



UNIVERSITY OF
CAMBRIDGE
Faculty of Education



Executive functions: Foundational skills for learning and for life

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PEDAL Research Centre

<https://www.cambridgeinternational.org/Images/417069-developing-the-cambridge-learner-attributes-guide.pdf>



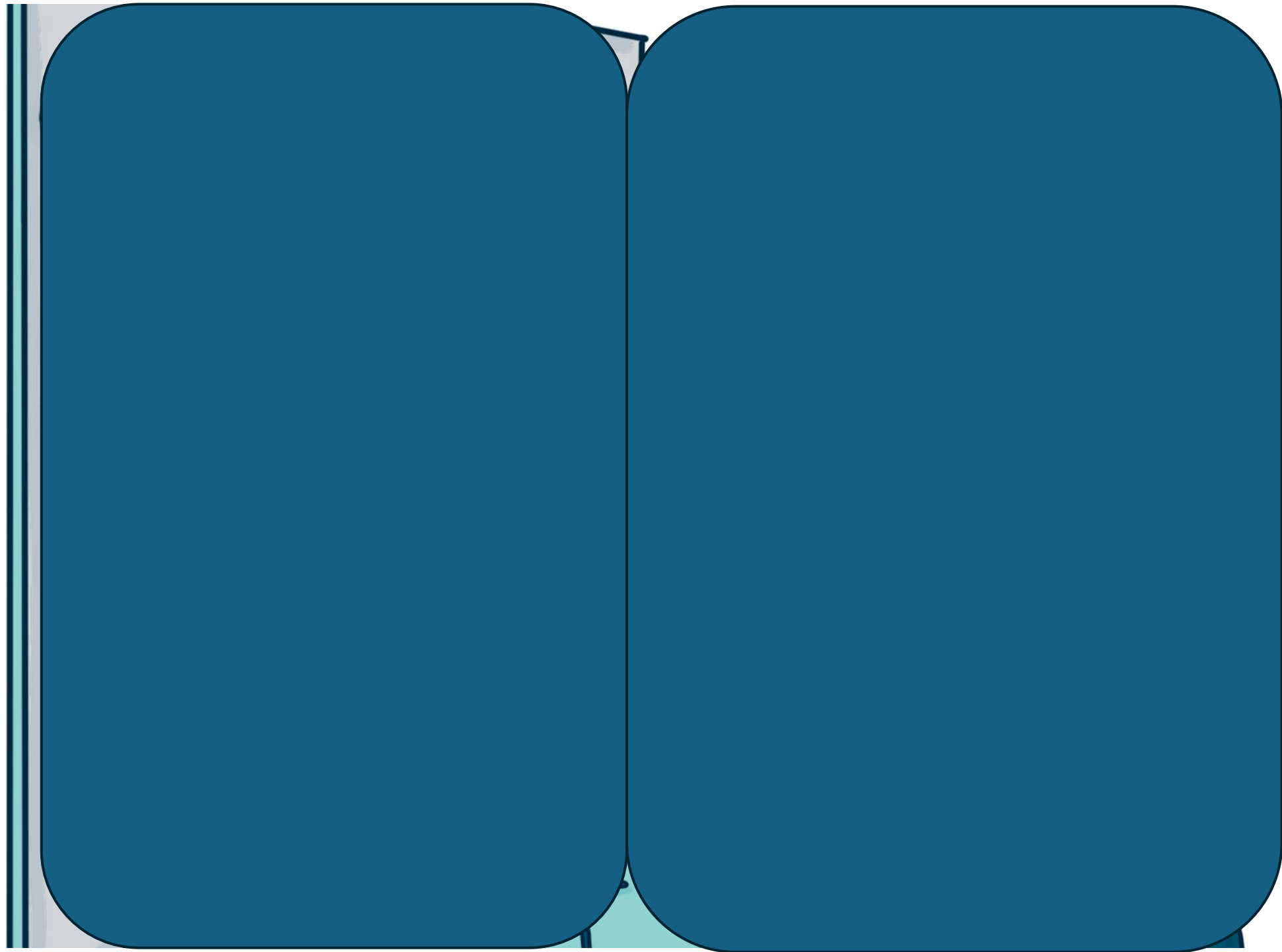
Confident

Responsible

Reflective

Innovative

Engaged



**Executive
functions:
Foundational
skills for learning
and for life**

Part 1

What are executive functions?

Part 2

How can we support our learners to develop them?

Executive functions are...



BRAIN-BASED SKILLS



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PROFILES

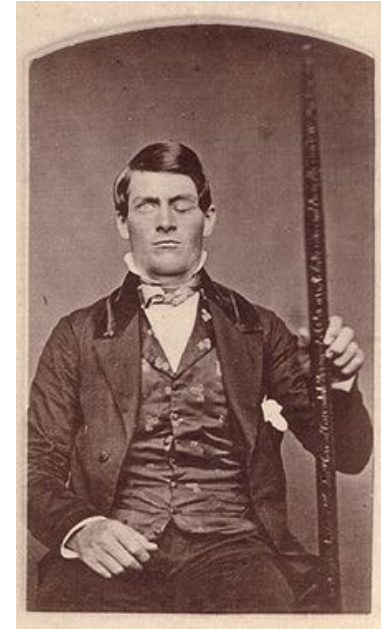


BUILDING BLOCKS FOR
LIFELONG LEARNING

The famous Phineas Gage case

In 1848 Phineas Gage, a 25-year-old American railroad construction worker had an accident

Gage was left with speech, movement, intelligence
But... difficulties with context-appropriate behaviour



Executive functions:

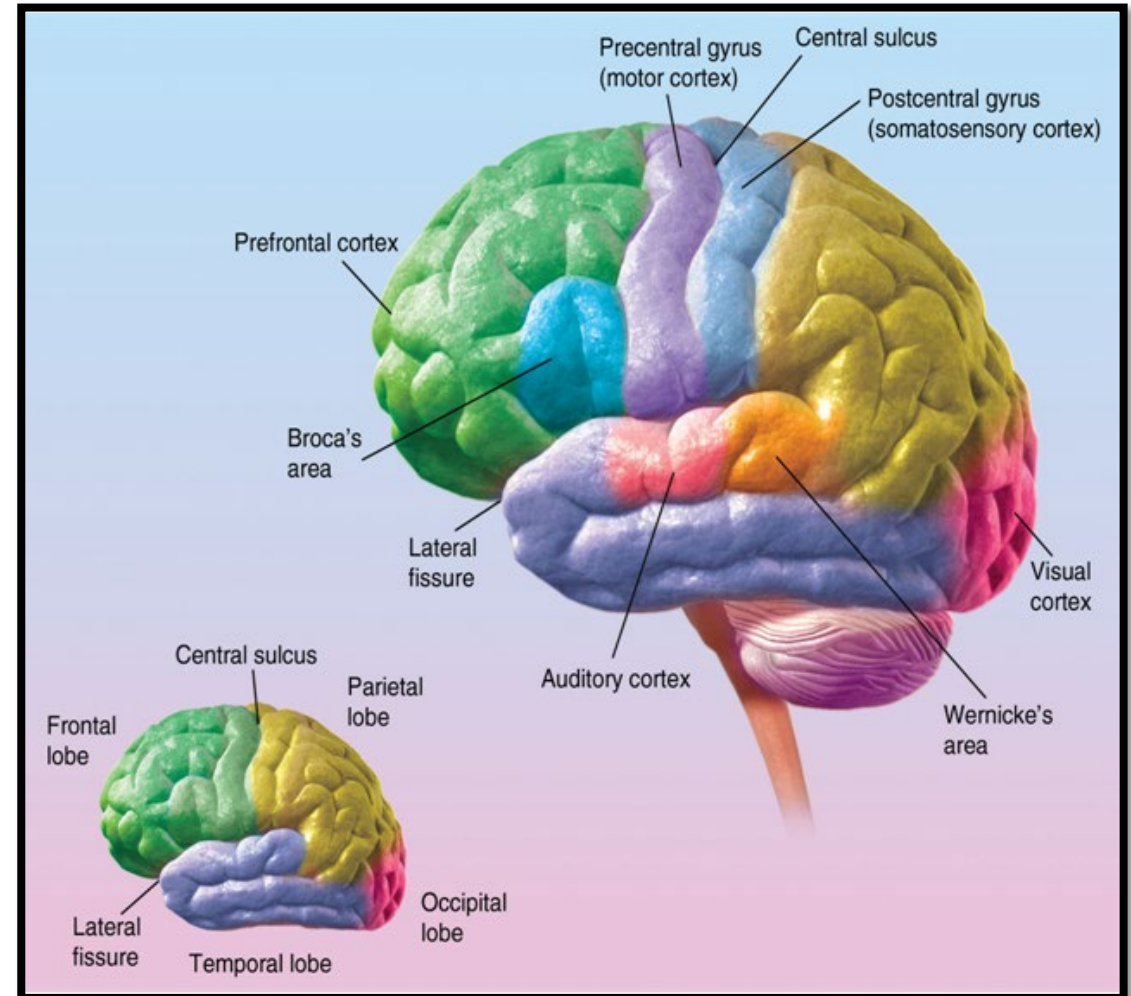
Prefrontal cortex

Prefrontal cortex

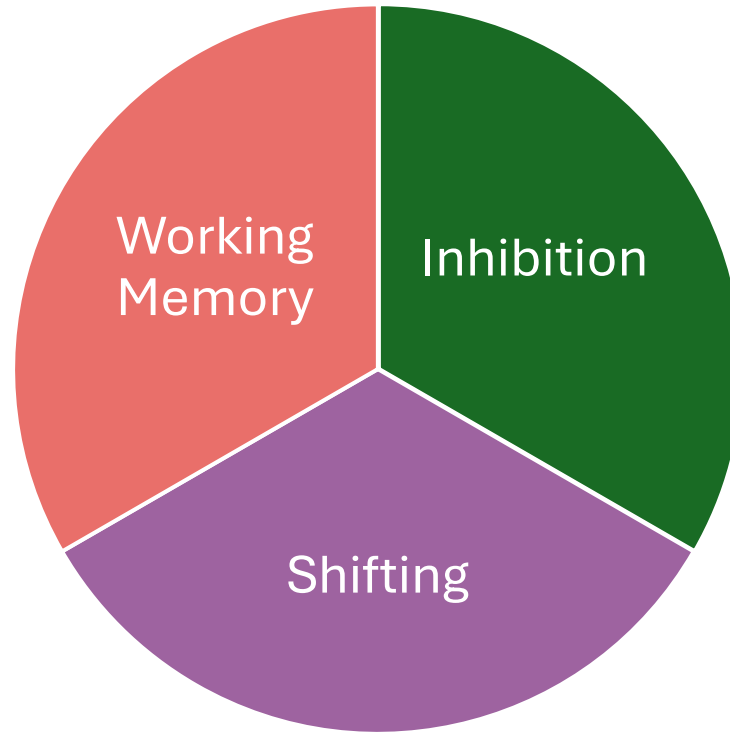
- plays a role in organizing and planning, decision making, impulse control
- adjusts behavior in response to rewards and punishments

Prefrontal challenges

- impair the ability to learn from consequences & decreases the ability to control impulses
- often found in neurodivergence



Basic Executive Functions

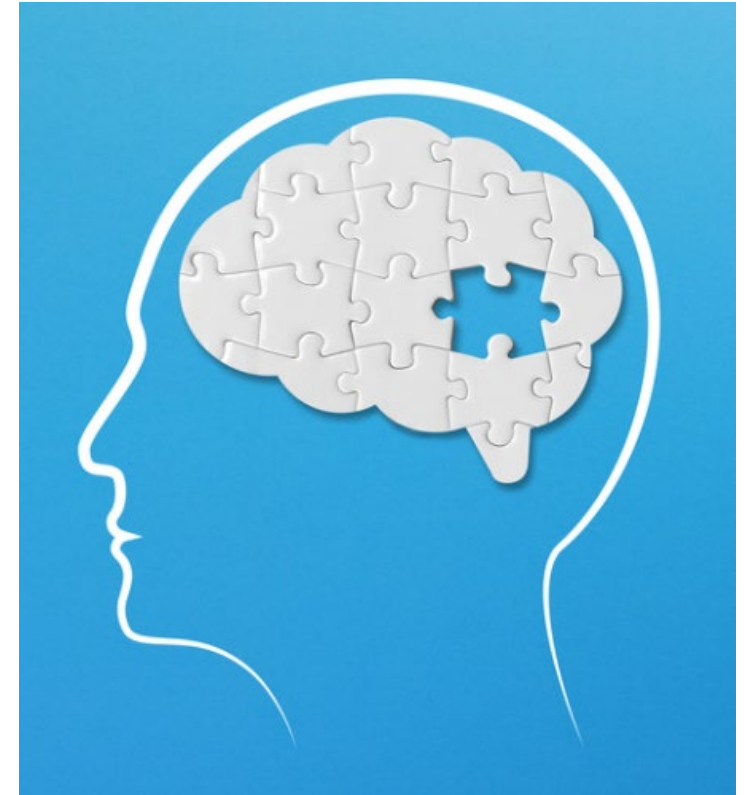


Working Memory

Holding information in mind and working with it

Helps to identify connections and patterns

Limited capacity



Working Memory Example

8 1 3 7 2

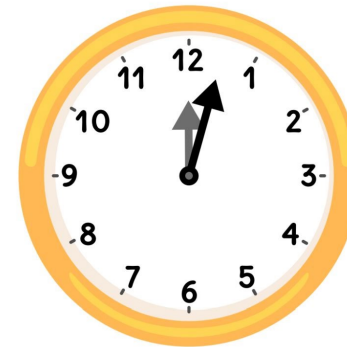
Inhibition

Ignoring distractions and temptations

Waiting your turn

Sticking to the plan

Regulating emotions



Inhibition Example

Say the colour of the ink







BLACK

RED

BLUE

GREEN

BLACK

BLUE

YELLOW

Flexibility

Thinking creatively 'outside the box'

Looking at things from different perspectives

Adapting to changing circumstances or requirements



Over to you...

Which executive functions do you think about most in your work?

Do you think about these at certain times of the day or week?

More with some learners more than others?

When have you used executive functions in the last week?

When have you NOT used them, but you should have?

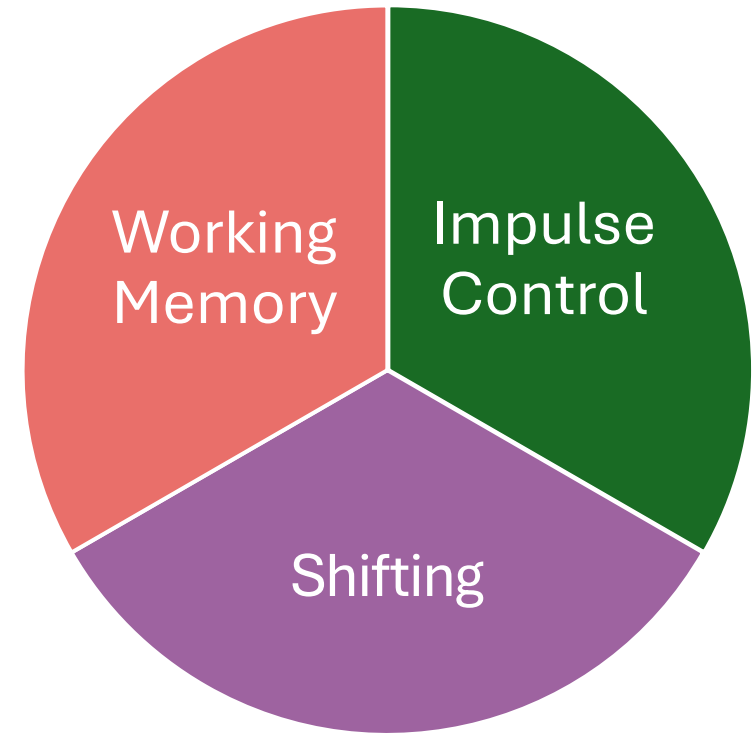


Image: Manasa
RB, M.Sc SLP

Executive functions are...



BRAIN-BASED SKILLS

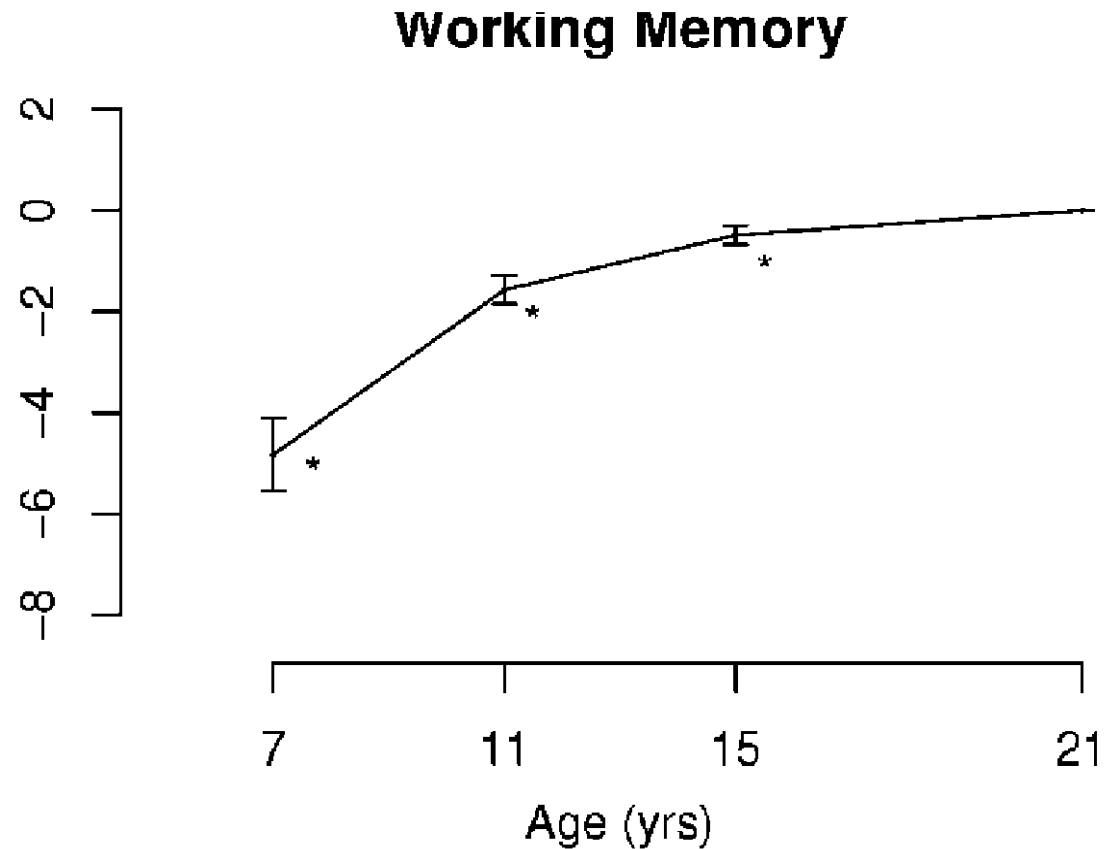


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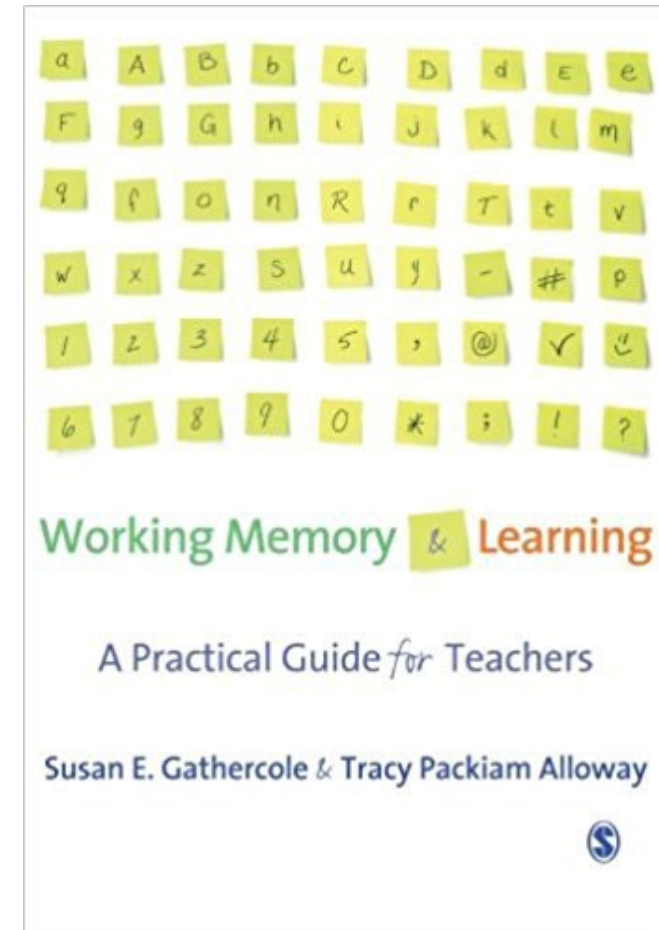
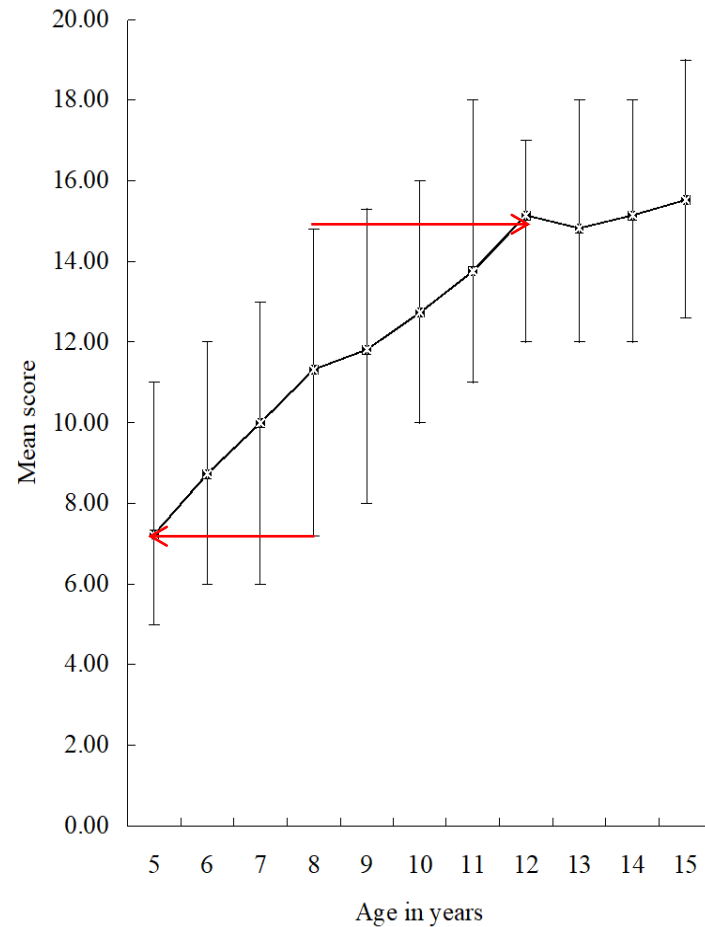
BUILDING BLOCKS FOR
LIFELONG LEARNING

One size does not fit all



Huizinga, Dolan and Van Der Molan (2006)

One size does not fit all



The skill and the will...

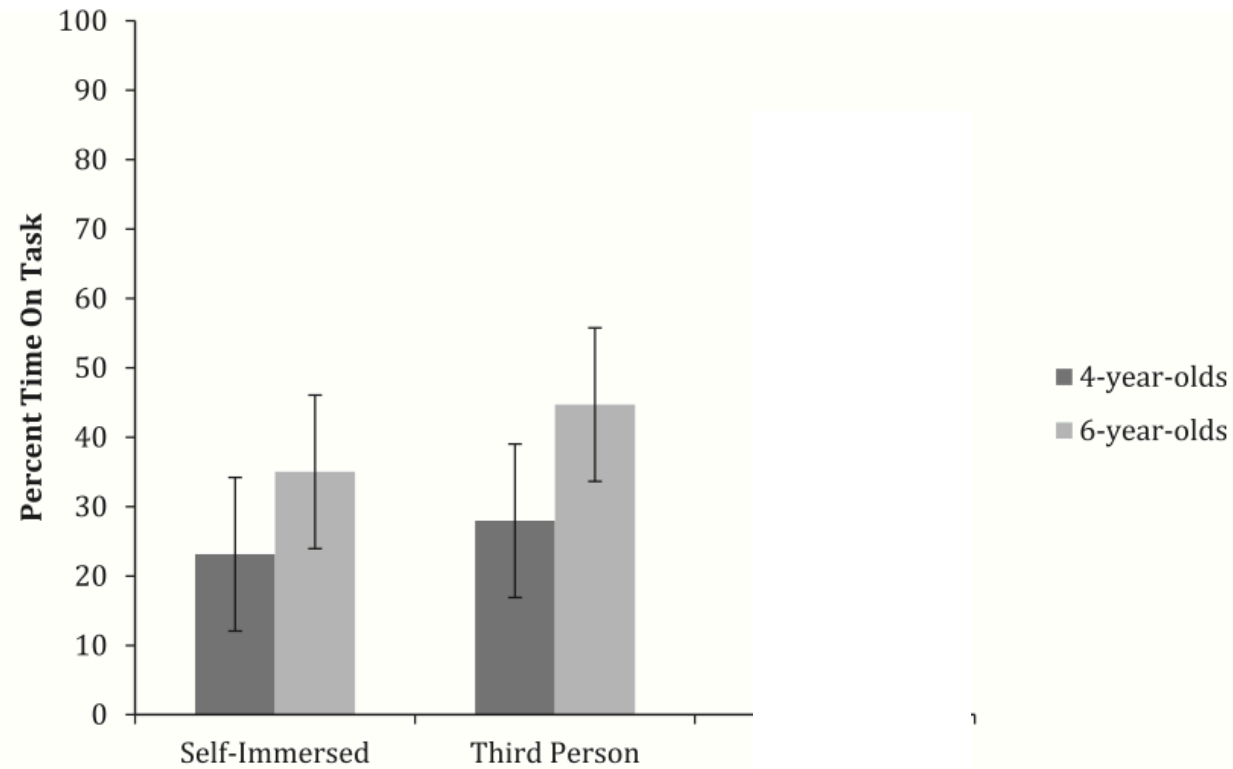
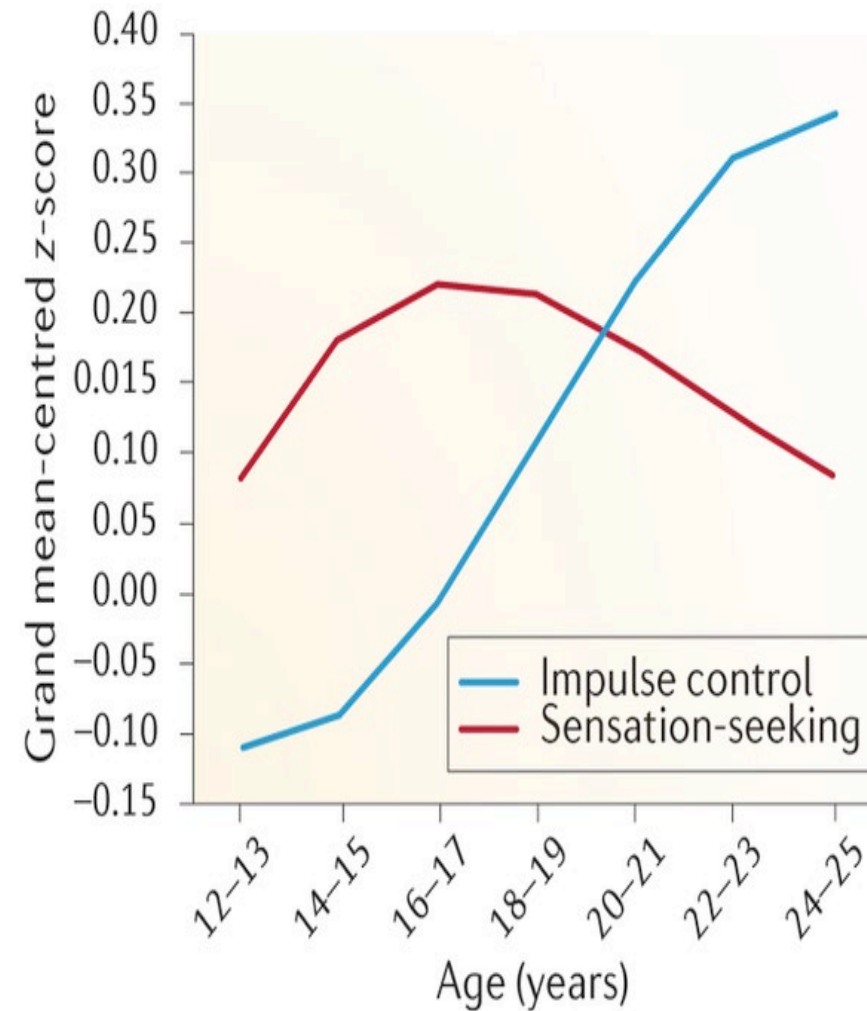


Figure 1. Percentage of time spent on work task by condition and age. Bars indicate 95% CI.



Photo by Studbee on Unsplash

Executive functions, adolescence and the judicial system



Executive functions are...



BRAIN-BASED SKILLS

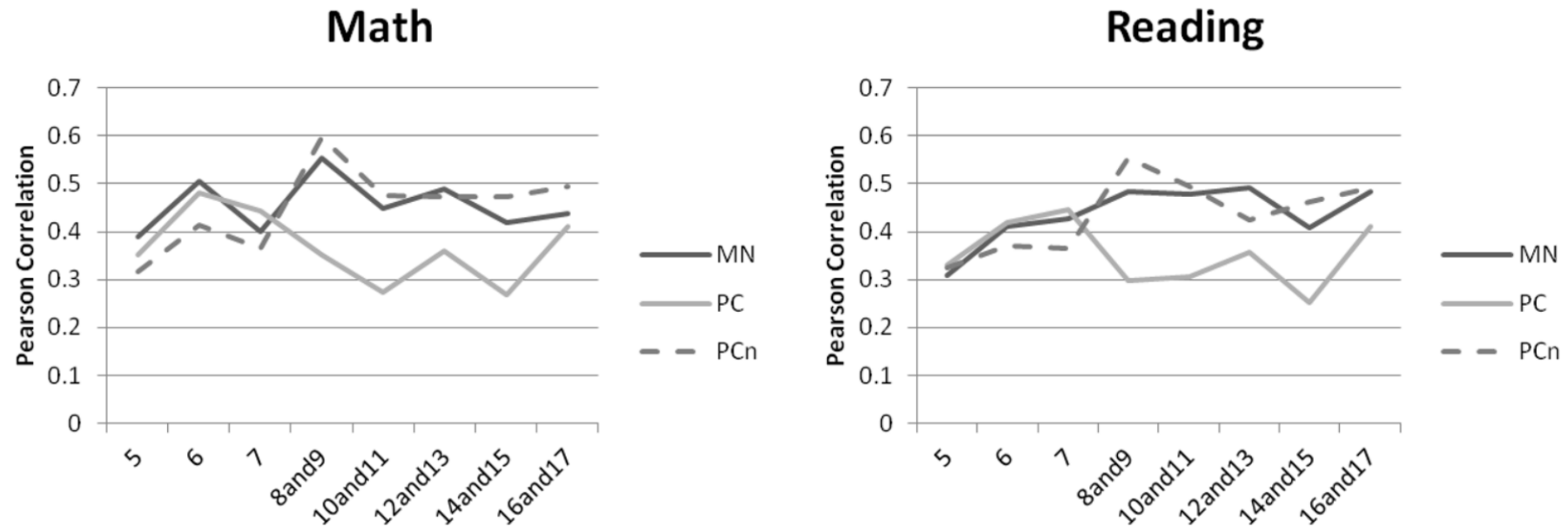


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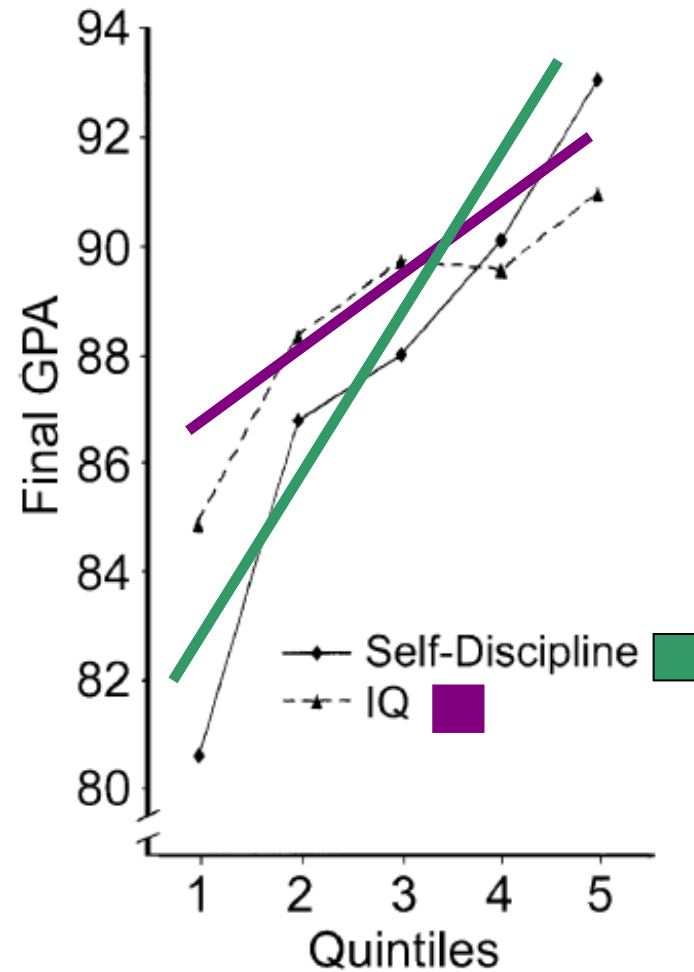
BUILDING BLOCKS FOR
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Executive functions predict math and reading scores



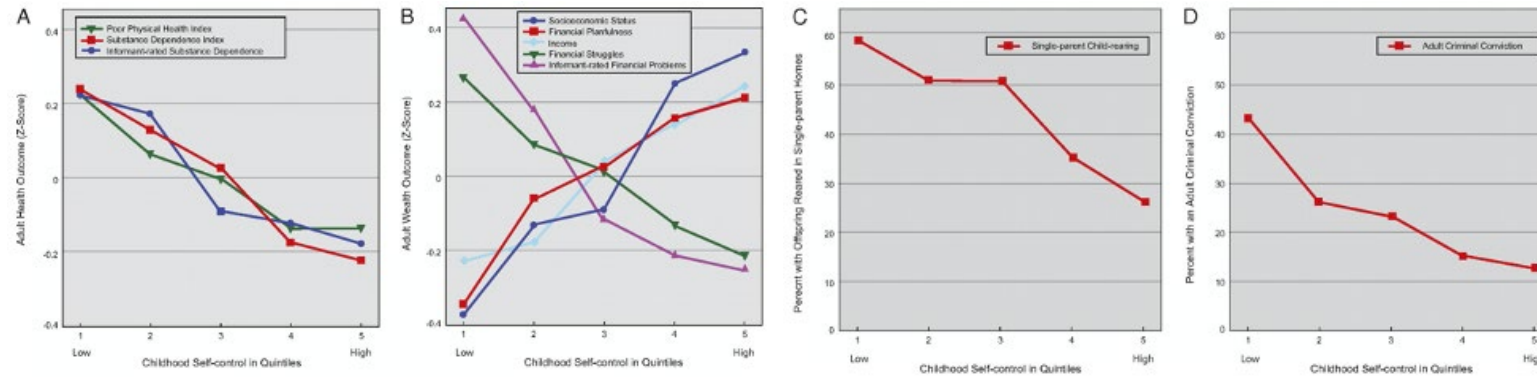
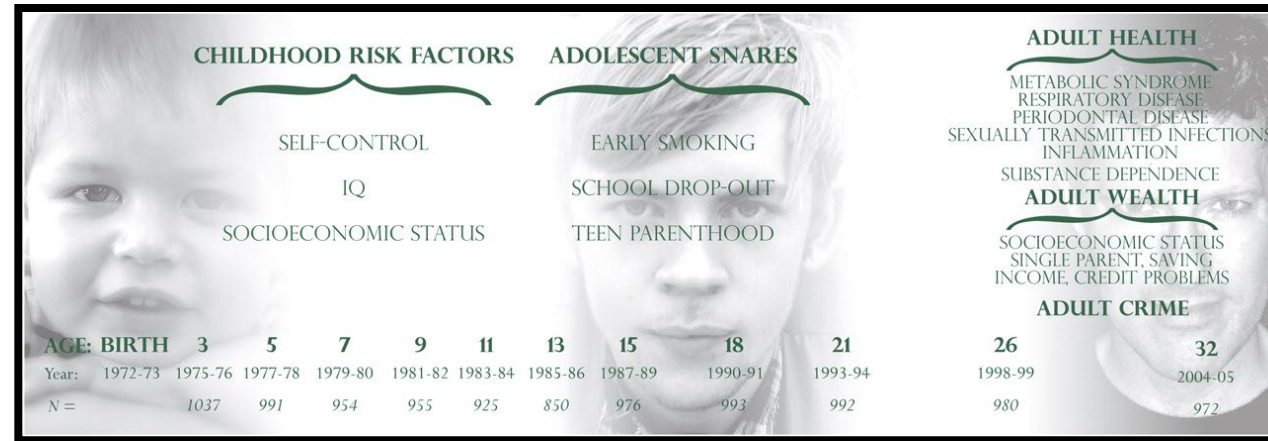
Best, Miller, Naglieri (2011)

Executive functions predict grade point average



Duckworth & Seligman (2005; Study 2)
See also Jacob & Parkinson, 2015

Executive functions matter for life



Terrie E. Moffitt et al. PNAS 2011;108:7:2693-2698

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Executive functions are...



BRAIN-BASED SKILLS



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BUILDING BLOCKS FOR
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Part 1

What are executive functions?

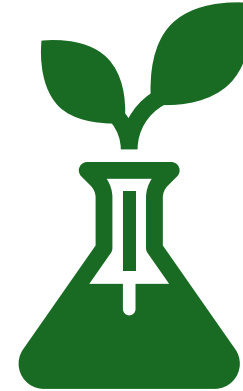
Part 2

How can we support our learners to develop them?

We build executive functions with...



A variety of moments
throughout the day

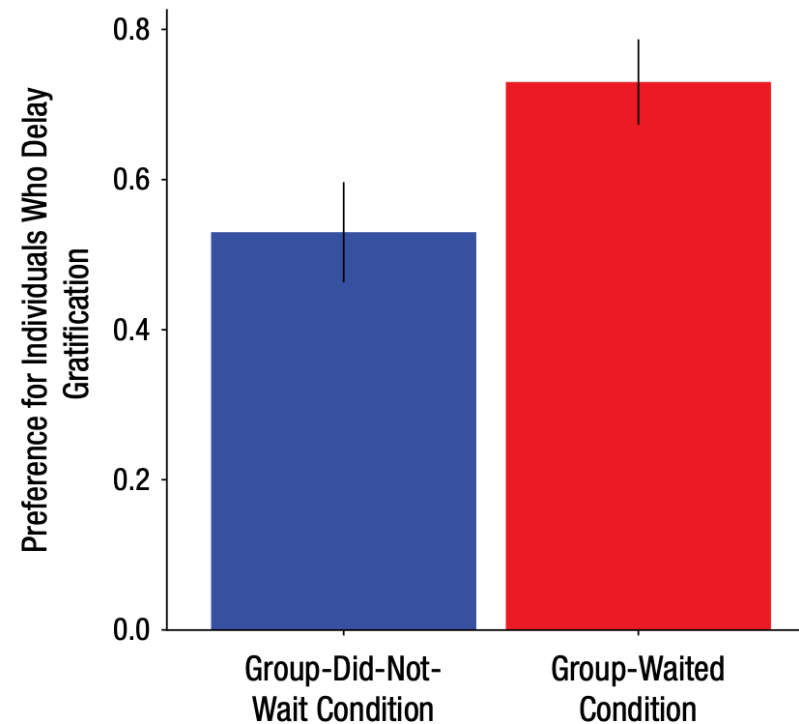


Knowledge of EF skills and
opportunities to practice them

What role models do learners have for executive functions?



In-group or Out-group



How do the physical space and props support executive functions?



Photo by [Monica Sedra](#) on [Unsplash](#)

How do the physical space and props support executive functions?



International School Billund, Denmark

How do the physical space and props support executive functions?



Photo by [Atikah Akhtar](#) on [Unsplash](#)

What role models do learners have for executive functions?



Photo by [Shubham Sharan](#) on [Unsplash](#)

How can we make use of dialogue and metacognition to build executive functions?



Photo by [Husniati Salma](#) on [Unsplash](#)

How can we make use of dialogue and metacognition to build executive functions?



Photo by [Jason Goodman](#) on [Unsplash](#)

We build executive functions with...



A variety of moments
throughout the day



Knowledge of EF skills and
opportunities to practice them

What can educators do?

Diagnose and treat

(“Barriers and solutions protocol” – Faith, Bush and Dawson, 2022)

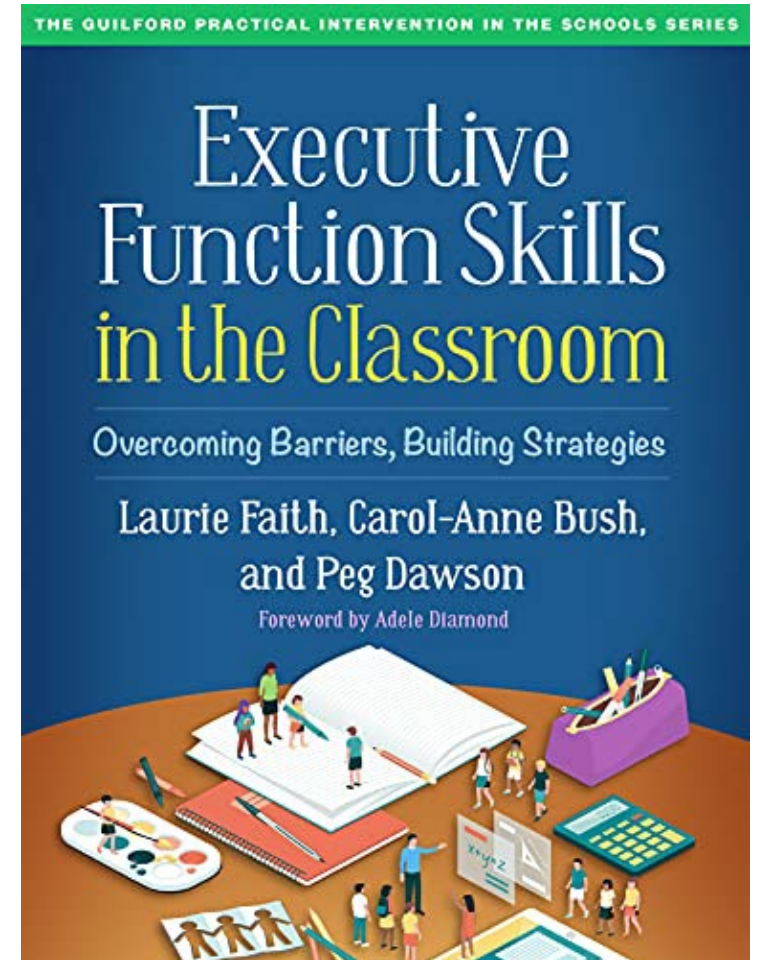
For whole class



For individual learners



- What does it look like?
- What could be the root cause in EF terms?
- What support can we put in place?



Mathematical problem solving

Looks like...

Can't see the patterns or interrelationships in a problem that is set.

Misses key information.

Could be...

Working memory limits how much information they can actively keep in mind at one time.

Try...

Using memory aids step by step, writing down the workings, saying it out loud.

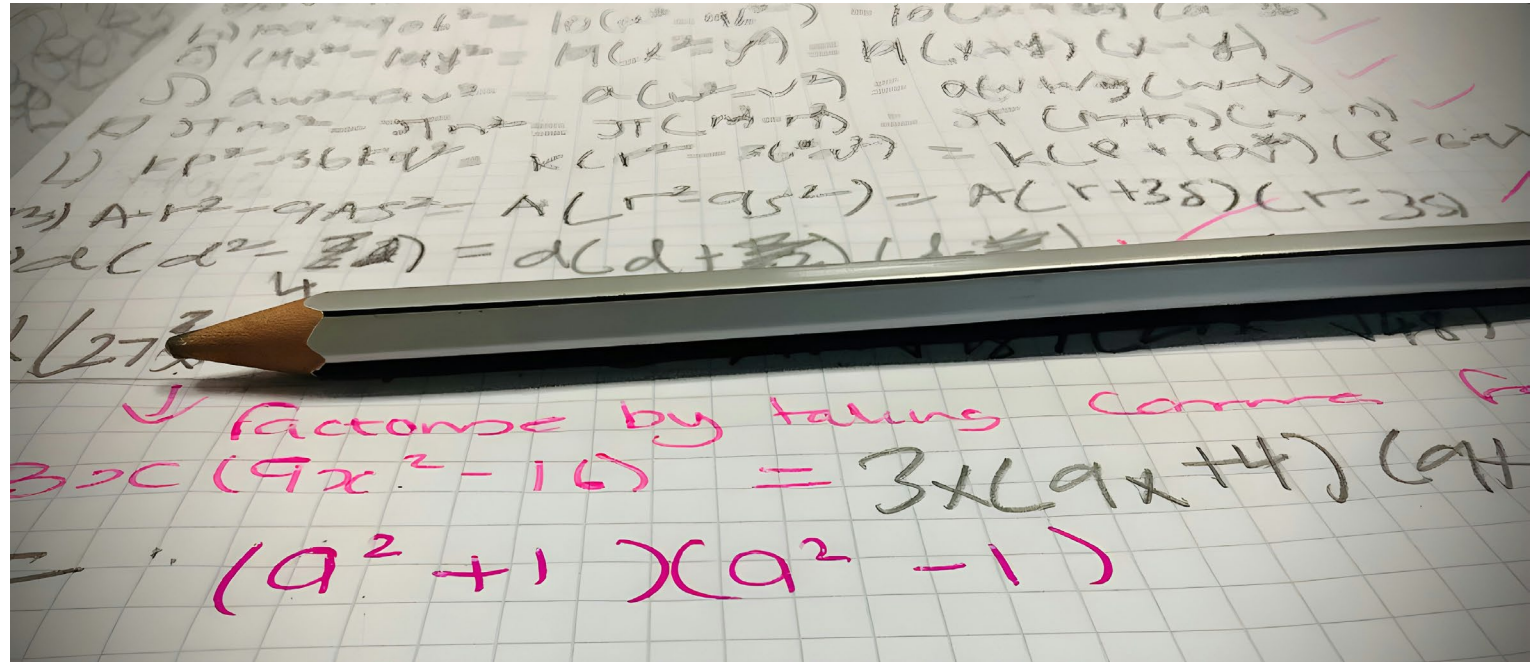


Photo by [Rishi](#) on [Unsplash](#)

Academic writing

Looks like...

It is hard to get going with the writing.

Could be...

Worrying (emotion regulation), finding it hard to plan and prioritize.

Try...

Talking about which parts are hard.
Agreeing on strategies.

Doing regular check ins with teacher or peers.

Recognizing success in the process, not just the outcome.



Photo by [Shalev Cohen](#) on [Unsplash](#)

Using social media

Looks like...

Ignoring people who are speaking to them. Missing out on sleep. Ruminating on a difficult conversation.

Could be...

Difficult to break the habit of picking up the phone (inhibition). Overwhelmed with feelings (emotion regulation).

Try...






A timer (external aid) to set limits.

Practicing strategies for managing emotions, like breathing, yoga and talking to someone.



Photo by [Sebastian Jauregui Martinez](#) on [Unsplash](#)

Core skills in 2025

1.  **Analytical thinking**
2.  **Resilience, flexibility and agility**
3.  **Leadership and social influence**
4.  **Creative thinking**
5.  **Motivation and self-awareness**

Note: The skills selected by surveyed organizations to be of greatest importance to workers at the time of the survey.

Source: World Economic Forum. (2025). *Future of Jobs Report 2025*.

Further resources

Recommended video to illustrate inhibition with the marshmallow task (delay of gratification) for young children

https://www.youtube.com/watch?v=QX_oy9614HQ

Report with overview of the concepts

Executive function mapping project: Untangling the Terms and Skills Related to Executive Function and Self-Regulation in Early Childhood, Stephanie Jones 2019

Podcast with Deborah Leong, developer of Tools of the Mind, explaining self-regulation and executive functions in the early years

<https://childinst.org/tools-of-the-mind-with-deborah-leong/>

Age-appropriate activity guides from 6 months – 12 years

Center on the Developing Child at Harvard University (2014). *Enhancing and Practicing Executive Function Skills with Children from Infancy to Adolescence*. Retrieved from www.developingchild.harvard.edu

Blog on nursery rhymes and self-regulation

<https://researchschool.org.uk/eastlondon/news/what-do-nursery-songs-and-self-regulation-have-in-common>

Webinar on self-regulation in the early years with the East London Research School (includes connections to EYFS)

<https://www.youtube.com/watch?v=RmcJdaLEr48>

Guide from Early Years Library on self-regulation (what is it and how to support it in early years)

<https://www.eif.org.uk/resource/early-years-library> > see 'Laying the foundations: Supporting children's self-regulation'



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Thank you!

You can find me on LinkedIn or
during the breaks.