Brain-Based Learning: Understanding How Students Really Learn.

Dublin - Ireland

18th March – 23rd March 2024

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- Ways to improve and accelerate teaching.
- Ensure long-lasting knowledge retention.
- Replacing conventional teaching methods with fun and creative practices.
- Promote student engagement.
- What does a human brain need to become and remain motivated.

THE BRAIN: FACTS AND MYTHS

True or False? Read the statements and decide if they are true or false.
Tick the box accordingly

True or false: Brain facts and myths

1. Environments that are rich in stimuli improve the brains of pre-school children.	True☐ False ☐
2. A stroke victim becoming paralysed can use other, undamaged parts of their brain to learn how to move again.	True☐ False ☐
3. Individuals learn better when they receive information in their preferred learning styles (e.g auditory, visual etc...)	True☐ False ☐
4. Blind people can develop superhuman hearing because they use the part of the brain that usually links to the eyes to process sound.	True☐ False ☐
5. Re-reading a text several times is a good learning strategy.	True☐ False ☐
6. Practicing piano in your mind can improve your actual piano play.	True☐ False ☐

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Environments that are rich in stimuli improve the brains of pre-school children

True or false?

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Environments that are rich in stimuli improve the brains of pre-school children

False

This is a misconception based on animal-models where animals were kept in small cages, leading to sensory deprivation. Children receive sufficient stimuli for their developing brains. Enriched and colourful classrooms may actually distract many children.

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A stroke victim becoming paralysed can use other, undamaged parts of their brain to learn how to move again

True or false?

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A stroke victim becoming paralysed can use other, undamaged parts of their brain to learn how to move again

True

Effectively, the stroke victim has to re-learn to move their limbs from scratch like a baby. It requires a lot of effort and training and the resulting connection is weaker than the original. Also in the first months one has to wait for the neuronal connection to the limb to re-stablish itself.

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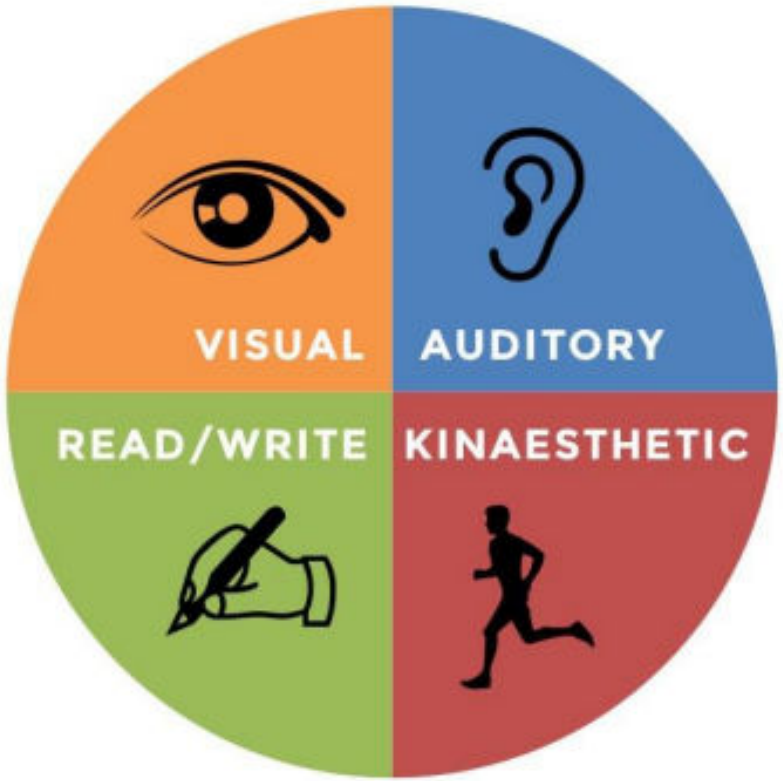
Individuals learn better when they receive information in their preferred learning style (e.g. auditory, visual, kinesthetic)

True or false?



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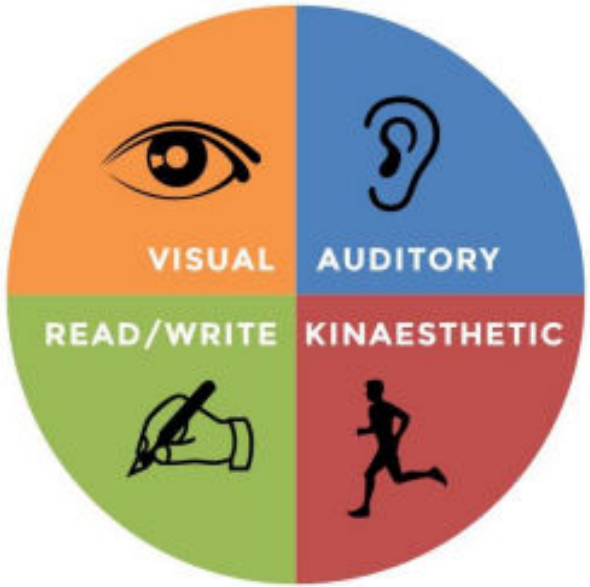
Individuals learn better when they receive information in their preferred learning style (e.g. auditory, visual, kinesthetic)

False



There is no scientific evidence that giving one student only visual information and another student only audio recordings based on their preferences has a positive impact on their learning.

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Blind people can develop superhuman hearing because they use the part of the brain that usually links to the eyes to process sound.

True or false?

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Blind people can develop superhuman hearing because they use the part of the brain that usually links to the eyes to process sound.

True

A blind person can understand a recording that is played 4 times faster than regular speech.
Regular humans cannot understand anything that is more than 2 times faster.
Some blind people can also echolocate, i.e. see their environment with their ears, like bats

https://www.scientificamerican.com/article/why-can-some-blind-people-process/#:~:text=Blind%20people%2C%20however%2C%20can%20comprehend,beings%20cannot%20talk%20this%20fast.
https://kids.frontiersin.org/articles/10.3389/frym.2022.628440

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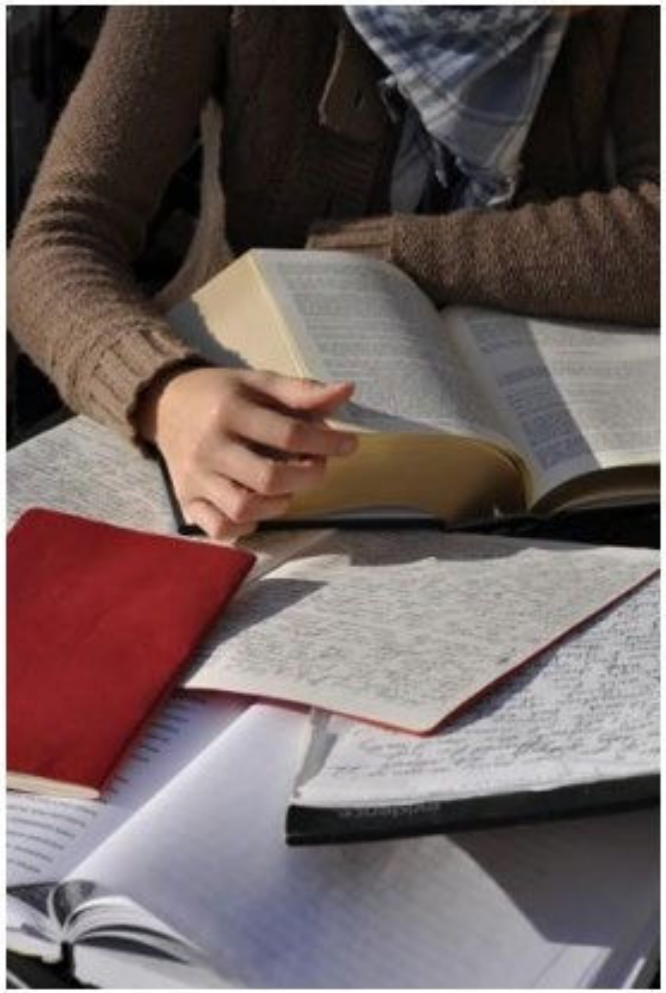
Re-reading a text several times is a good learning strategy

True or false?



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Re-reading a text several times is a good learning strategy

False

Re-reading a text does not make students better at remembering the text a week or a month afterwards. Instead, re-reading gives students a false sense of mastery of the subject because of the increased familiarity.

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Practicing piano in your mind can improve your actual piano play

True or false?

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Practicing piano in your mind can improve your actual piano play

True

Studies have shown that mental piano practice can induce similar neural changes than actually playing the piano.

https://www.hoffmanacademy.com/blog/can-you-practice-piano-in-your-head/

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What is a Mindset?

- Our mindset is made up of our **beliefs**, **ideas** and **attitudes**.

- Thinking about our mindset can help us when we do things, especially when we face a challenge.

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Mindset: The New Psychology of Success

According to the author Dr Carol Dweck, there are two different types of mindset,

- the FIXED; amd
- the GROWTH.

Mindset Challenge:	Fixed or Growth	Reason
Chris Gardner (Will Smith)	Fixed then Growth	Chris begins by displaying a fixed mindset about his son's basketball ability but then flips the narrative, telling his son, "don't ever let somebody tell you you can't do something, not even me".

Growth vs Fixed Mindset

Can the way we think about ourselves and our abilities shape our lives?

> The way we think about our intelligence not only affects the way we feel but it can also affect what we achieve. It affects whether we keep up with new habits or learn new things.

A **fixed mindset** means believing intelligence is unchangeable. If you think you're not good at something, you might believe you'll never improve.

A **growth mindset** is believing that your intelligence and talents can improve with effort and practice.

IMPORTANT TO ADOPT A POSITIVE OUTLOOK ON LEARNING.

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FIXED MINDSET

It's not . . .

I give up!

It's too hard.

I can't do this.

I can't do any better.

GROWTH MINDSET

It's . . .

I will try it another way.

I can train my brain.

I can't do this – yet!

Is this my best effort?

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"When do you feel smart?"

(from Carol Dweck's book, *Mindset: The New Psychology of Success*, page 22)

We asked people, ranging from grade schoolers to young adults, "When do you feel smart? The differences were striking.

People with the growth mindset said:	People with the fixed mindset said:
"When it's really hard, and I try really hard, and I can do something I couldn't do before."	"It's when I don't make any mistakes."
"When I work on something a long time and I start to figure it out"	"When I finish something fast and it's perfect."
	"When something is easy for me but other

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Teachers act as role models: If they display a growth mindset attitude, it is easier for students to also aquire a growth mindset.

Praise their effort not their intelligence. Teacher's feedback can challenge a student to improve and grow.

No one is fully growth mindset in all areas. We need to find our students mindset and adapt your approach accordingly.

INSTEAD OF.....	TRY THINKING....
I'm not good at this	What am I missing?
I give up	I'll use a different strategy
It's good enough	Is this really my best work?
I can't make this any better	I can always improve
This is too hard	This may take some time
I made a mistake	Mistakes help me to learn
I just can't do this	I am going to train my brain
I'll never be that smart	I will learn how to do this
Plan A didn't work	There's always Plan B
My friend can do it	I will learn from them

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In a growth mindset, challenges are exciting rather than threatening. So rather than thinking, oh, I'm going to reveal my weaknesses, you say, wow, here's a chance to grow.

— Carol S. Dweck —

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Tips for Stronger Learning and Memory

As teachers, we want our students to remember what they learn. Studying hard right before tests might help in the short term. Real understanding comes from using special teaching techniques that help students overcome the natural tendency to forget.

Overcoming Forgetfulness: **Spaced Learning**
This strategy involves revisiting taught concepts at increasing intervals.

Diversifying Learning with **Interleaved Practice**
Interleaved practice introduces variety into learning, helping students see connections and grasp underlying principles.

Simplifying Complexity with **Chunking**
Chunking simplifies complex information into smaller, more manageable parts.

Beyond Spaced Learning, Interleaved Practice and Chunking, consider including:

Retrieval Practice: Use quizzes or summaries to reinforce memory
Elaboration: Encourage diagrams or peer explanations to deepen understanding
Metacognition: Use reflection journals for students to identify effective study methods

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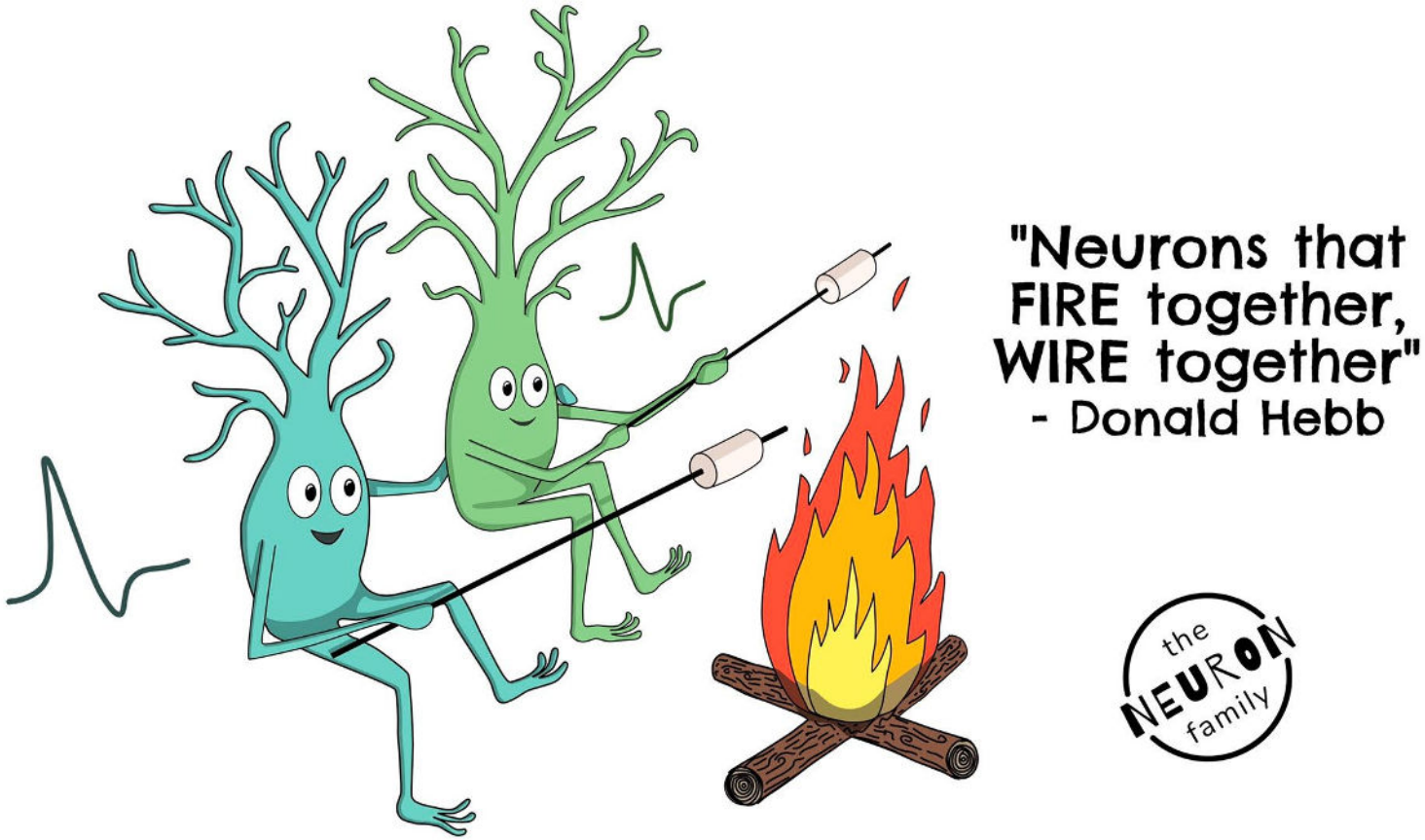
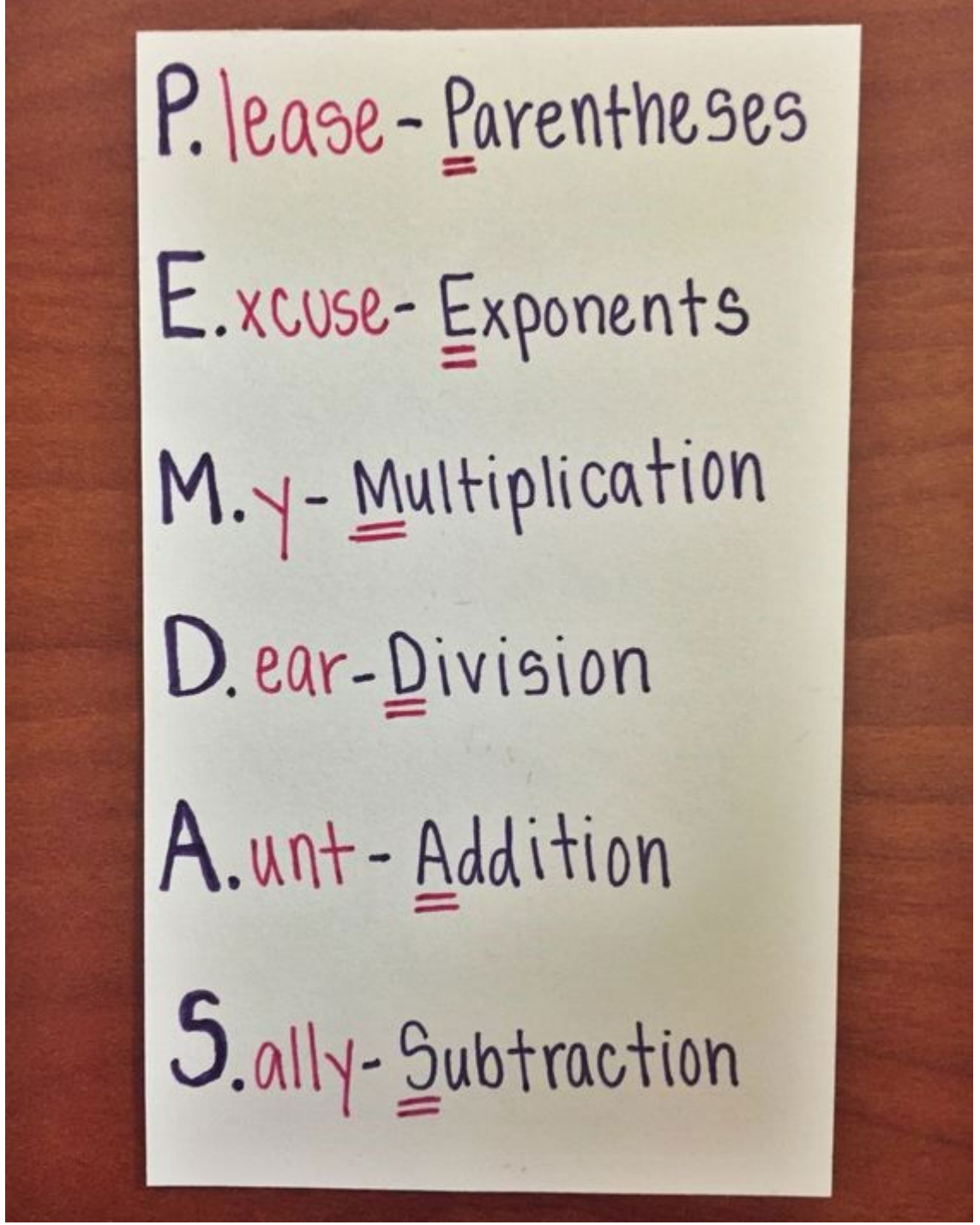
Students only know and notice what is relevant to them. Choose material that is of interest to the students.



Mnemonics

King	K	Kilometer
Henry	H	Hectometer
Died	D	Decameter
Magnificently	M	Meter
Drinking	D	Decimeter
Chocolate	C	Centimeter
Milk	M	Millimeter



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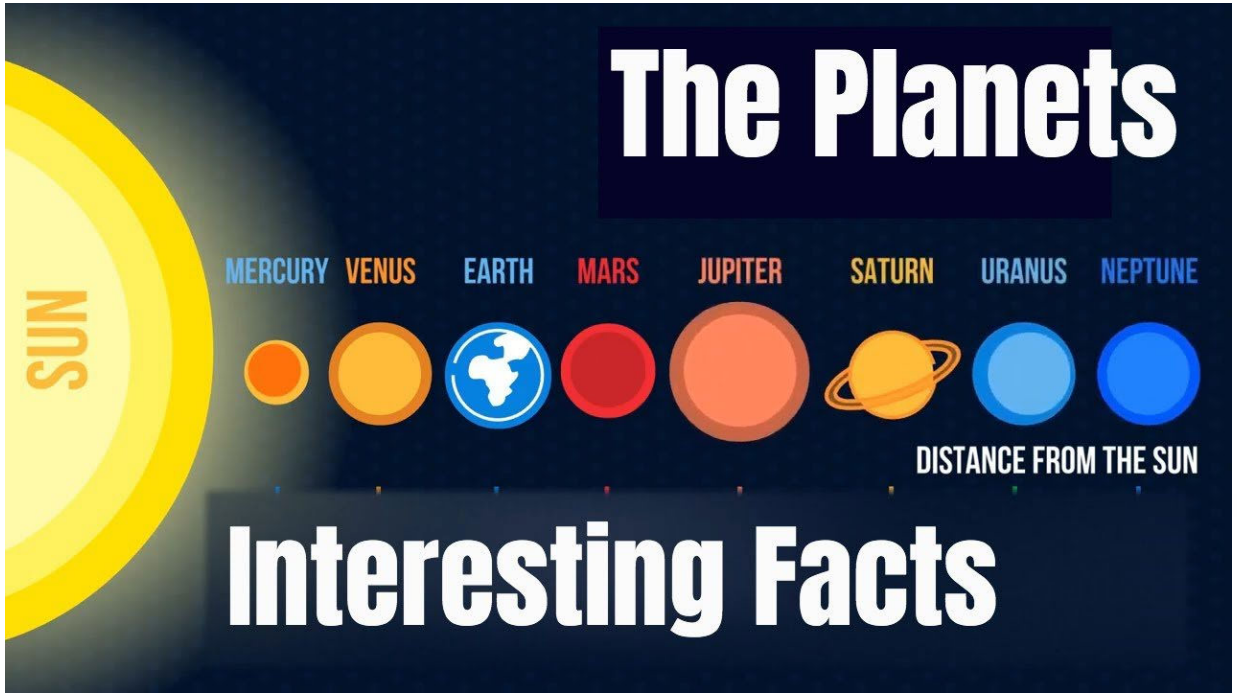

My	Mercury
Very	Venus
Easy	Earth
Method	Mars
Just	Jupiter
Set	Saturn
Up	Uranus
Nine	Neptune
Planets	Pluto

Planet Mnemonic

My	Mercury	
Very	Venus	
Excellent	Earth	
Mathematics Teacher	Mars	
Jumped	Jupiter	
Silently	Saturn	
Upon	Uranus	
Numbers	Neptune	

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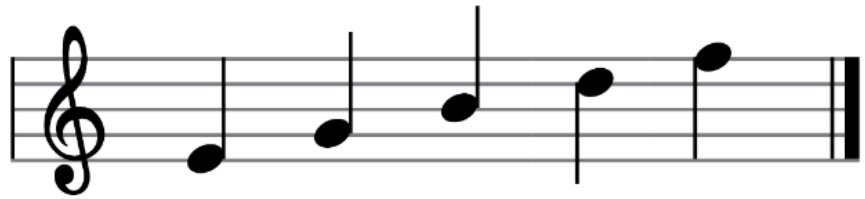
Every Good Boy Does Fine

Elvis' Guitar Broke Down Friday

Eat Good Burritos During Fiesta

Treble clef
Line notes

E4 G4 B4 D5 F5

STAVE'N'TABS

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Atomic Habits

- Based on James Clear's guide on how to change your habits and get 1% better every day.
- Following simple rules for creating good habits and breaking bad ones.

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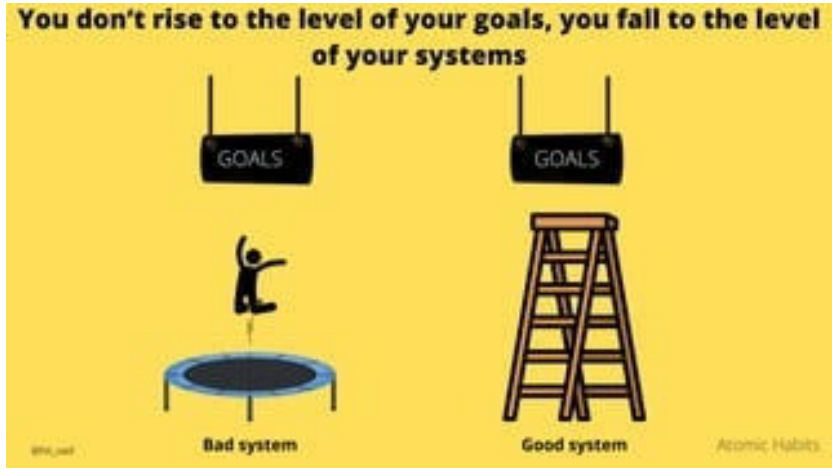
Small habits make a big difference



Small improvements are often underestimated as we typically look for fast or instant results, especially nowadays.

Improving by 1% isn't a massive or drastic change but it can be much more meaningful in the long run.

The starting point doesn't matter, but are our habits putting us on the path to success?

Focus on getting 1% better every day!

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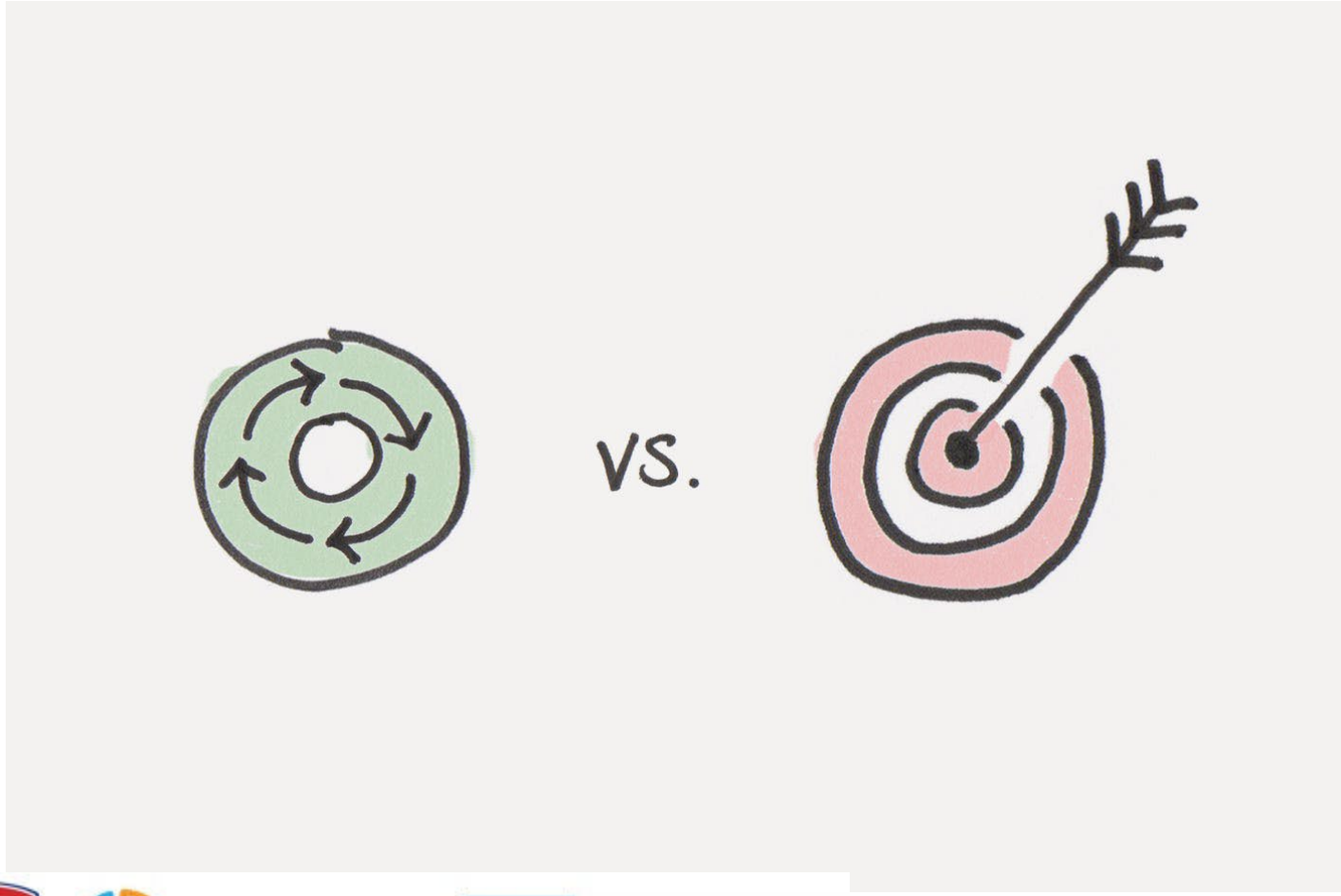
If you’re having trouble changing your habits, the problem isn’t you. The problem is your system.



- Goals are about the results you want to achieve. Systems are about the processes that lead to those results.
- If you’re struggling to reach a goal you need to change your systems. Having good systems leads to continuous learning and growth.

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If you’re having trouble changing your habits, the problem isn’t you. The problem is your system.

- Building good habits and good systems while breaking bad ones is the way we rise to the level of our goals.
- The purpose of setting goals is to win the game. The purpose of building systems is to continue playing the game. – Continuous improvement.

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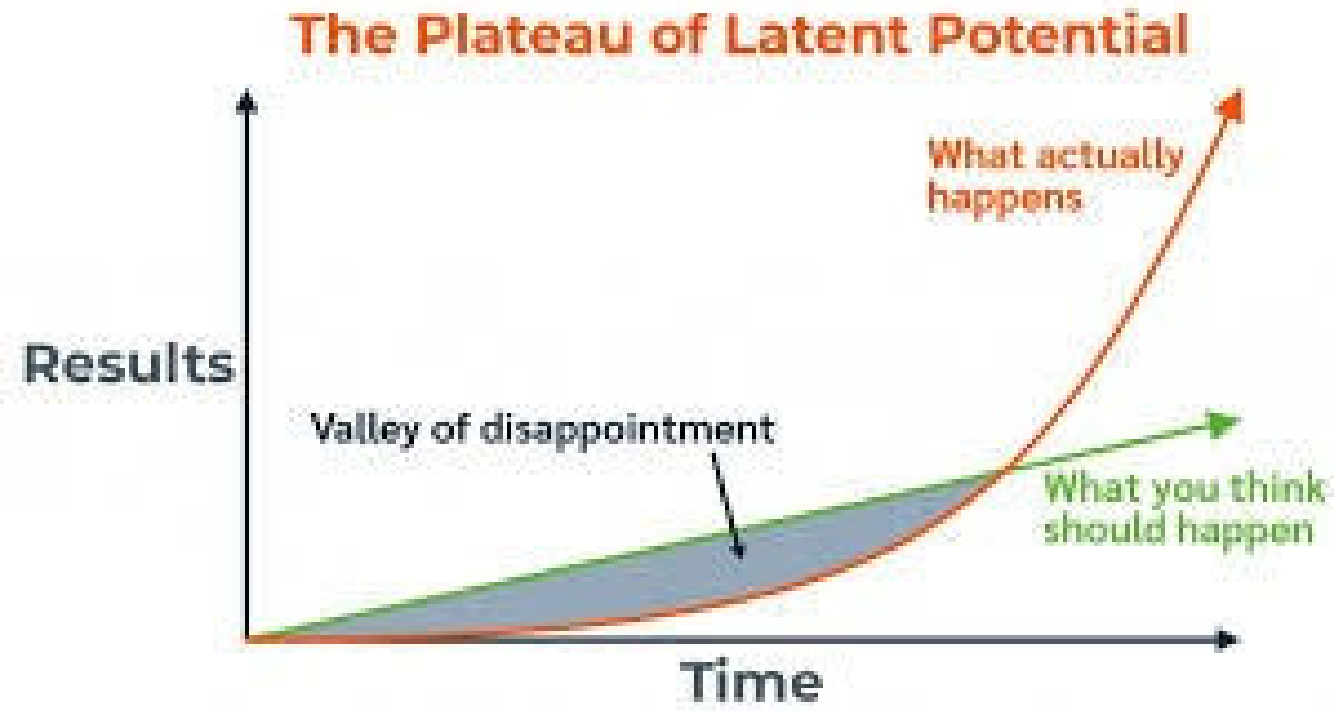

Valley of Disappointment

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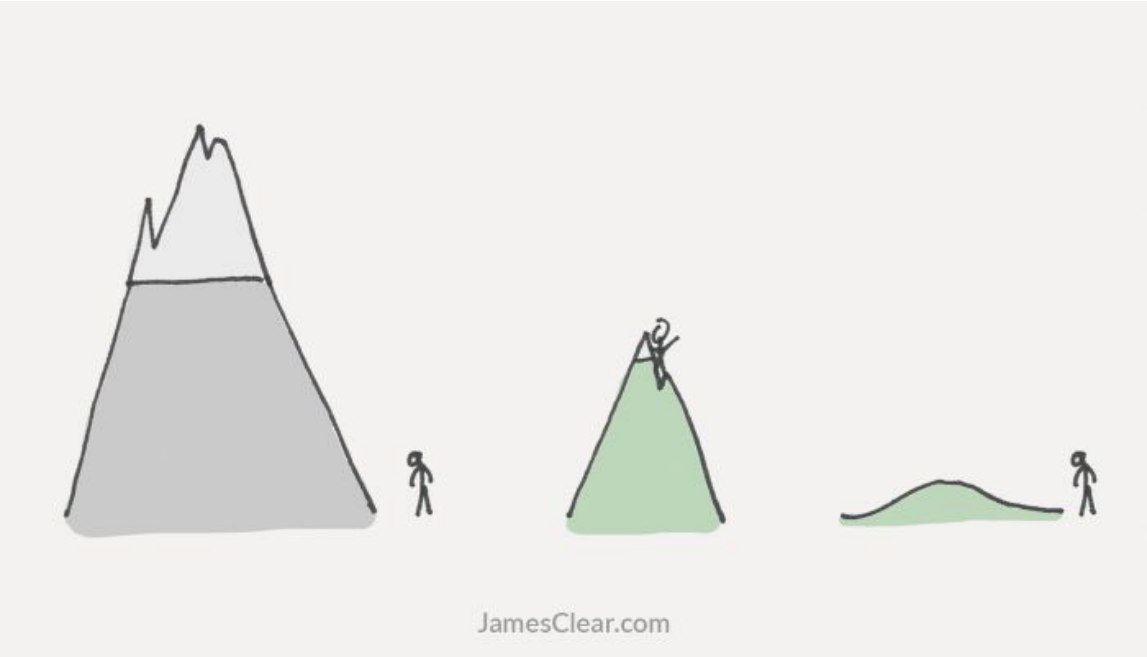
The Goldilocks Rule

- Very often we are faced with students who are lacking motivation, losing sight of their goals, losing steam, etc.
- The Goldilocks Rule tells us that humans experience peak motivation when working on tasks that are right on the edge of our abilities. This links to “When do we feel smart?” It’s not when something is easy or when something seems to be impossible, and we lose sleep over it until we give up.
- In order to motivate our students, tasks need to be at the perfect in between of boredom and anxiety.



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Four Laws of Behaviour Change

The Atomic Habits Cheat Sheet summarises many of the key ideas into a reference guide as to how to build a good habit or break a bad one.

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Directions Test

Please say nothing to anyone else!

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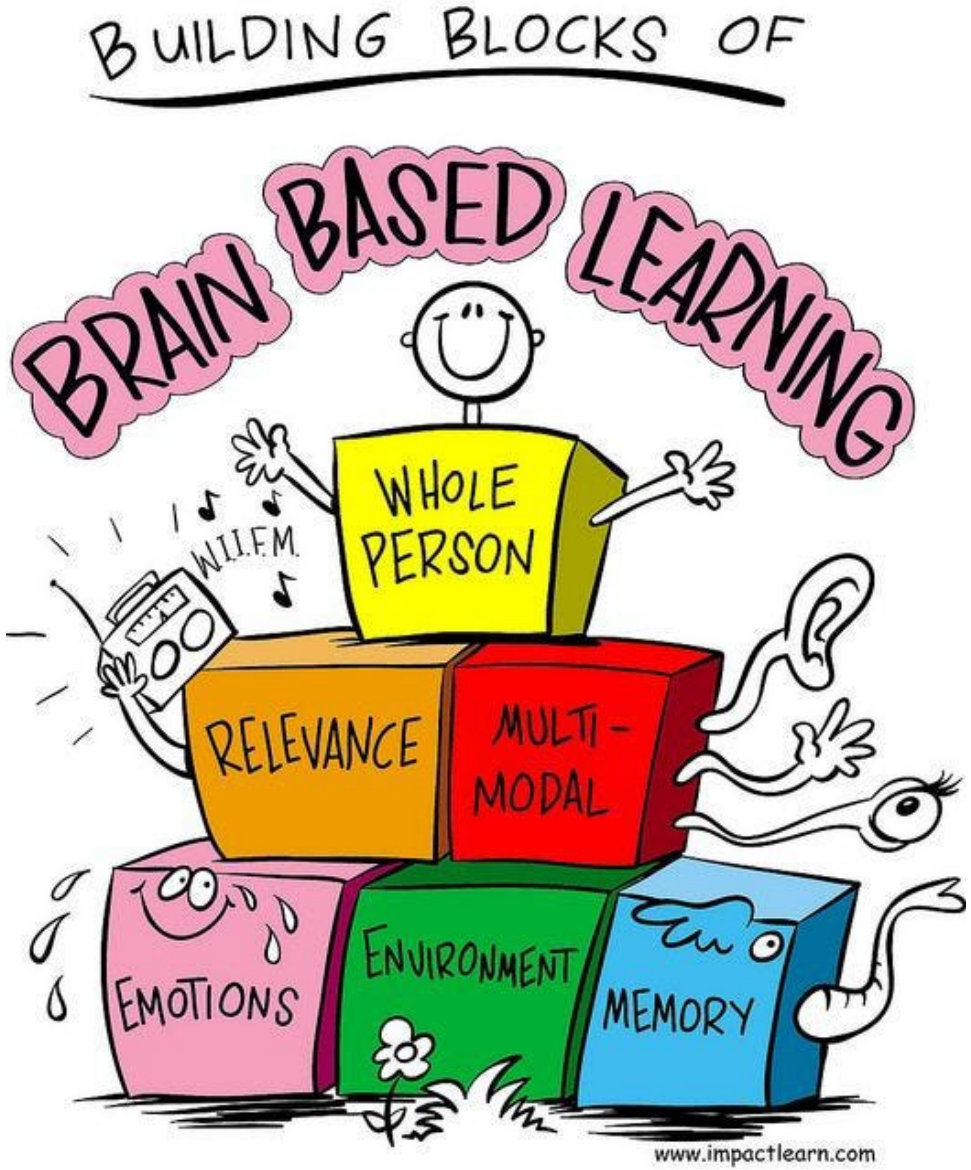
As adults we also fail to follow clear instructions, which proves that we shouldn't get frustrated when students "just don't get it".

There's much more to the brain and knowing how students learn can make a massive difference!

Implementing some of the techniques we discussed today could lead to some significant improvements, within ourselves and our students.



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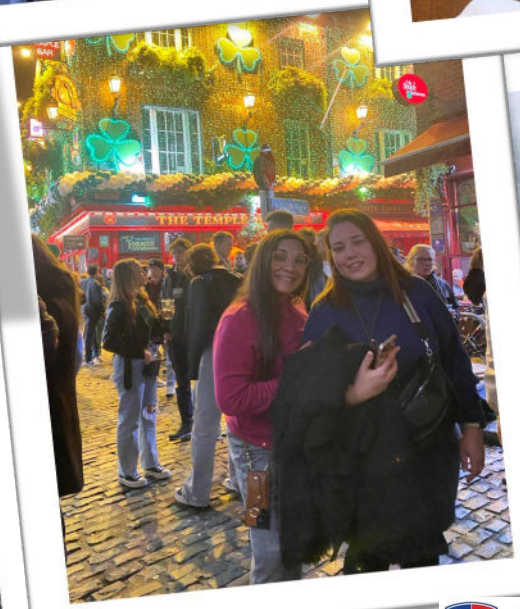

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