

# How to Scaffold Working Memory to Aid Learning

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Presented by:

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1

## Agenda



- ☐ Introduction
- ☐ Understanding Working Memory (WM)
- ☐ Cognitive Load + Its Implications
- ☐ Strategies for Supporting WM
- ☐ Q+A

2

## Landmark College Institute for Research and Training (LCIRT)

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



3

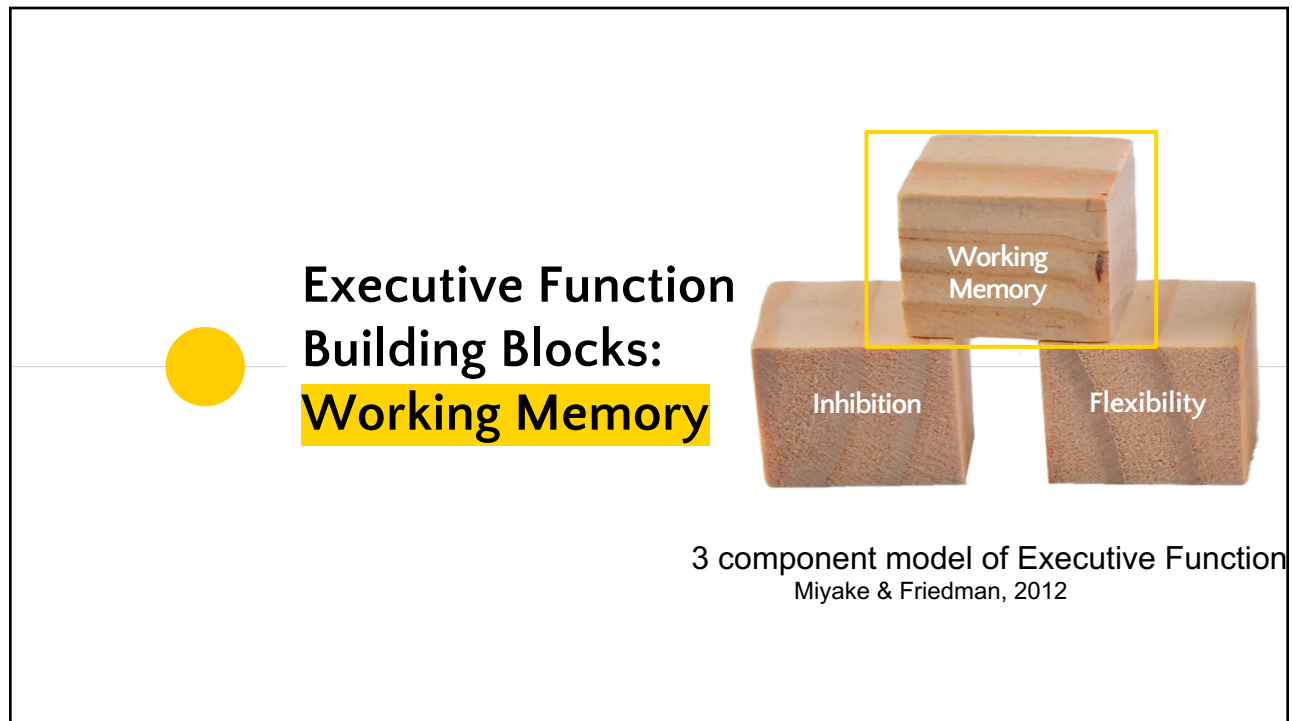
## Working Memory

Hold information mentally long enough to  
process and act on.  
Holding onto the here and now.

Demo

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4



5

The diagram shows a silhouette of a human head in profile, facing left. Inside the head, there are three interlocking green gears of different sizes, symbolizing cognitive processes.

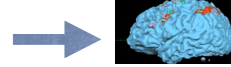
**Working Memory (WM)**

- Processing capacity is limited
  - What is this limit? (**POLL**)
- Gateway to information processing + knowledge acquisition
  - E.g., learning to read
  - Automatic vs. controlled processes

6

## WM ability linked to important life outcomes

- General cognitive ability



- Language & academic aptitude



- Reasoning and planning



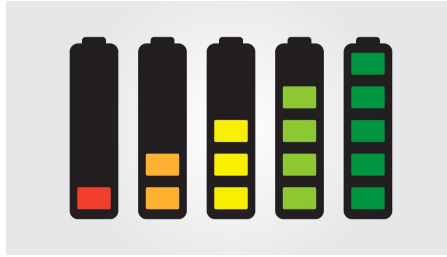
7

## WM: “Breakdowns”

- Difficulty remembering directions while working
- Difficulty remembering sequence of ideas
- Difficulty in group discussion or individual conversation
- Hard to hold one bit of information while doing something else
- Difficulty in reading comprehension, math, writing



8



## WM: The role of cognitive load

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

9



## Cognitive Load: Intrinsic Loads

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



10

## ● Cognitive Load: **Extraneous Loads**

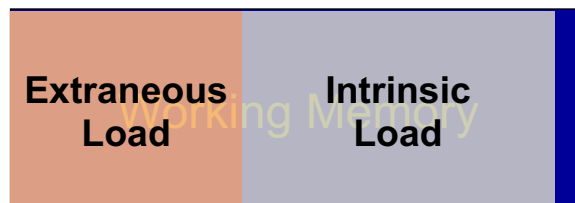
- Parts of a learning task that are not integral to the learning goal
  - Spelling in a critical thinking essay
  - Reading in an algebra word problem



11

## ● 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

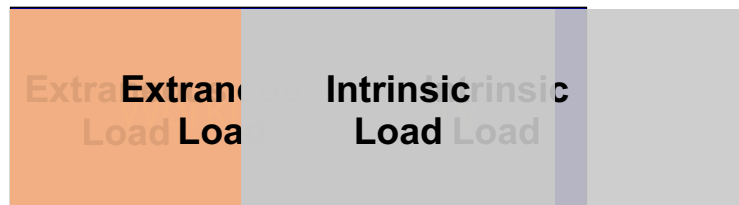


12



## 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



13



## Cognitive Load + Learning

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



14



## Supporting Working Memory

Techniques and strategies for helping WM

15



## Cognitive Load + Learning

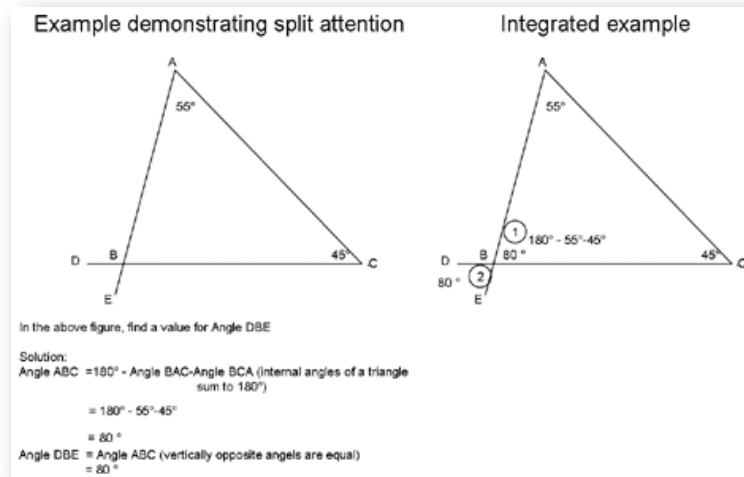
- Skills and strategies can reduce extraneous cognitive load and free up working memory
  - Automatization of skills
  - Addressing confidence and other affective issues
  - Effective strategy use



16



## Reduce Extraneous Load



Split Attention Effect

17



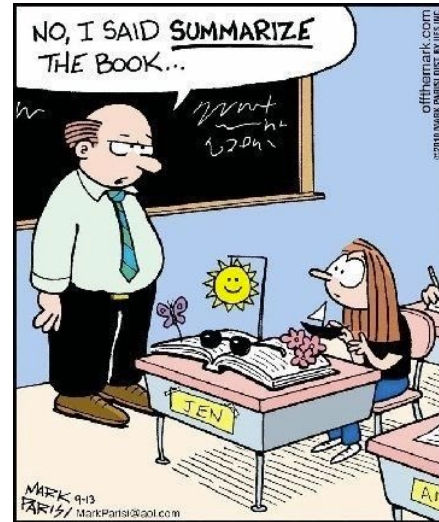
## Routines

- Writing down assignments
- Formatting assignments
- Organizing notebooks and materials
- Preparing for tests and projects
- Brief mindfulness exercise
- Ask/answer a question

18

## Clear directions

- In writing
- Bullets, checklists
- Wait time
- Re-verbalize




19



## Clear Directions


- Clarity: "organizing instruction, explaining content, providing examples, guided practice, and assessment of learning"
- Evidence: Meta-analysis showed a .75 effect size between clarity of communication and student achievement

20



Clear directions example: Reading tasks		
Good	Tell students <b>what</b> to read	Read X
Better	Tell students <b>what</b> to read AND <b>why they're reading it</b>	Read X in order to Y
Best	Tell students <b>what</b> to read AND <b>why</b> they're reading it AND <b>how</b> to engage while they read	Read X in order to Y by Z-ing

21



Tell students <b>what to read</b>	Read the article "The Really Big One"
AND <b>why they're reading it</b>	in order to understand why the Pacific coast should be preparing for a massive earthquake
AND <b>how to engage while they read</b>	by listing the historical evidence about the last major earthquake in this region

22

## Break up the work: Pomodoro technique



1. Decide on the task.
2. Set a timer (usually 20–25 minutes).
3. Work on the task until the timer rings.
4. After the timer ends, put a checkmark on a piece of paper.
5. After the first three checkmarks, take a short break (3–5 minutes), then repeat (go to step 2).
6. After four pomodoros (checkmarks), take a longer break (15–30 minutes), reset your checkmark count to zero, then go to step 1.

<http://www.tomatotimers.com/>

23



## External aids



Agendas/schedules



Clocks/reference to time



Multiple modalities

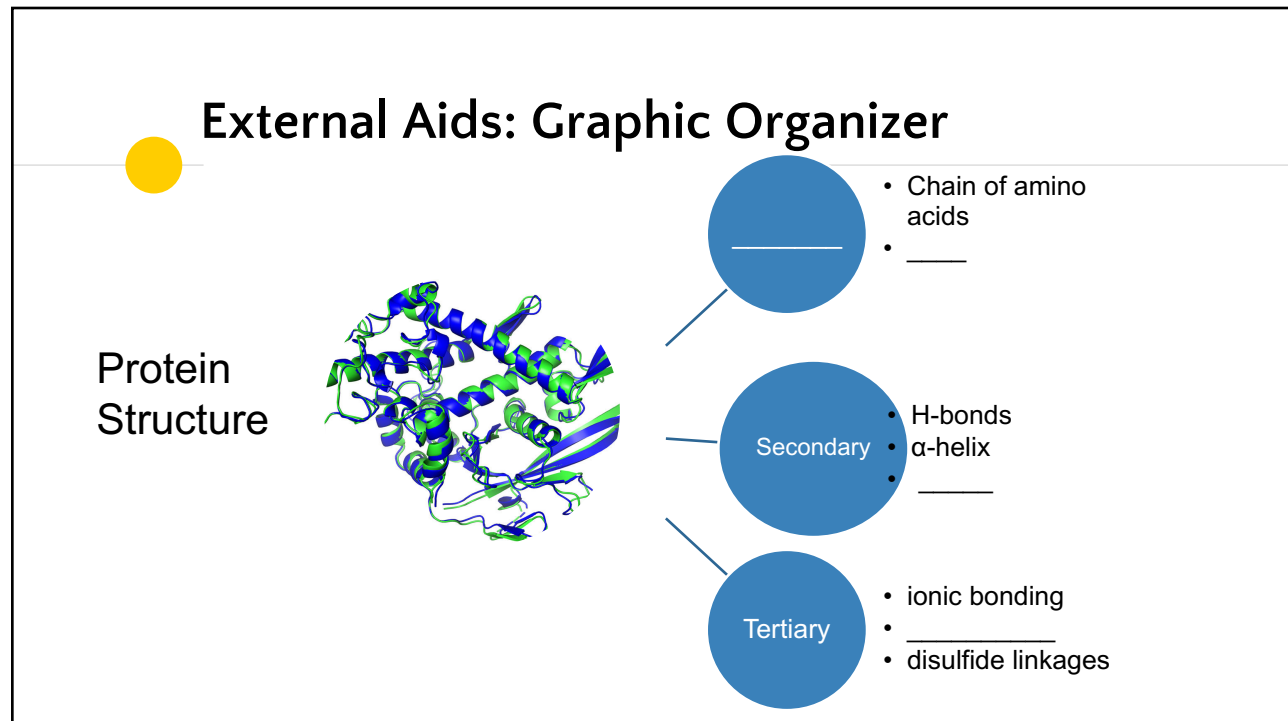
Visuals/ graphical organizers



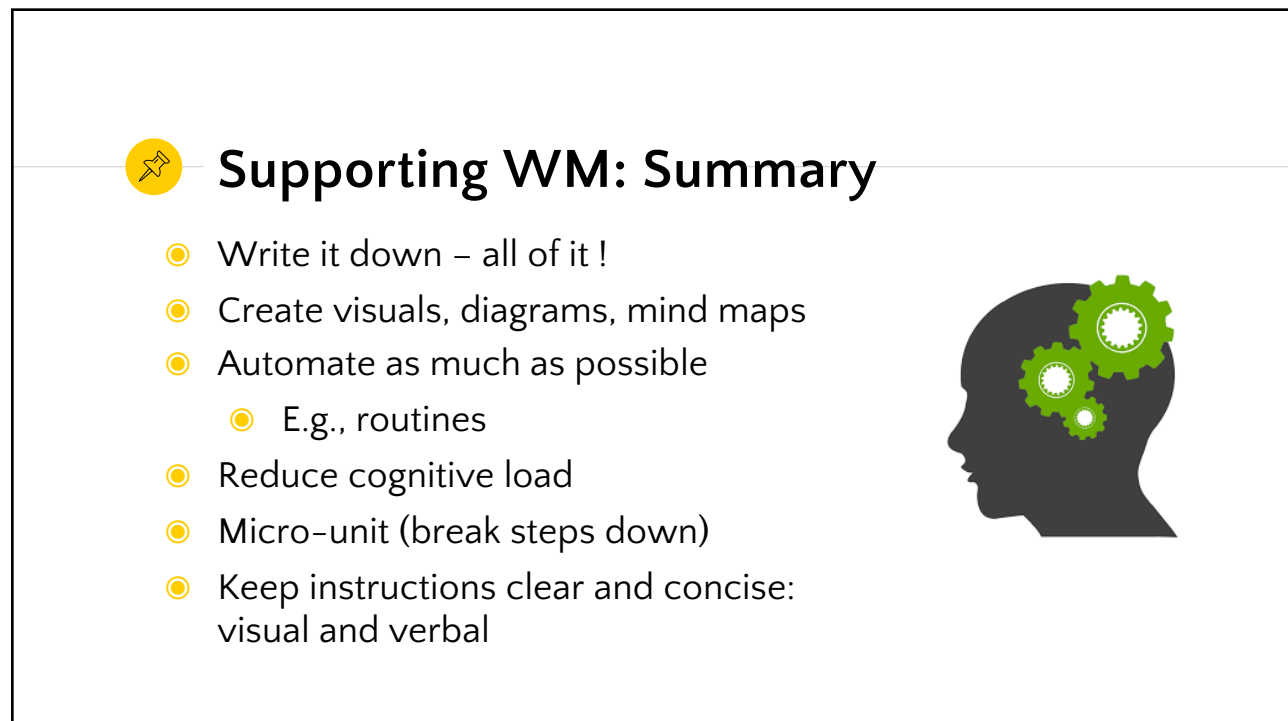
Write it down!

Audio note taking tech ([Clean](#))

24



25



26

Online certificate program for educators

## *Learning Differences and Neurodiversity*

Specializations in: **Executive Function | Autism on Campus | Disability Services**

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27



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Any questions?

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28