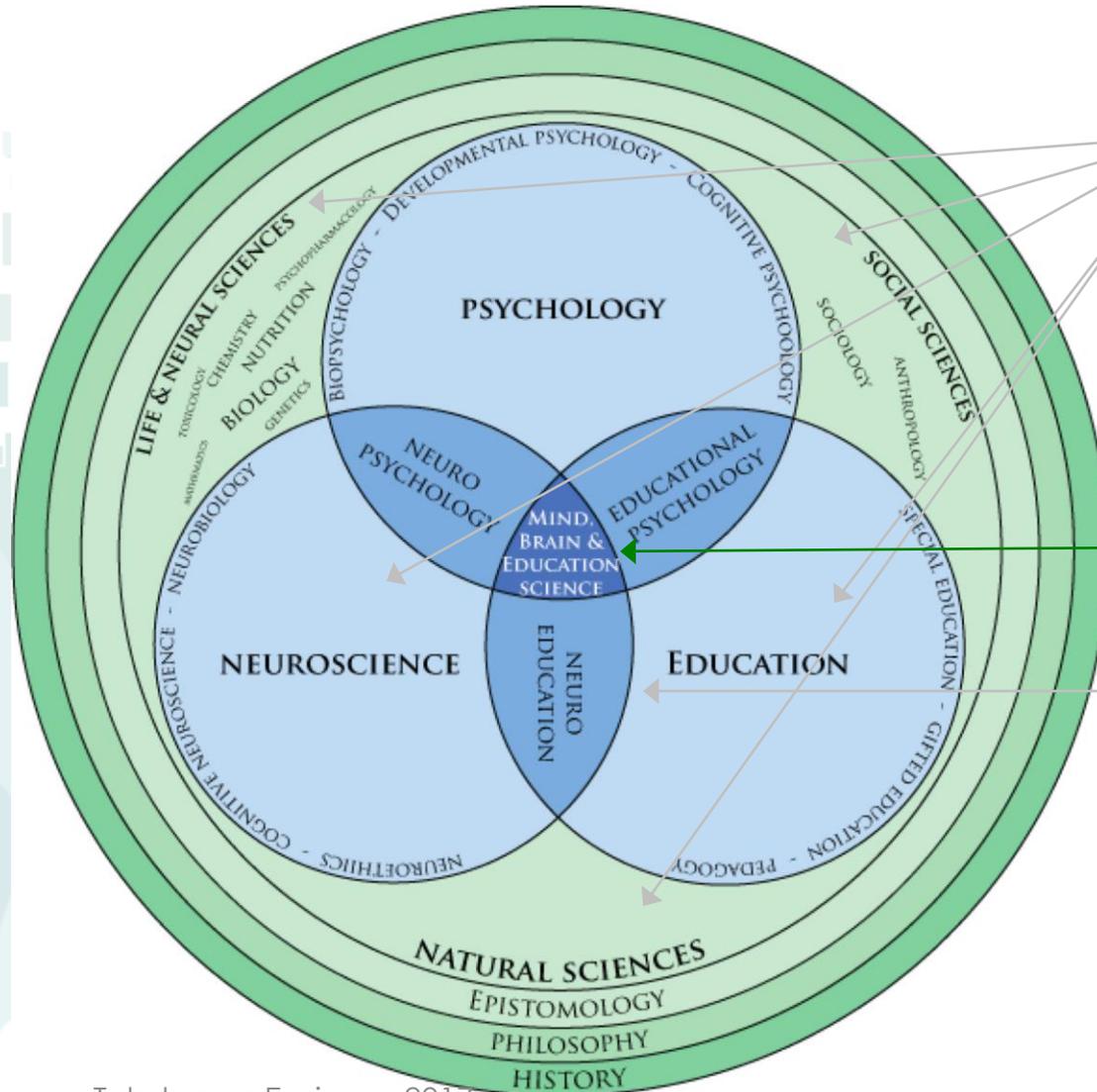


# Unconscious prejudices

- “If only the children were better behaved...” (as if social contagion had no role in teaching)
- “If only the parents were more responsible (passed on better genes)...” (as if intelligence was fixed by hereditary factors alone)
- “If only the kids would eat (sleep) better...” (presuming no one has taken the time to explain the role of sleep and nutrition in learning)
- “If only kids spent less time on computers...” (as if all contact with technology hurts learning)
- “If only there were more boys (girls) in my class...” (as if one gender is superior in learning to another)

“...Then I would be a great teacher.”

# The focus is on “THE TEACHING-LEARNING DYNAMIC”



THE LEARNING SCIENCES

**MIND, BRAIN, AND EDUCATION SCIENCE**

EDUCATIONAL NEUROSCIENCE

vs.

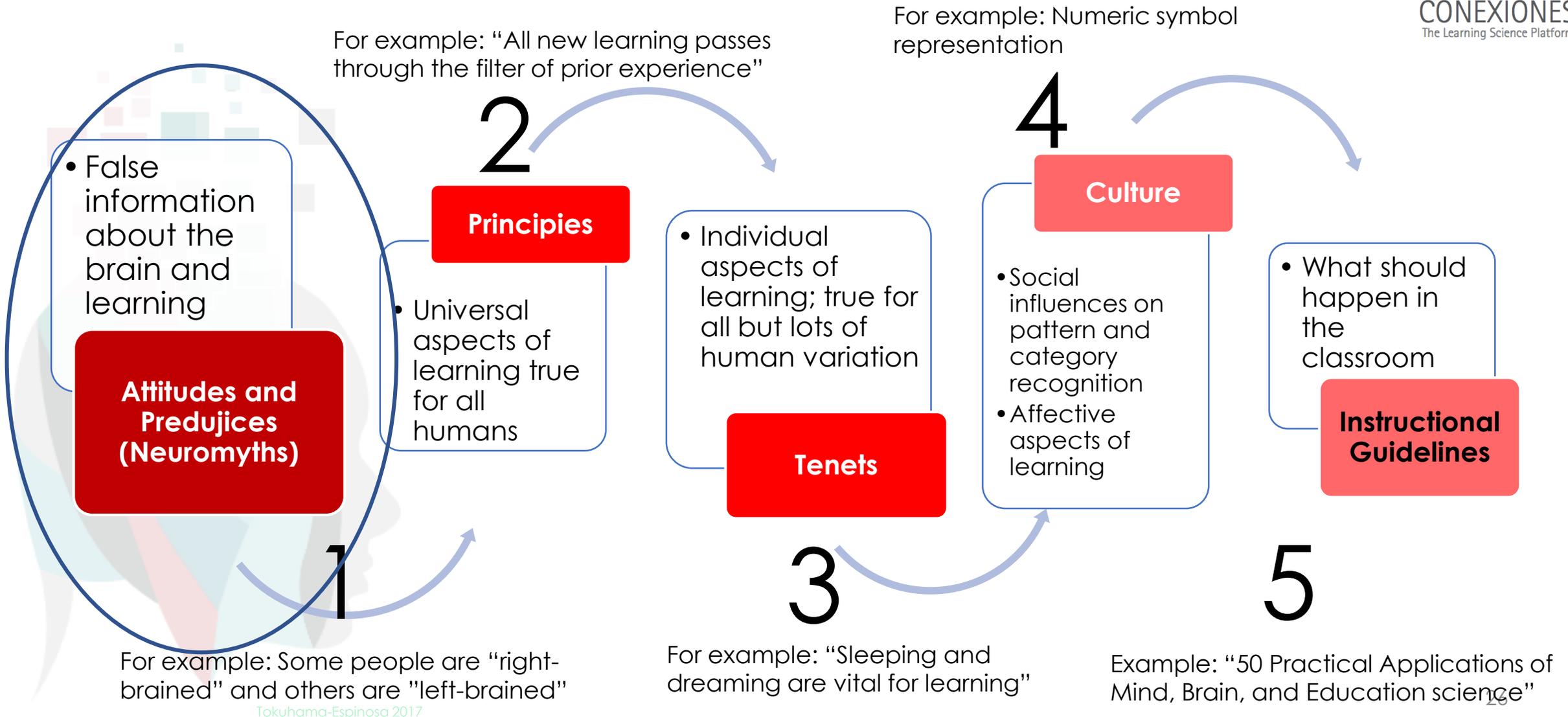
(NEURO EDUCATION)



- Designing educational experiences without an understanding of the brain is like designing a glove without an understanding of the human hand.

-attributed to Leslie Hart (1983)

# The “new first steps” in teacher professional development:



# Example Research on the “teacher as researcher” model

- Dana, N. F., Marrs-Morford, L., Roberts, S., & Laffoon, K. (2017). Teaching Principals to Be Action Researchers: The Indiana Principal Leadership Institute Coaching Model. *Journal of Practitioner Research*, 2(1), 1.
- Gess-Newsome, J. (2015). A model of teacher professional knowledge and skill including PCK: Results of the thinking from the PCK Summit. In *Re-examining pedagogical content knowledge in science education* (pp. 38-52). Routledge.
- Hamza, K., Palm, O., Palmqvist, J., Piqueras, J., & Wickman, P. O. (2018). Hybridization of practices in teacher–researcher collaboration. *European Educational Research Journal*, 17(1), 170-186.
- Mertler, C. A. (2016). *Action research: Improving schools and empowering educators*. Sage Publications.
- Mirra, N., Garcia, A., & Morrell, E. (2015). *Doing youth participatory action research: Transforming inquiry with researchers, educators, and students*. Routledge.
- Phillips, D. K., & Carr, K. (2014). *Becoming a teacher through action research: Process, context, and self-study*. Routledge.

# Internet searches

- Example: "Student motivation"



student motivation

All Images Videos News

About 748,000,000 results (0.50 seconds)

Google Scholar

"student motivation"

Articles

About 137,000 results (0.08 sec)

Any time  
Since 2018  
Since 2017  
Since 2014  
Custom range...

1900 —

**Classrooms: Goals, structure**  
C Ames - Journal of educational psych  
This article examines the classroom le  
theory of motivation. Classroom struct  
types of achievement goals salient an  
☆ 99 Cited by 8739 Related arti

Intrapersonal and interserson

Google Scholar

"student motivation"

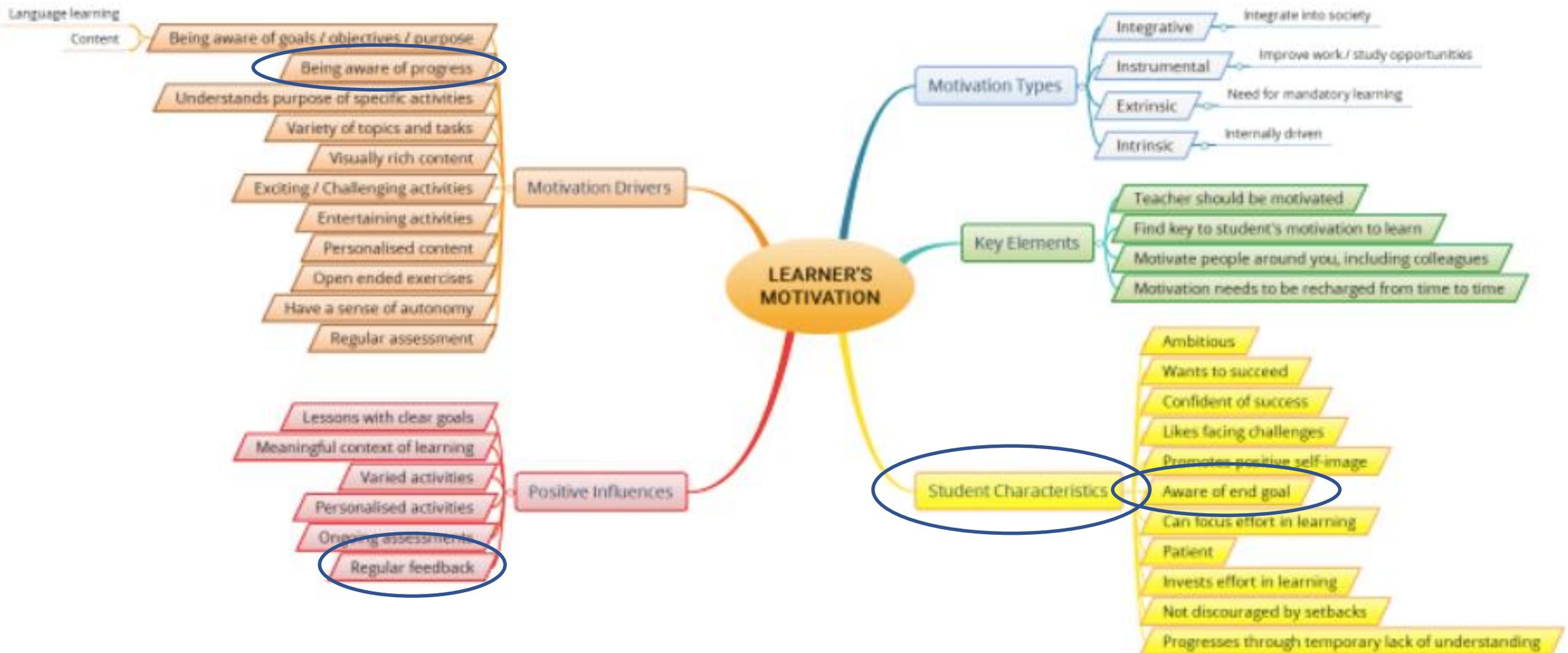
Articles

About 6,940 results (0.70 sec)

Any time  
Since 2018  
Since 2017  
Since 2014  
Custom range...

**SOCIOCULTURAL INFLUENCE THROUGH THE LENS OF**  
J Reeve, RM Ryan, EL Deci - Big  
Imagine doing what many educati  
student interactions, and formulat  
and learning. In a secondary schc  
☆ 99 Related articles

# The Role of Key Words



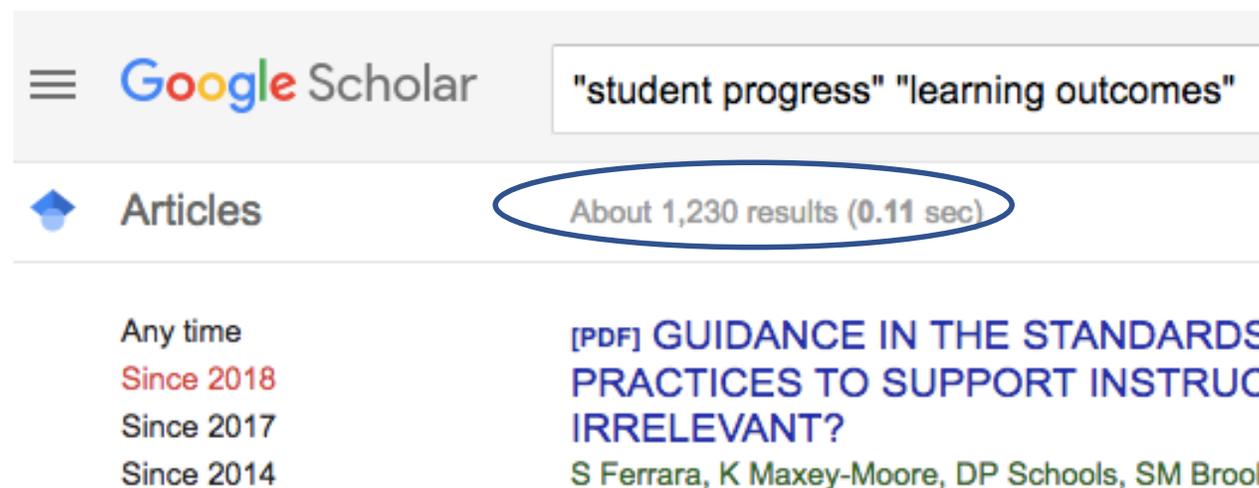
# A good question is vital to good research

- “How and to what extent does X influence Y?”
- ~~“How and to what extent does **motivation** influence **learning**?”~~

- “How and to what extent does a **student’s awareness of his progress** influence **learning outcomes**?”

# Google Scholar

- “How and to what extent does a **student’s awareness of his progress** influence **learning outcomes?**”



Google Scholar

"student progress" "learning outcomes"

Articles

About 1,230 results (0.11 sec)

Any time  
Since 2018  
Since 2017  
Since 2014

[PDF] GUIDANCE IN THE STANDARDS PRACTICES TO SUPPORT INSTRUC IRRELEVANT?  
S Ferrara, K Maxey-Moore, DP Schools, SM Broot

# Critical Thinking vs. Bias

- Humans have biases (*cognitive ontology*)
- It is natural to believe things we want to believe (“theory of brain”)
- We tend to find what we are looking for (because we ask biased questions):
  - “How and to what extent does a **student’s awareness of his progress** influence **learning outcomes**?”
  - vs.
  - “**What improves self-awareness and learning?**”

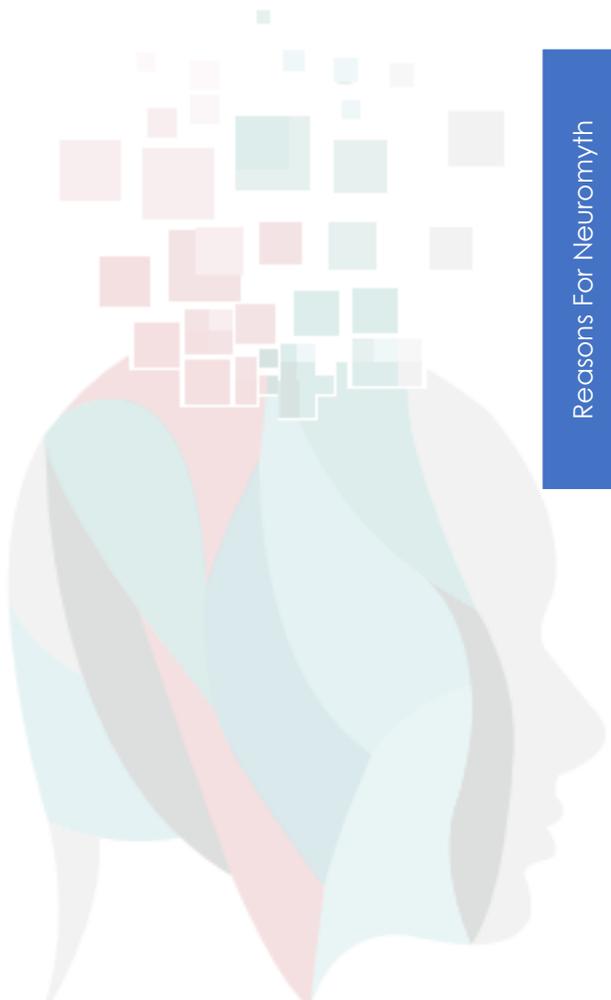
# Examples of biased (bad) research questions:

- “Which learning style leads to the best study habits?”
- “Why do boys and girls learn differently?”
- “Why are boys better at math than girls?”
- “Why are girls better at language than boys?”
- “How do you control crazy teenagers?”
- “What can we do with the increase in ADHD students in our classrooms?”
- “How can we reduce computer time to improve student learning?”
- “ ... ”

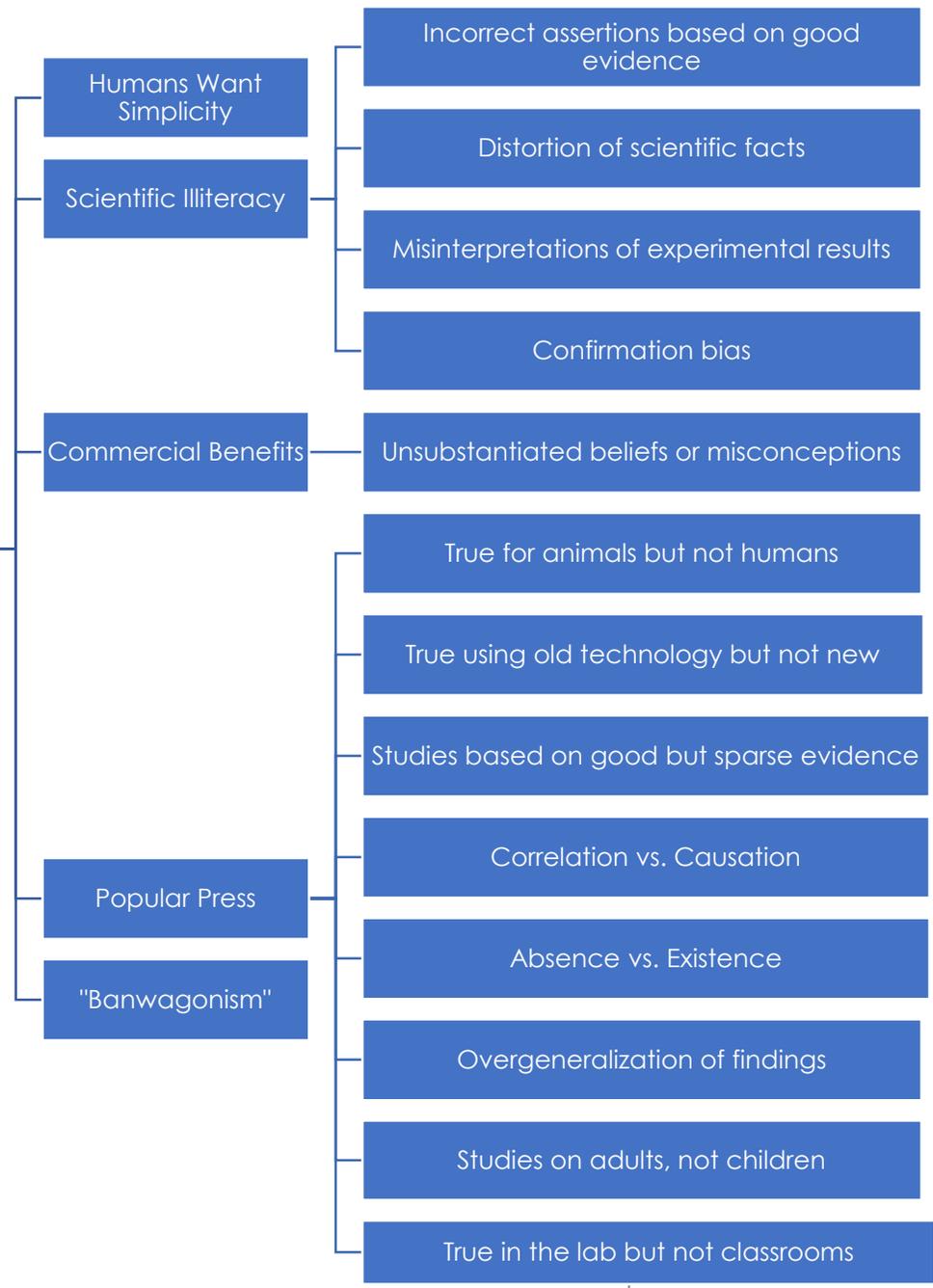
# Hints

- Resist bias! Keep an open mind!
- Ask questions that cannot be answered “yes” or “no”
- Begin with “how and to what extent” (qualitative data and quantitative data)
- Develop a strong list of key words before starting your search
- Use Google Scholar rather than Google (or a friend’s recommendation)
- Ask for help! ([www.thelearningsciences.com](http://www.thelearningsciences.com))

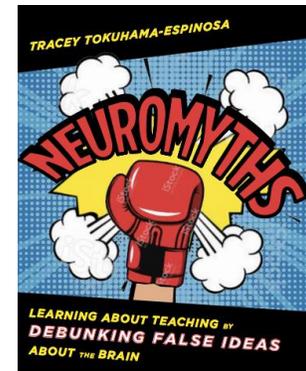
# Origins:



Reasons For Neuromyth



10 September 2018



Tokuhama-Espinosa, 2018

# Criteria for identifying myths

In general you can have confidence in studies....

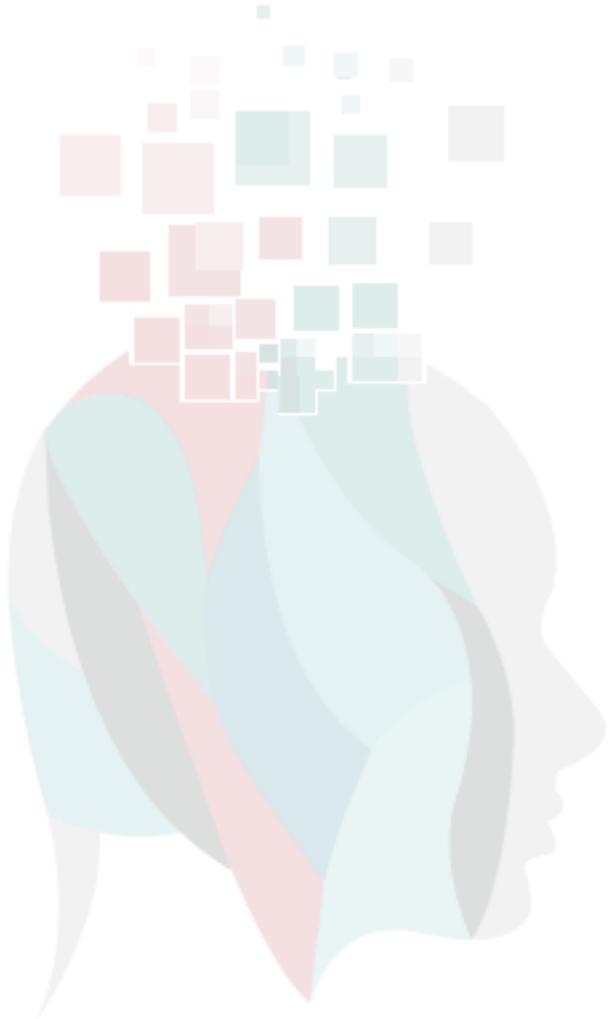
1. that are **current**
2. that have been **replicated**
3. that are conducted on humans
  - **School-aged children**
4. that appreciate the complexities of learning
  - measure “**real**” **skills** used in academic and life settings, not just lab design)

# 3-2-1



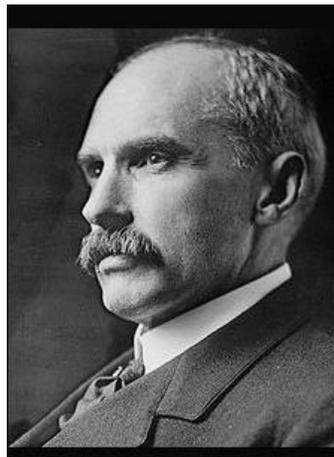
- 3: Three things you didn't know before
  - 2: Two things you will continue to research or talk about
  - 1: One thing you will change in your personal or professional life based on the information that was shared
- **Visible Thinking:** • “I used to think .... And now I think....”

# Questions?



# For more information:

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Who dares to teach must never cease to learn.

(John Cotton Dana)