



UNIVERSITY OF
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Faculty of Education








Executive functions: Foundational skills for learning and for life

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PEDAL Research Centre

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*.

Cambridge learners are

Confident
Responsible
Reflective
Innovative
Engaged



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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



UNIQUE INDIVIDUAL
PROFILES

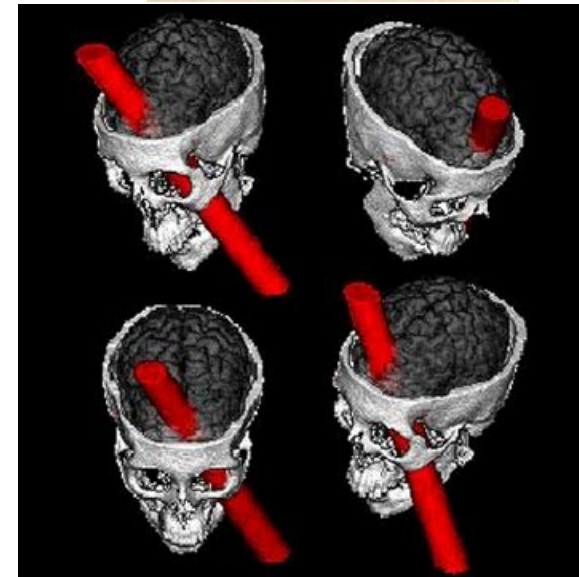
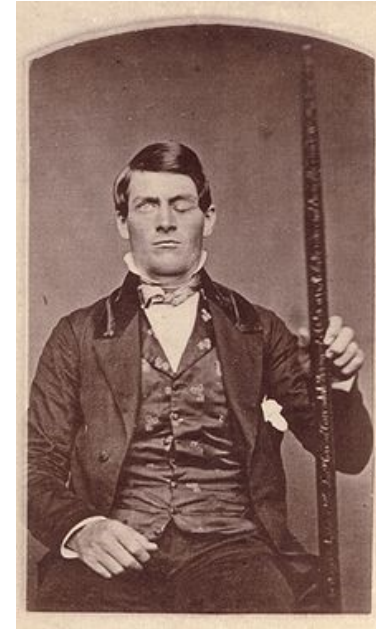


BUILDING BLOCKS FOR
LIFELONG LEARNING

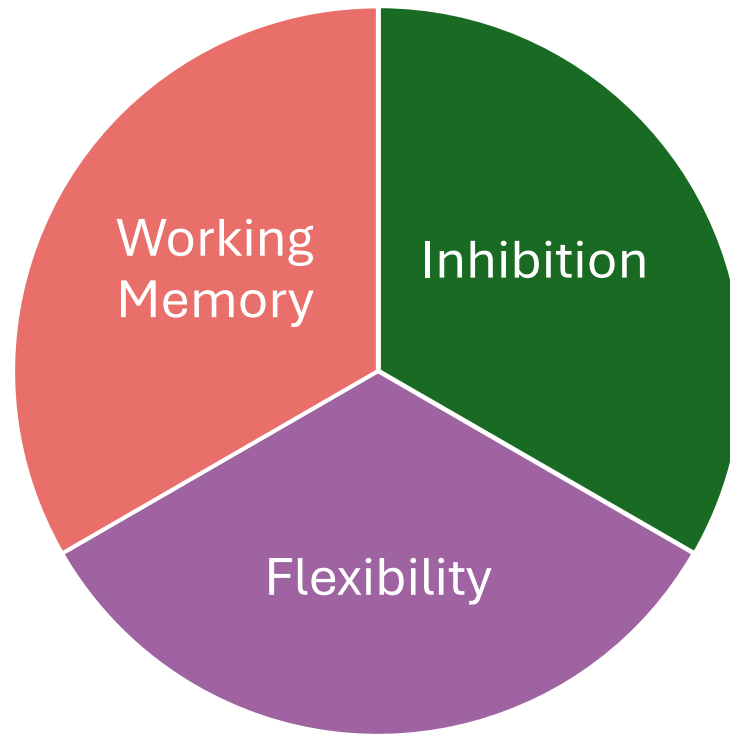
The famous Phineas Gage case

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

He was left with speech, movement, and intelligence but... difficulties with context-appropriate behaviour.

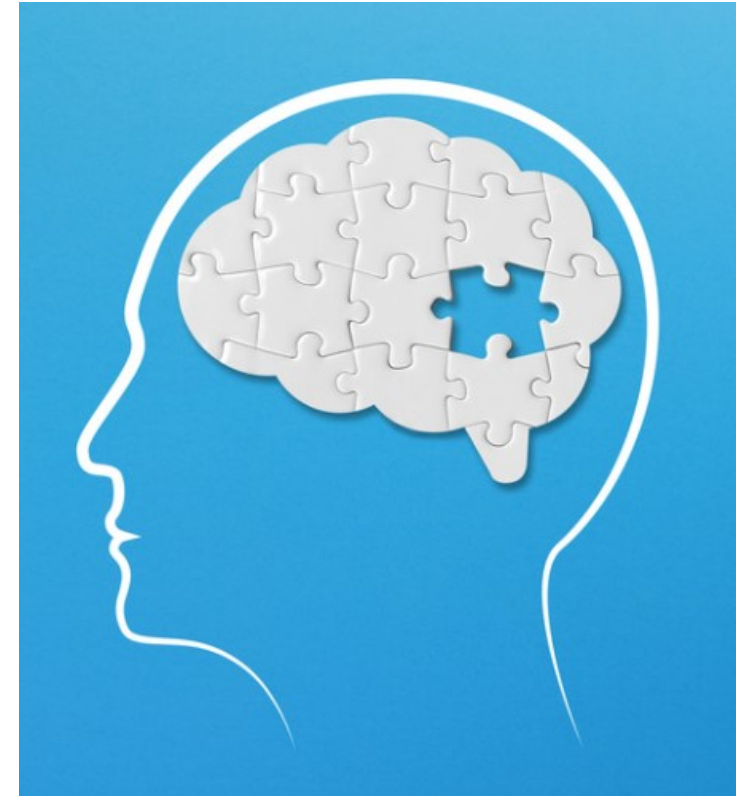


Basic Executive Functions



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...

- When have you used executive functions in the last week?
- When have you NOT used them, but you should have?

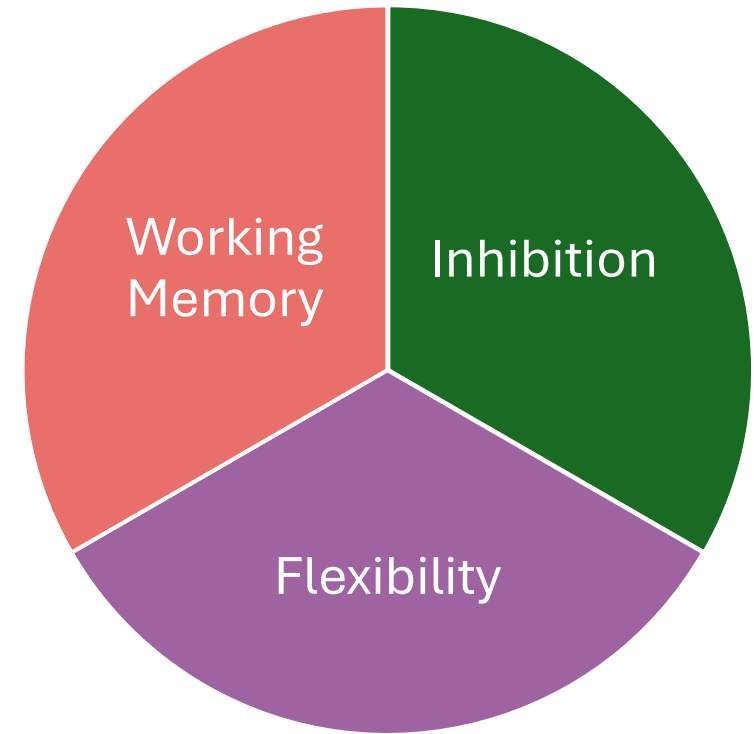


Image: Manasa
RB, M.Sc SLP

Executive functions are...



BRAIN-BASED SKILLS

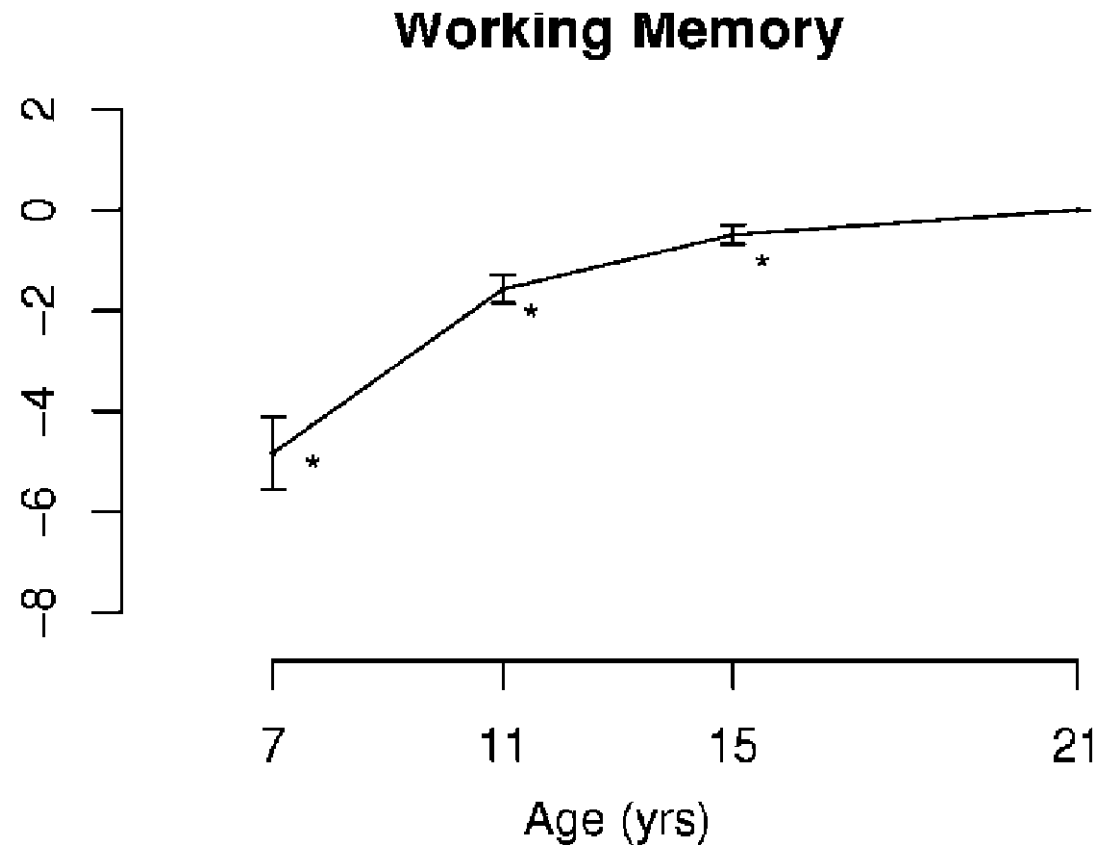


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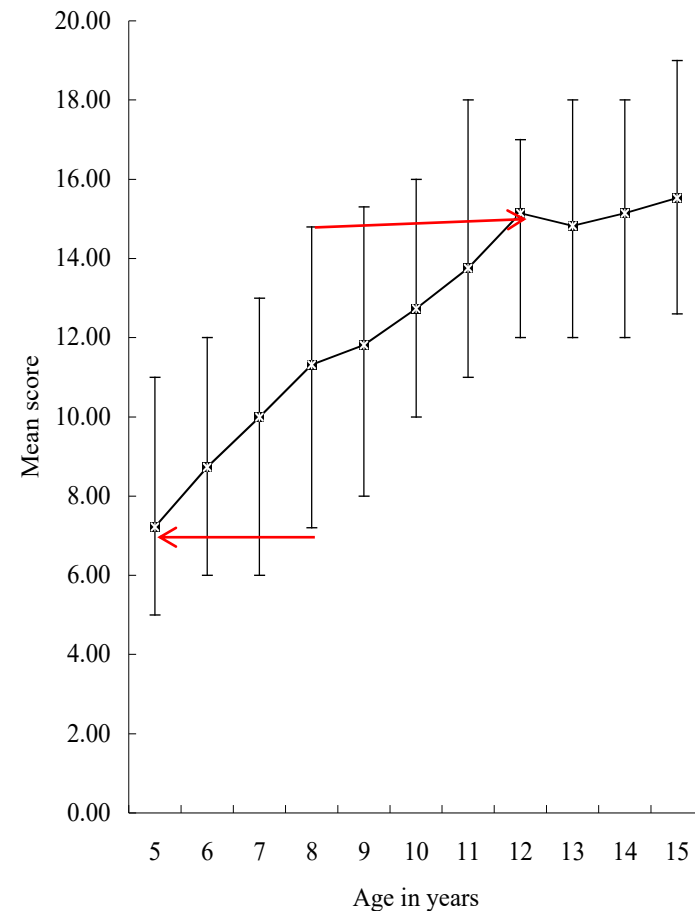
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Executive functions improve with age.



Huizinga, Dolan and Van Der Molan (2006)

Within any classroom, kids' executive functions vary a lot.



Kids' executive functions depend on the moment and on their mood.

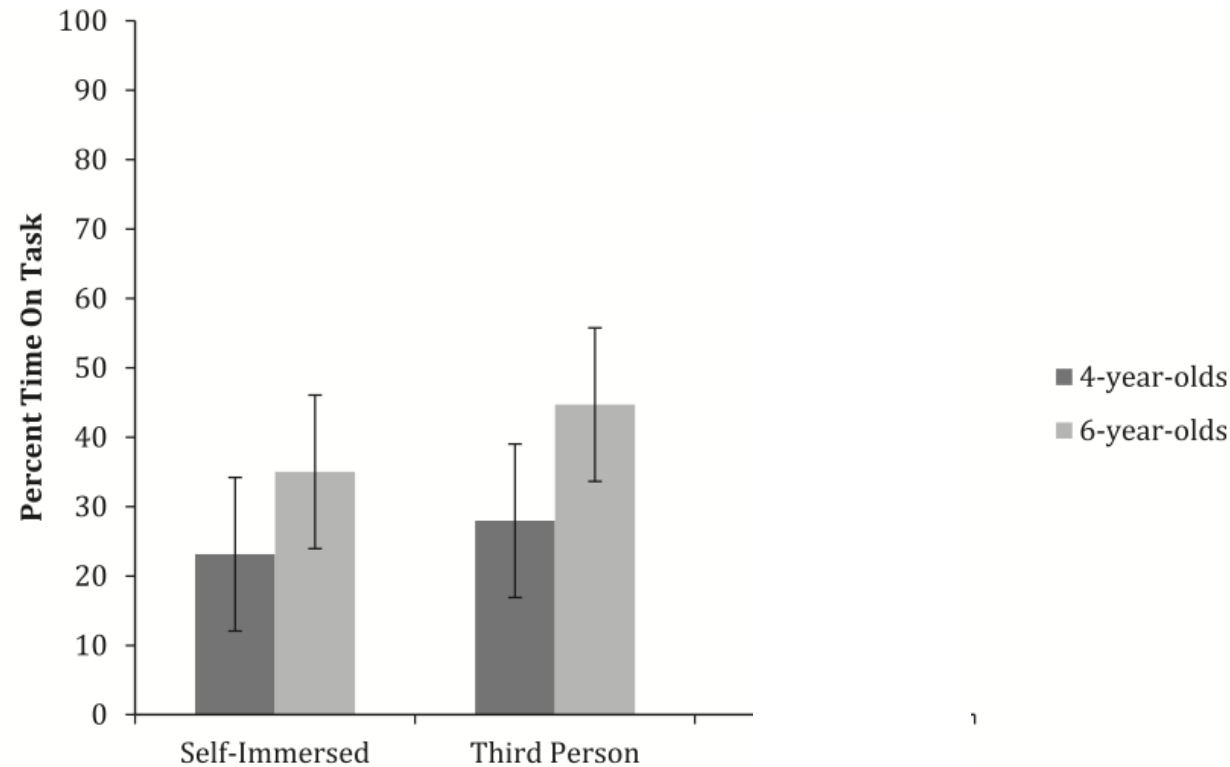


Photo by Studbee on Unsplash

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

Executive functions are...



BRAIN-BASED SKILLS

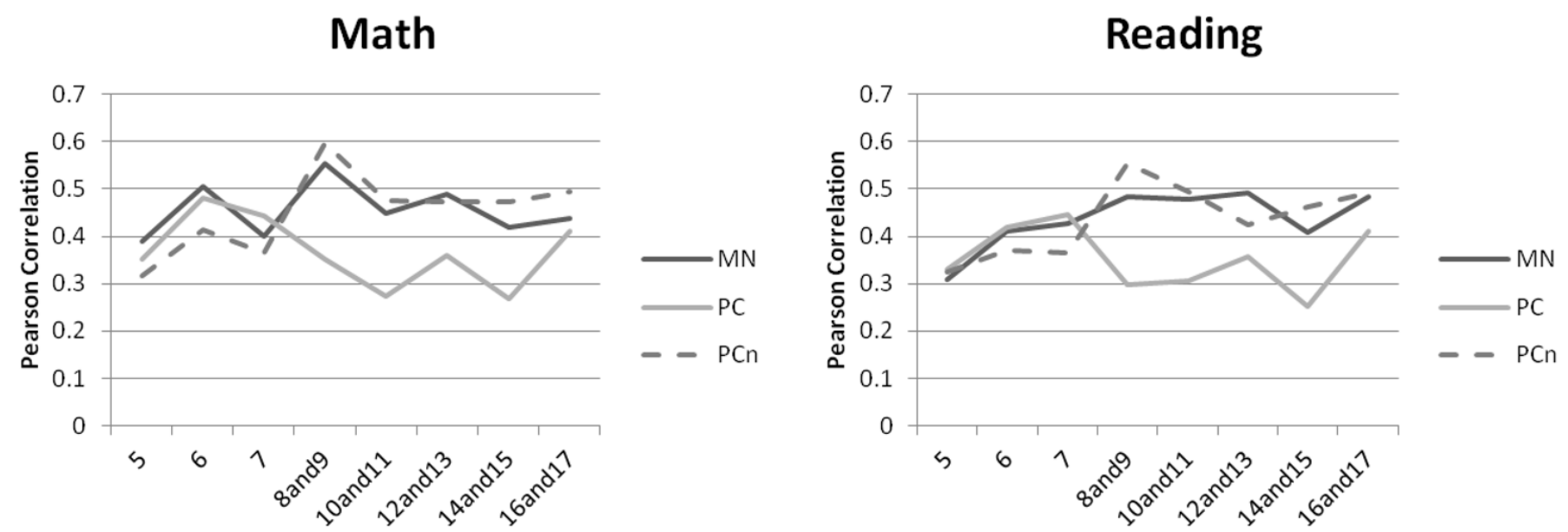


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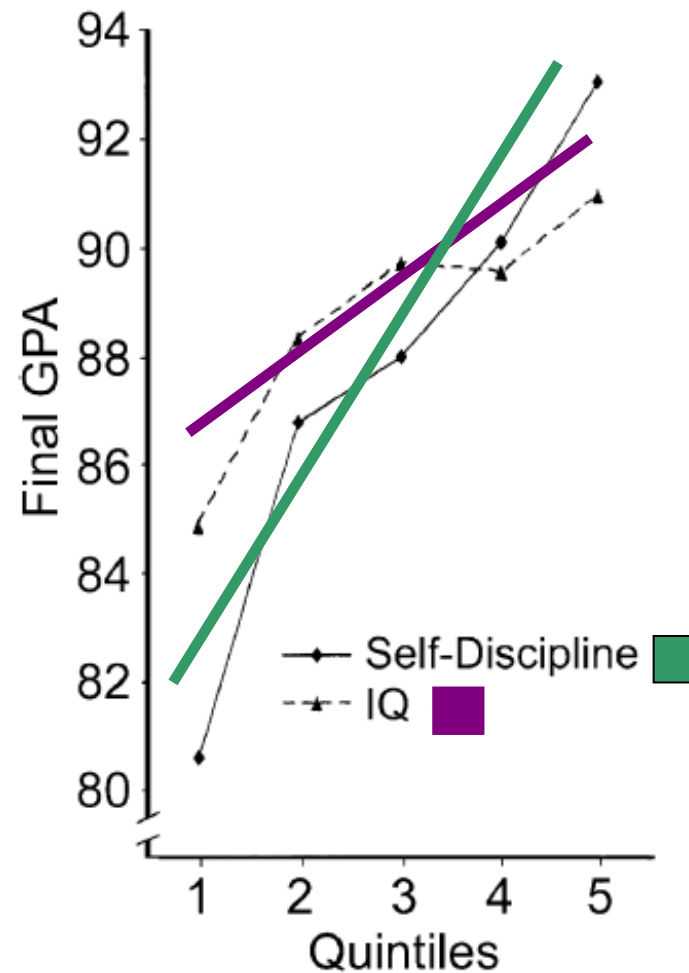
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Executive functions predict math and reading scores



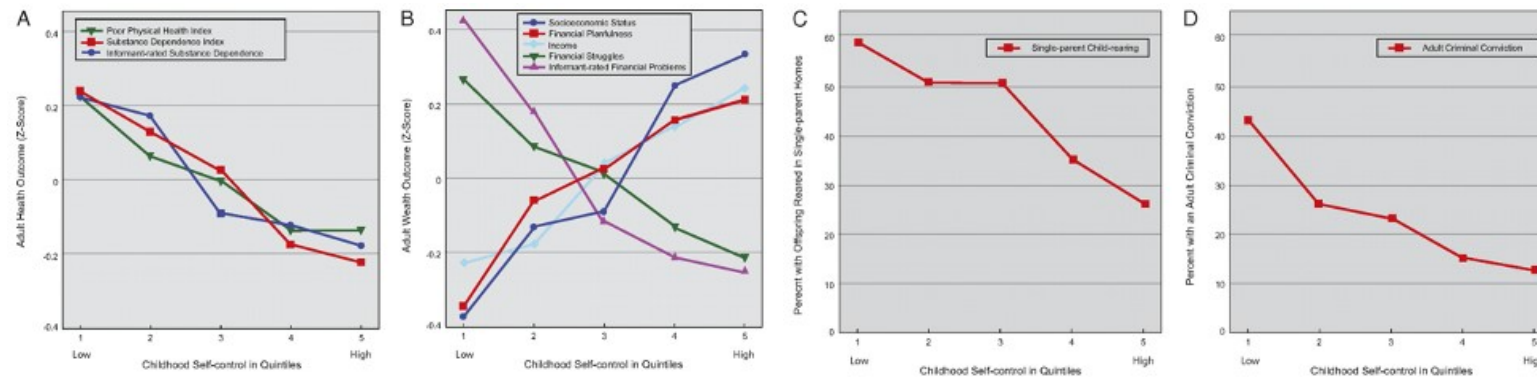
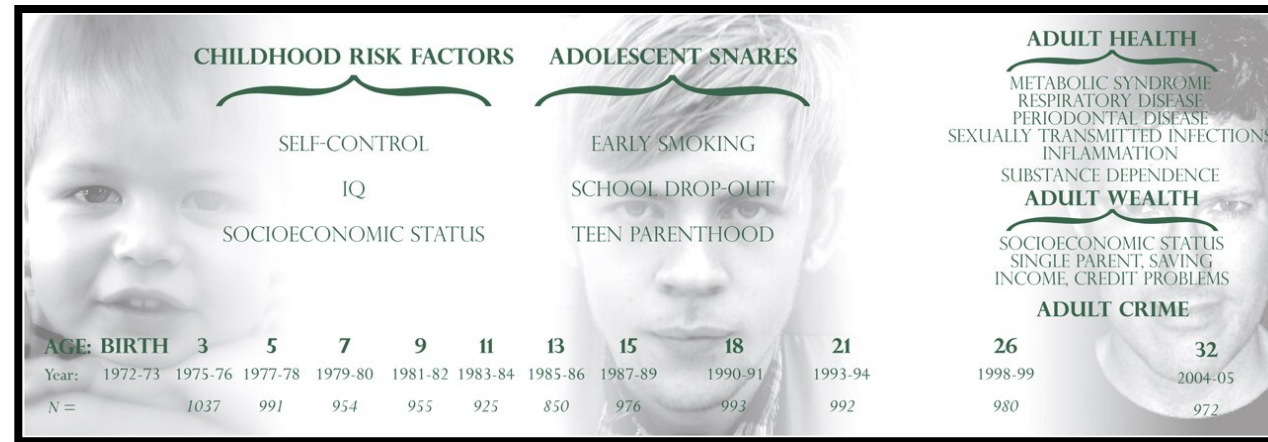
Best, Miller, Naglieri (2011)

Executive functions predict grade point average



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

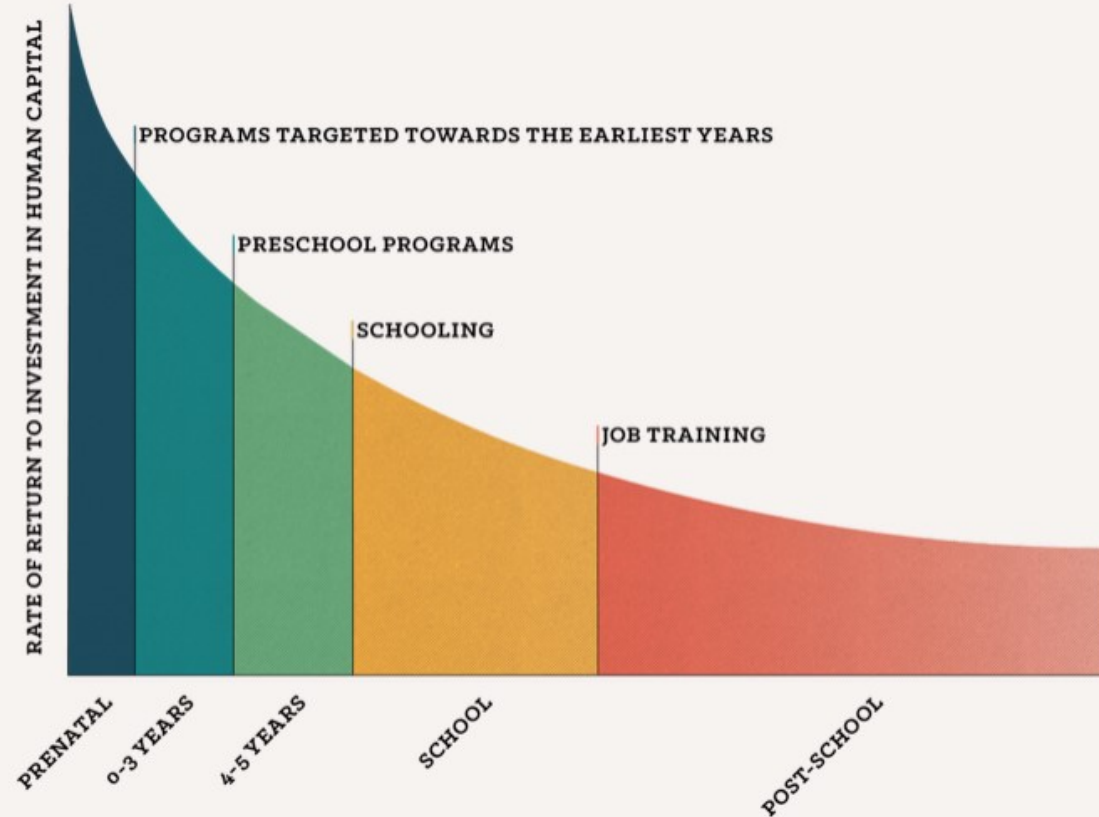
Executive functions matter for life



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

©2011 by National Academy of Sciences

Investing in the early years pays off later



Heckman, James J. (2008). "Schools, Skills and Synapses," *Economic Inquiry*, 46(3): 289-324

See also <https://heckmanequation.org>

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Executive functions are...



BRAIN-BASED SKILLS



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**Executive
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Part 1

What are executive functions?

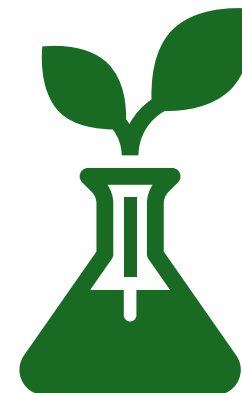
Part 2

How can we support our learners to develop them?

We build executive functions with...



A variety of moments throughout
the day

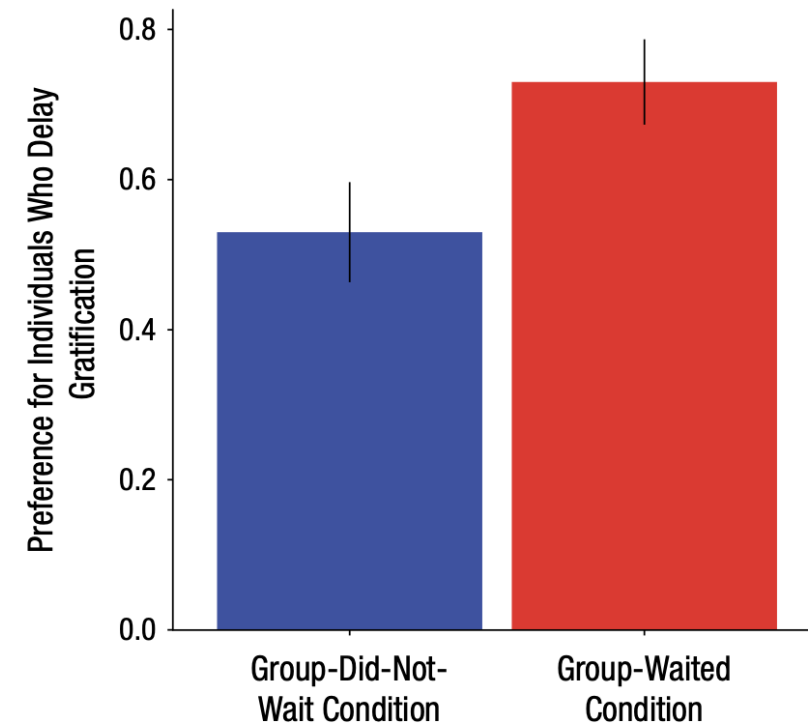


Knowledge of EF skills and
opportunities to practise them

The social context matters for executive functions.

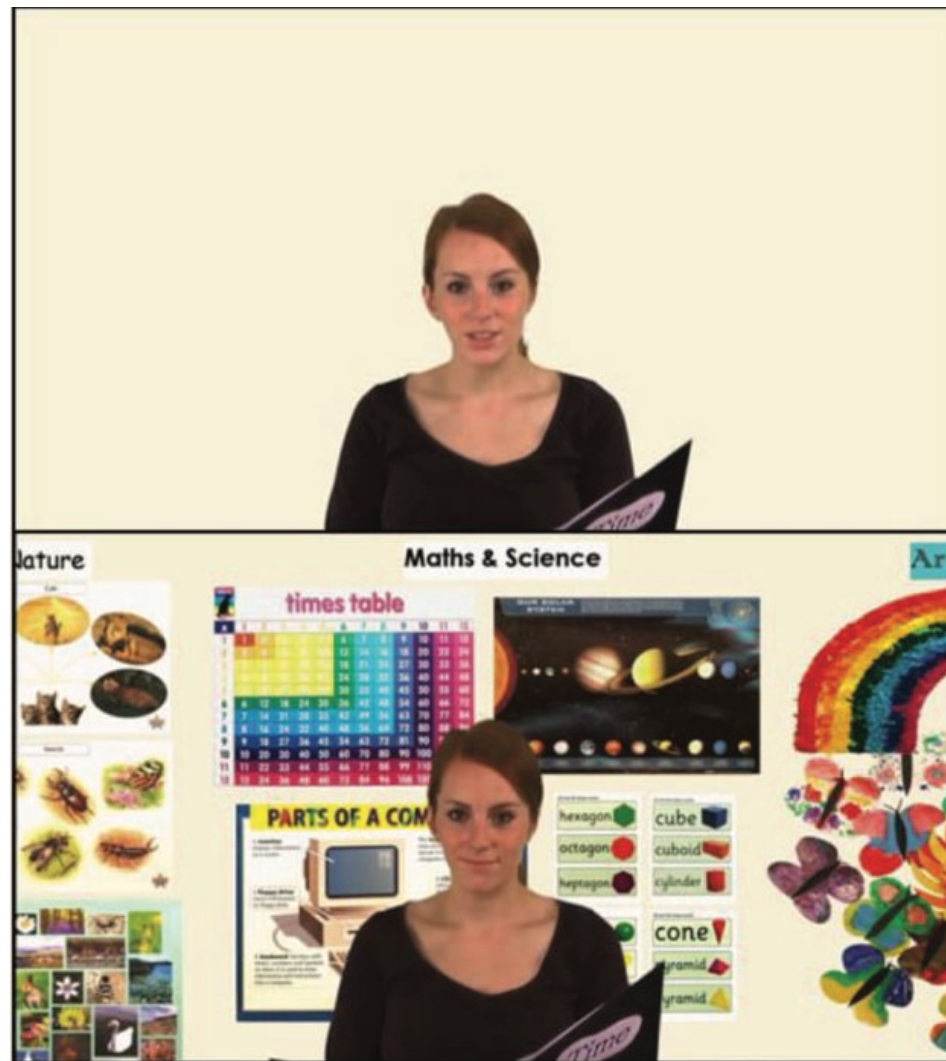


Photo by [Bhong Bahala](#) on [Unsplash](#)



Doebel & Munakata (2018)

The physical context matters for executive functions.



Hanley et al. (2017)

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Does this classroom space support executive functions?



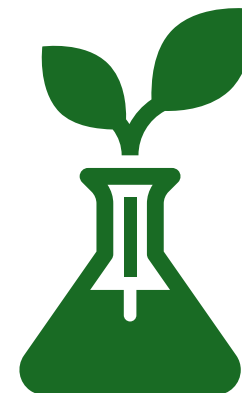
Photo by [Monica Sedra](#) on [Unsplash](#)

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We build executive functions with...



A variety of moments throughout
the day



Knowledge of EF skills and
opportunities to practise them

What can educators do?

Diagnose and treat

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

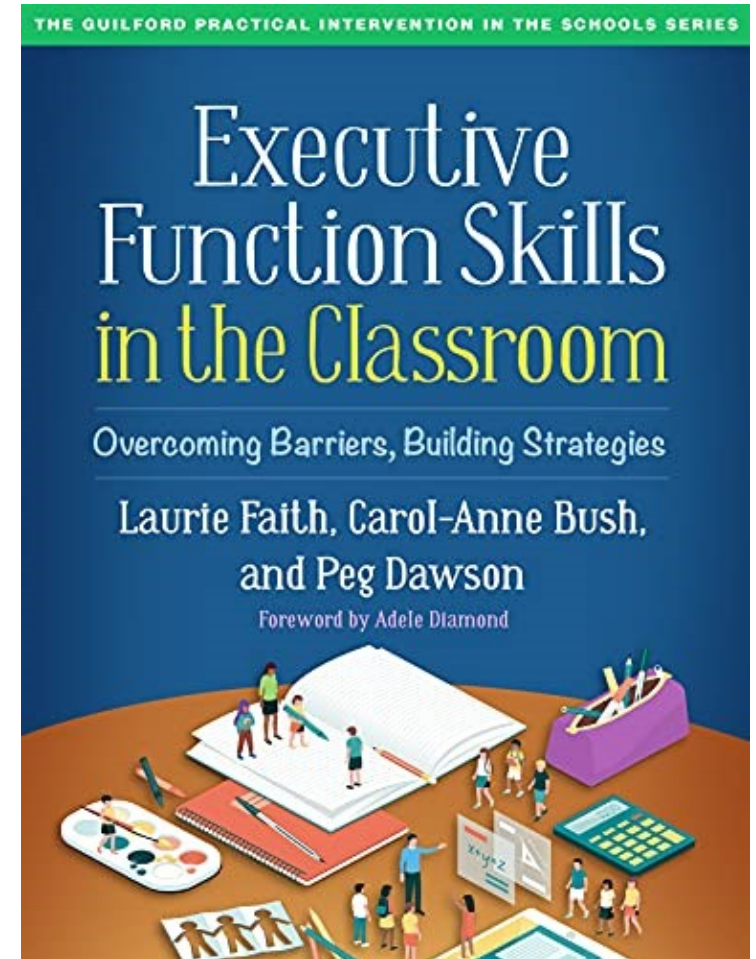
For whole class



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.

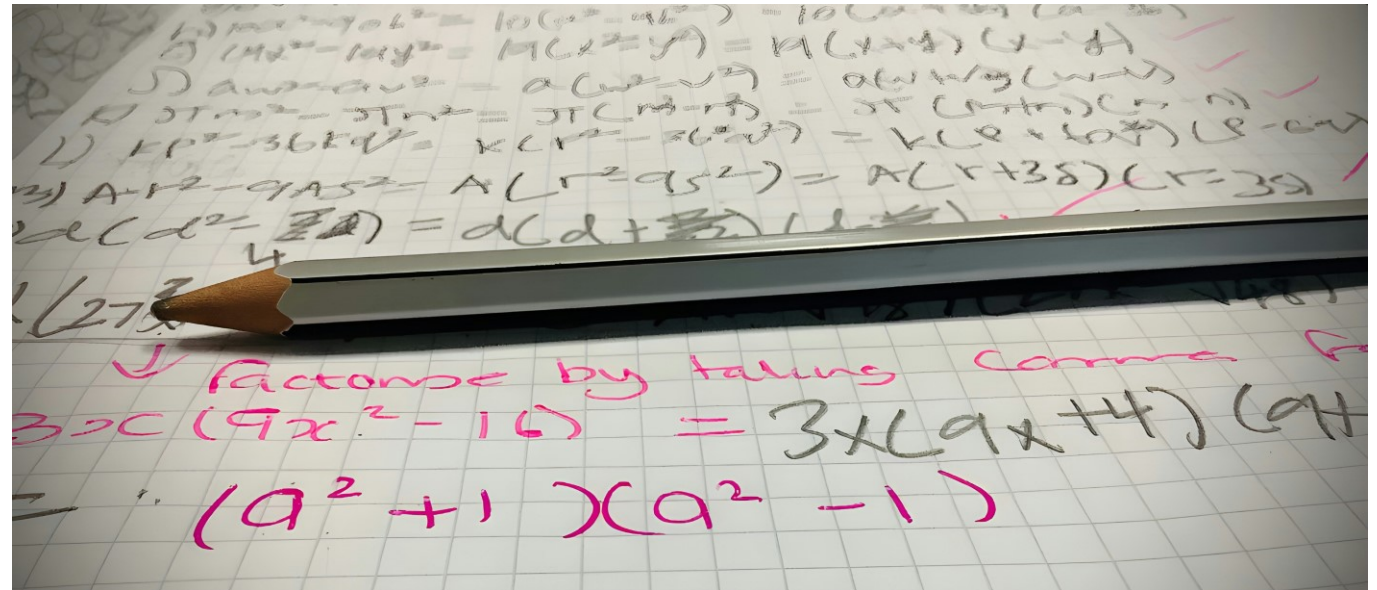


Photo by [Rishi](#) on [Unsplash](#)

Academic writing

Looks like...

It is hard to get going with the writing.

Could be...

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

Try...

Talking about which parts are hard and agreeing on strategies. Recognising 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...

Practising strategies for managing emotions, like breathing, yoga and talking to someone. A timer (external aid) can help to set limits.



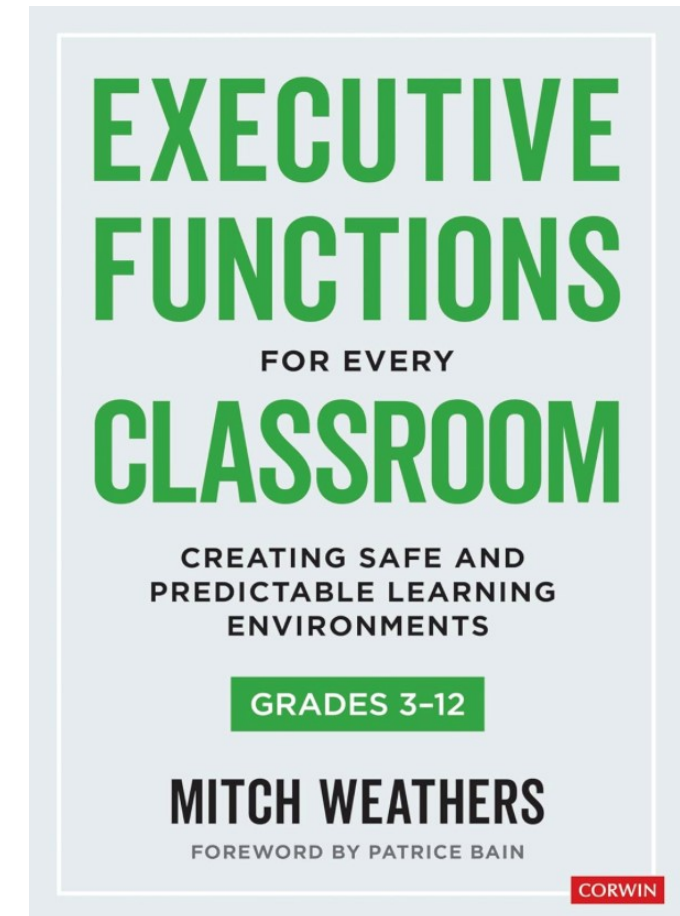
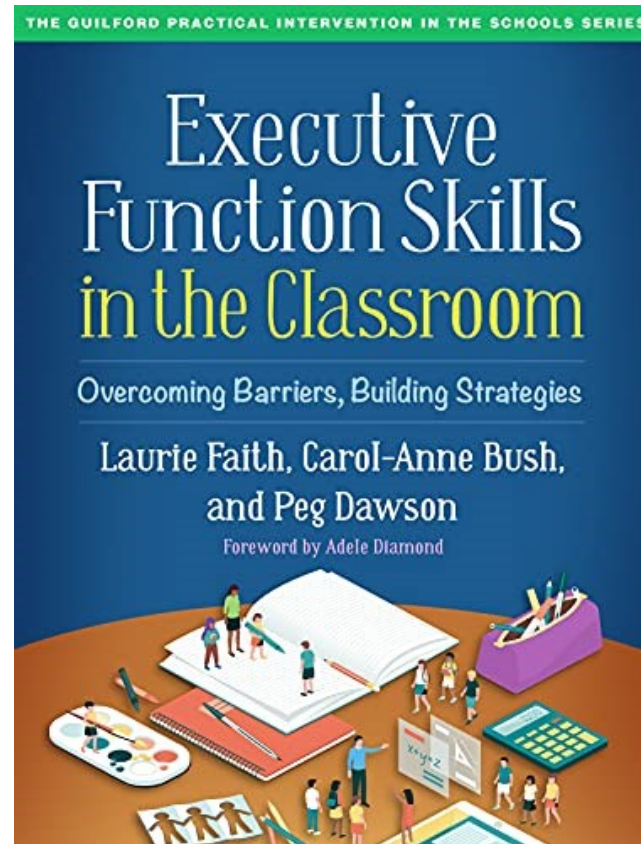
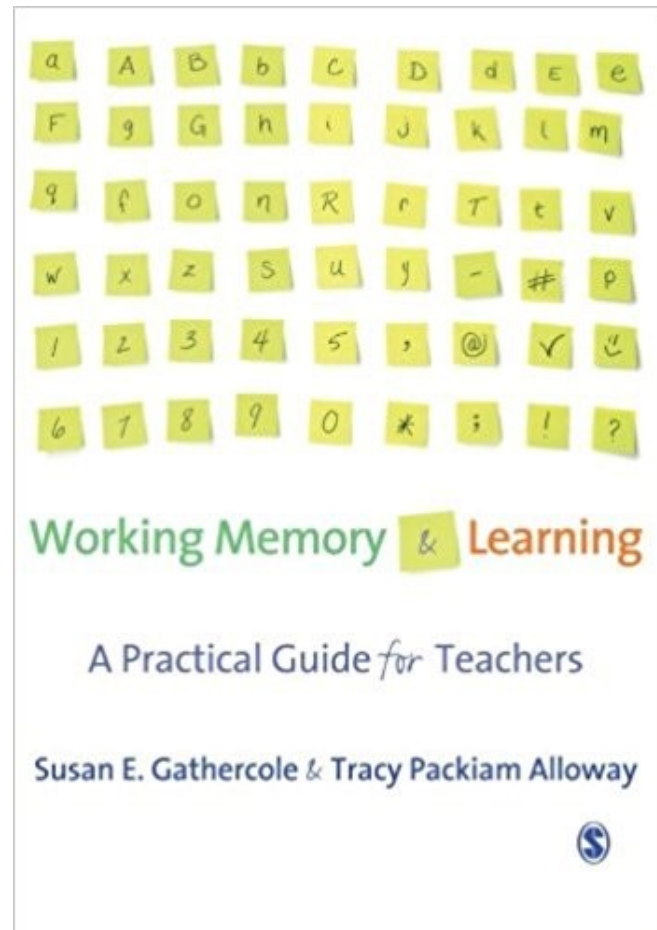
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Source: World Economic Forum. (2025). *Future of Jobs Report 2025*.

Recommended books



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Just published! Getting started with executive functions



Metacognition

Metacognition describes the processes involved when learners plan, monitor, evaluate and make changes to their own learning behaviours.

[Metacognition](#)



Oracy

Oracy refers to the skills involved in using spoken language to communicate effectively. Teachers help learners develop their oracy skills through a range of approaches.

[Oracy](#)



Reflective practice and school evaluation

Reflective practice helps teachers connect experiences, enhancing student progress. School evaluation is supported by a clearly defined set of standards.

[Reflective practice and self evaluation](#)



Self management

Self management skills refer to the process of monitoring and managing one's own learning, emotions and behaviour in order to stay focused, motivated and effective.

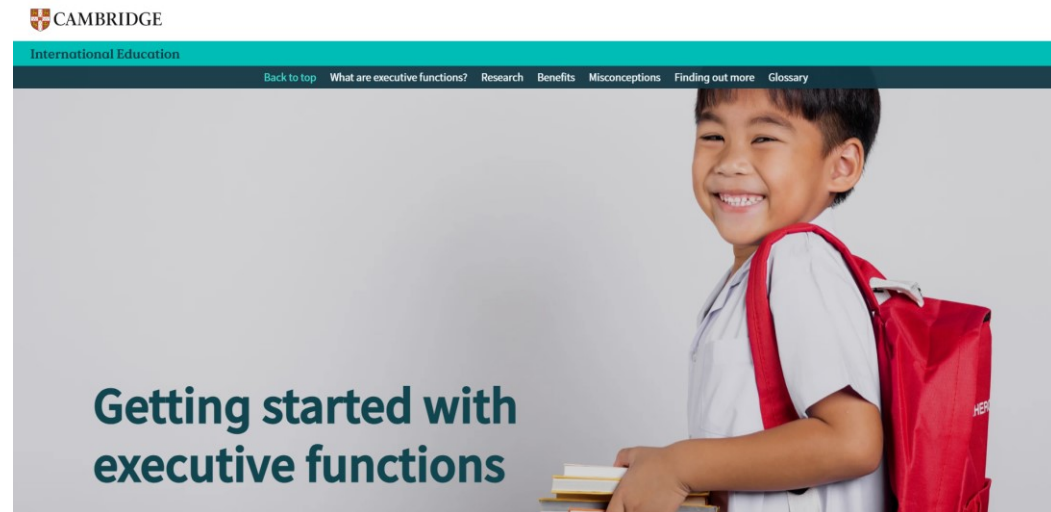
[Self management](#)



Teaching with technology

Teaching with technology refers to educational approaches using online resources, online lessons, the use of Artificial Intelligence (AI) or teaching tools and platforms.

[Teaching with technology](#)



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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/>

Podcast with Prof Sam Wass and Dr Gemma Goldenberg on attention and distraction in young children

<https://thevoiceofearlychildhood.com/its-time-to-rethink-attention/>

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>

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'

Cambridge guide on metacognition

<https://www.cambridgeinternational.org/Images/272307-metacognition.pdf>

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Thank you!

You can find me on LinkedIn or
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