LANDMARK COLLEGE
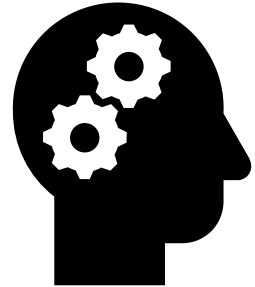INSTITUTE FOR RESEARCH AND TRAINING

Executive Function: A Crucial Factor in Student Success

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Agenda: At a glance

- Understanding Executive Function (EF)
  - Definition, importance, development, challenges
  - Cognitive load: what is and why should we care?
    - Simulation
- Introducing approaches to supporting EF
  - Clarity
  - Micro-uniting
  - Metacognition

LANDMARK COLLEGE
INSTITUTE FOR RESEARCH AND TRAINING

Research

Learning Theory

Strategies, Tools, and Practice

Established in 2001 to research, develop, and disseminate Landmark College's best practices for students who learn differently

What do successful students do?

- Learn academic content

- Solve problems
- Take action independently
- Set and meet their own goals
- Manage themselves in challenging situations

Executive Function (EF):

the group of complex mental processes…that control the skills (such as organizing tasks, remembering details, managing time, and solving problems) required for goal-directed behavior
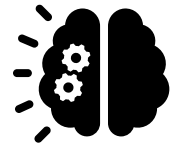
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-Merriam-Webster

📌 EF: Conductor Metaphor
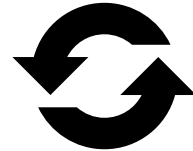
📌 What's so special about EF?

- ◉ EF skills predict learning & achievement
  - ○ Often, better than IQ (e.g., Benson et al., 2013)

- ◉ EF challenges often present in many clinical conditions
  - ○ E.g., ADHD, autism (e.g., Zelazo, 2020)

- ◉ EF skills can be improved with practice
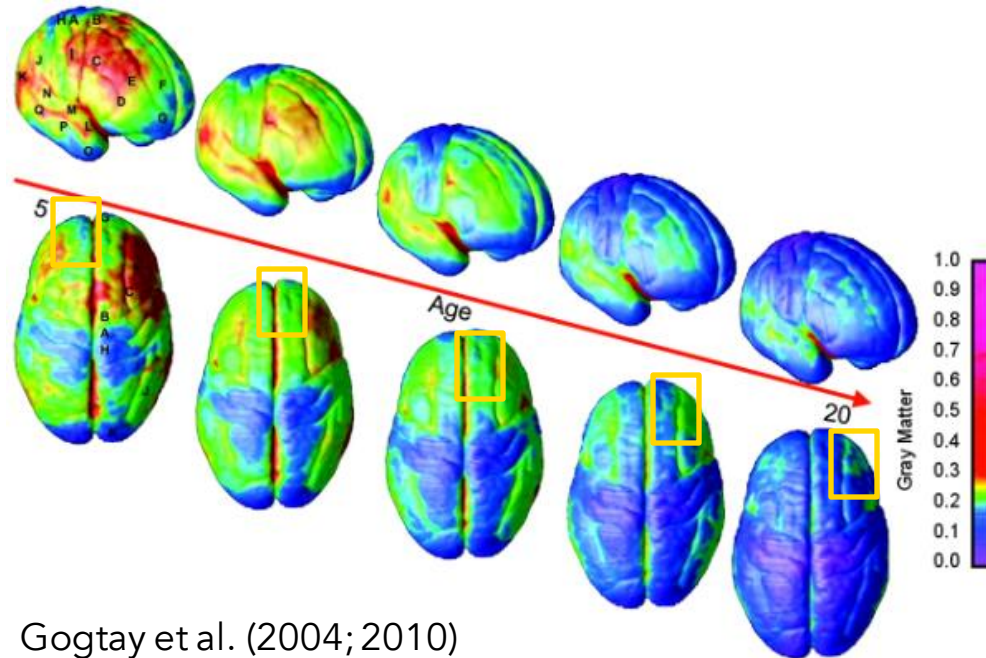 - ○ E.g., Espinet, Anderson, & Zelazo, 2013

📌 Other key points about EF

- ◉ Processing capacity is limited
  - ◉ What is this limit?

- ◉ Gateway to information processing + knowledge acquisition
  - ◉ E.g., learning to read
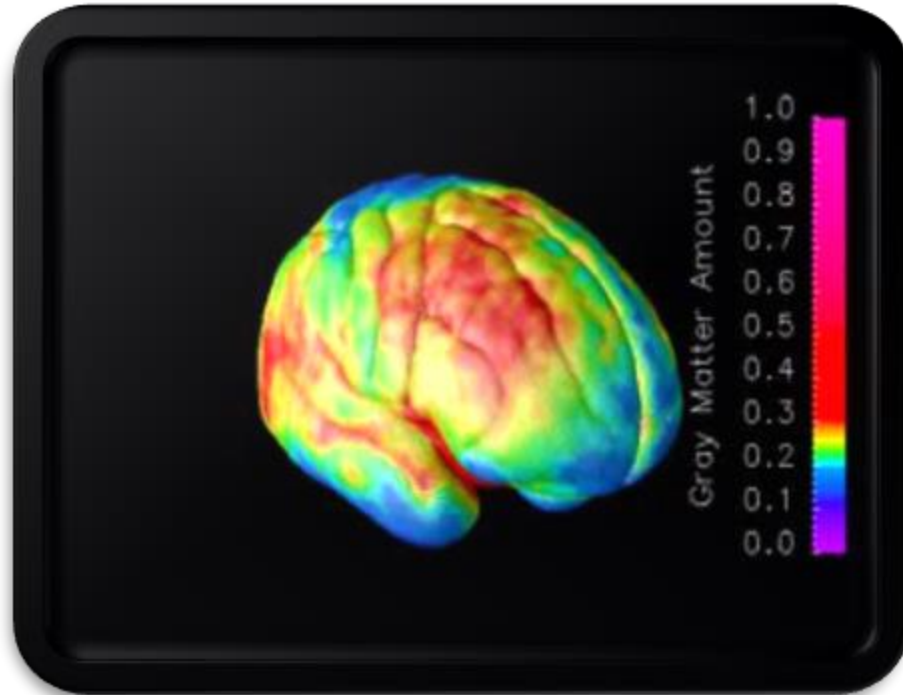 - ◉ Automatic vs. controlled processes

Other key points about EF: Development of EF
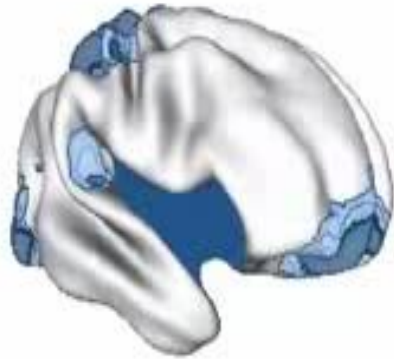

Gogtay et al. (2004; 2010)

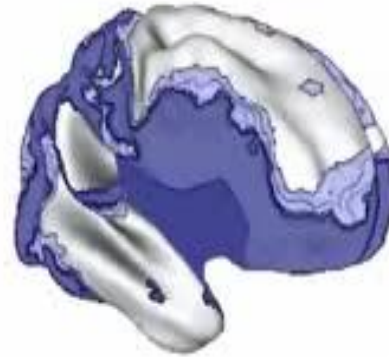# Other key points about EF: Development of EF

EF Devo: ADHD Brain Maturation

AGE: 6

ADHD   Non-ADHD

Over 250,000 in Print!
4- to 13-year-olds

The Revolutionary "Executive Skills" Approach to Helping Kids Reach Their Potential

SMART but SCATTERED

Boost Any Child's Ability to:

✓ Get Organized   ✓ Follow Through on Tasks
✓ Resist Impulses   ✓ Learn from Mistakes
✓ Stay Focused   ✓ Stay in Control of Emotions
✓ Use Time Wisely   ✓ Solve Problems Independently
✓ Plan Ahead   ✓ Be Resourceful

Peg Dawson, EdD, and Richard Guare, PhD
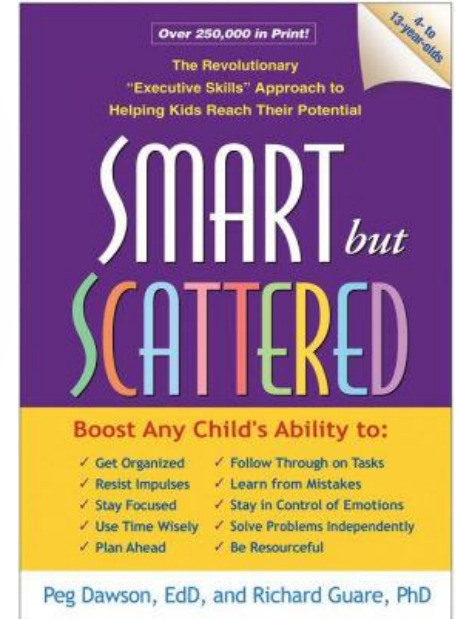
EF "Breakdowns"

- Difficulty remembering sequence of ideas
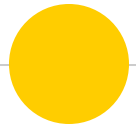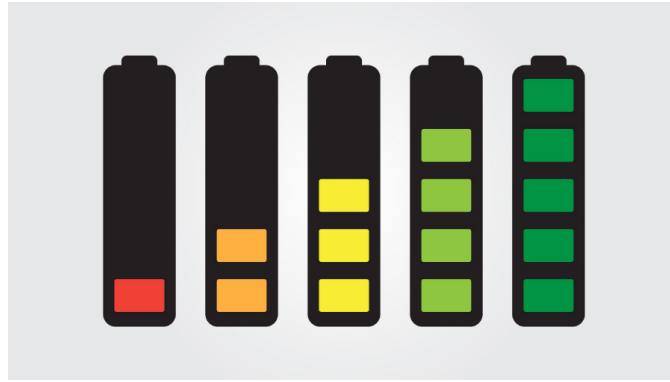- Hard to hold one bit of information while doing something else
- Acting impulsively
- Executing the appropriate action when needed
- Over/under focus on a task
- Can't get started – "What to do first!"
- Assigning priorities

Understanding cognitive load

Cognitive load describes how we fill EF – and its implications for learning

Cognitive Load: Extraneous Loads

Parts of a learning task that are not integral to the learning goal
- Spelling in a critical thinking essay
- Reading in an algebra word problem
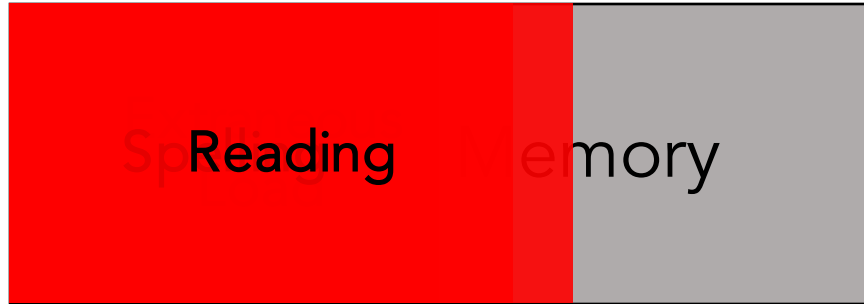
Cognitive Load: Intrinsic Loads

- Core elements of a learning task
  - Analysis in a critical thinking essay
  - Algebraic reasoning in an algebra word problem

Cognitive Load + Learning

- Learning is efficient when cognitive load doesn't exceed working memory capacity
  - When extraneous loads are low
  - When intrinsic loads are appropriate to the learner's ability level
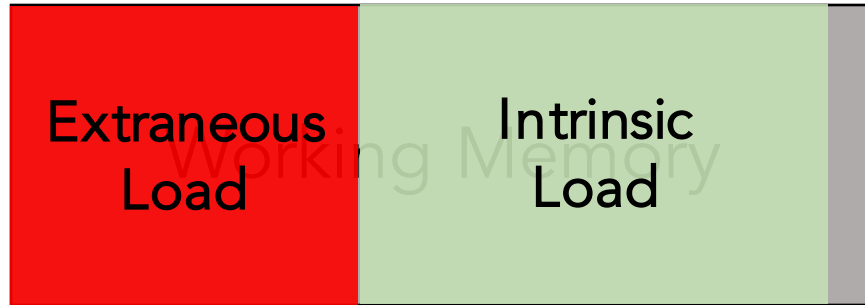
Cognitive Load + Learning

- Learning is slowed or stops when cognitive load exceed working memory capacity
  - When intrinsic loads are beyond a learner's ability level
  - When extraneous loads are high

Extraneous Load | Intrinsic Load
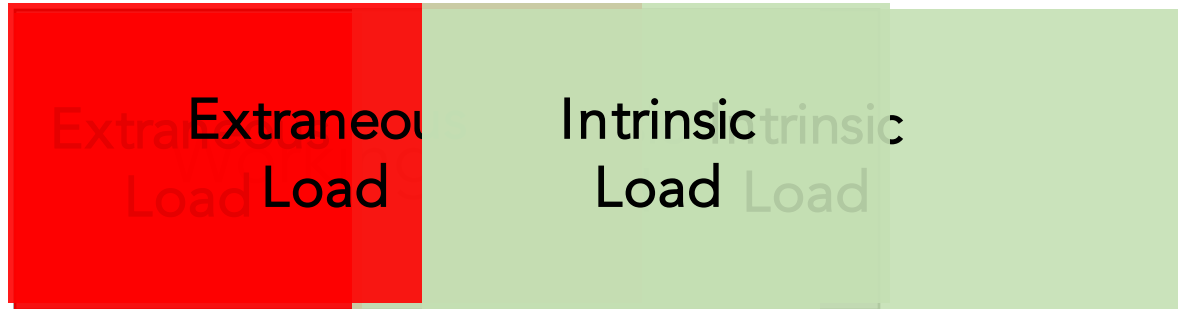
Cognitive Load + Learning

- Factors limiting available working memory
  - Weakness in memory, attention, or EF
  - Language deficits
  - Poorly automatized skills
  - Anxiety or other affective issues

Cognitive Load + Learning

- Skills and strategies can reduce extraneous cognitive load and free up working memory
  - Automatization of skills
  - Addressing confidence and other affective issues
  - Effective strategy use

Cognitive Load: <mark>Simulation</mark>

1. Gather paper and pen/pencil

2. Write down a few things you've learned today

3. But… write with your **non-dominant** hand!

4. You'll have two minutes

5. Starting now…

Common Types of Load

Attention

- Clutter and unnecessary complexity
- Lack of perceived importance
- Lack of context
- No personal relevance
- Information spatially scattered

Language

- Unnecessarily complex text
- Lack of multi-modal supports
- Single expression format

Affective

- High levels of anxiety
- Learned helplessness
- Setup for failure
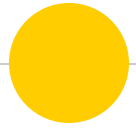
Supporting Executive Function

Three general approach, techniques, and strategies

1. Be explicit

- ◎ Clear rubrics

- ◎ Always share a "why?

- ◎ Provide models/exemplars

- ◎ Model your thinking and your processes.

- ◎ Provide clear directions
  - ○ In writing, bullets, give wait time

3. Find x.

3 cm

4 cm

Here it is
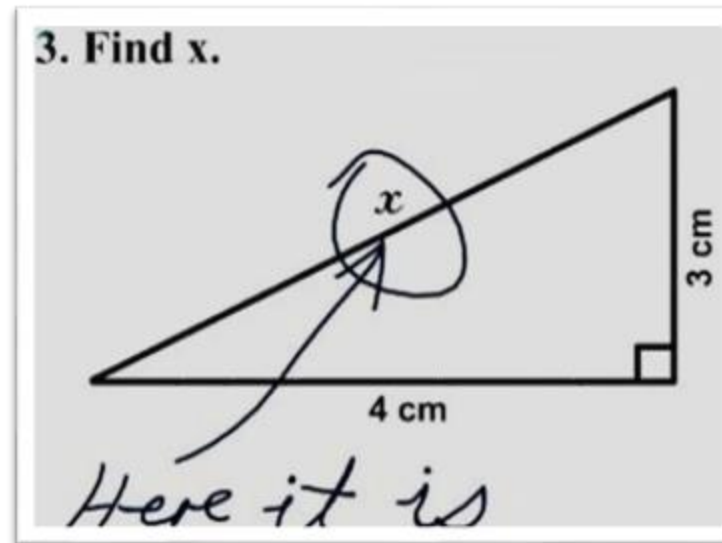
2. Break up the work

A **project** is a final product.

It is something you finish.

A **task** is one of many steps that are taken to start and eventually finish a project.

It is something you do.

Break up the Work: Projects vs. Tasks

IntellectsLinkup
Linking Capabilities with Opportunities !

Organize Your Projects With GANTT CHART

Research Activity	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Time in Months								
Develop research proposal	▮							
Literature review		▮	▮					
Develop questions for data collection				▮				
Pilot study				▮				
Data Collection					▮			
Data analysis						▮		
Write up for first draft							▮	
Write up for final draft							▮	
Submission of dissertation								▮

So you NEVER miss a Deadline!

Break up the work: Pomodoro

1. Decide on the task(s).
2. Set the timer (20 minutes).
3. Work on the task until the timer rings.
4. Put a checkmark on a piece of paper.
5. After the first 3 checkmarks, take a short break (~5 minutes), then repeat (go to step 2.)
6. After 4 pomodoros (checkmarks), take a longer break (~30 minutes)
7. Reset your checkmark count to zero, start over at step 1.

3. Use/teach metacognition

◉ Thinking about one's own abilities, especially study skills/memory, and monitoring learning

◉ Understanding of personal EF strengths & weaknesses in specific situations, under specific conditions

Metacognition in Practice: Self-Monitoring

◉ "Walk me through it" to help student visualize situation and develop awareness

◉ Think about the future they hope to reach

    ◉ e.g., an A on a paper or test

◉ Social modelling and proactive

Metacognition in Practice: Cognitive Wrappers

Please answer the questions honestly; your responses will have no impact on your grade.

1. How much time did you spend preparing for this exam? _____

2. When you were preparing for the exam, what percentage of your study time did you spend on each of these activities?
   a. Reading the textbook _____
   b. Reviewing homework solutions _____
   c. Solving new problems for practice _____
   d. Reviewing your notes _____
   e. Reviewing the lecture materials _____
   f. Other (please specify): _____

3. Looking over your graded exam, check the area where you lost the <u>most</u> points on the exam.

   ☐ Errors in calculations   ☐ Did not know how to approach the problem

   ☐ Errors with interpreting diagrams ☐ Made careless mistakes

   ☐ Did not understand the concept   ☐ Other (please specify):

4. Now that you have reviewed your exam, what is one thing you will do differently when studying for the next exam?

Metacognition in Practice: Cognitive Wrappers (2)

Test #	Understanding	Memory	Test Question	Incomplete Answer

Understanding – didn't fully understand the concept or information

Memory – understood the information, but couldn't remember it on the test

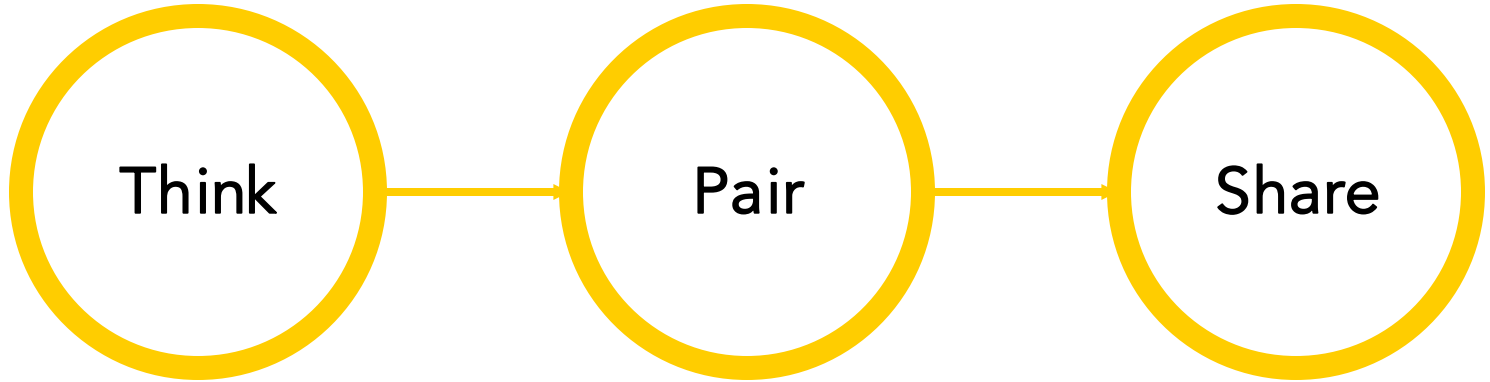**Test Question** – had difficulty interpreting the test item in the way the tester wanted

Metacognition in Practice: Cognitive Wrappers (3)
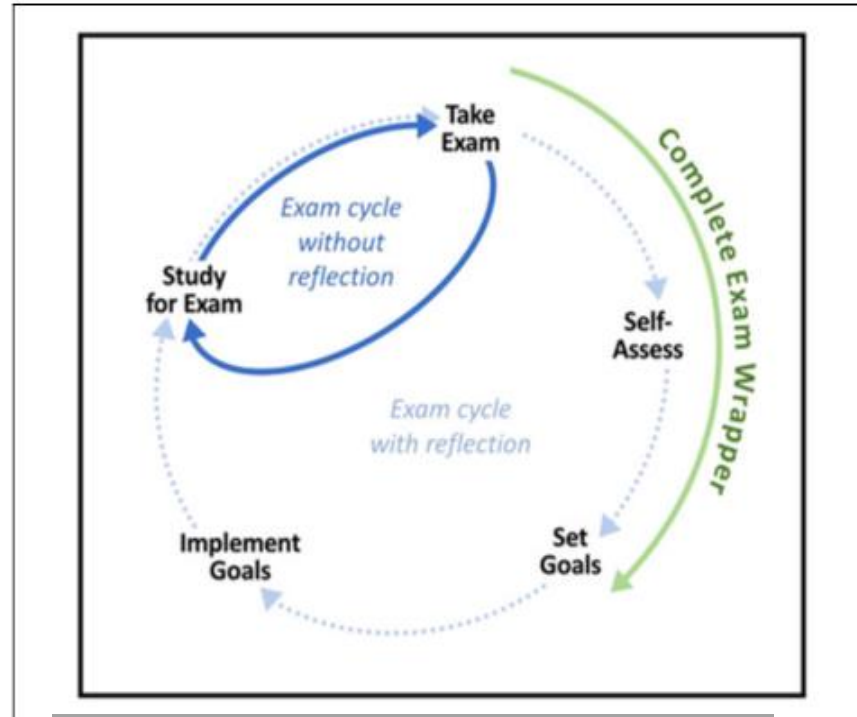
Gezer-Templeton et al, 2017

Which of these might you try?
Why? How?

Think → Pair → Share

Supporting EF: Other Ideas

- "What's one small step I can take right now?"
- Practice shifting between big picture and details ("tree vs. forest")
- Automate > use routines
- Multi-modal: use visuals, diagrams, mind maps
- Separate the set-up from the task
- Identify and plan for hindrances (W.O.O.P goals)