UNSW SYDNEY

Study Research Faculties Engage with us About us

UNSW > Staff > Associate Professor Steven Most

Follow

Associate Professor

Associate Professor Steven Most

Ph.D. in Psychology, Harvard University

Science
School of Psychology

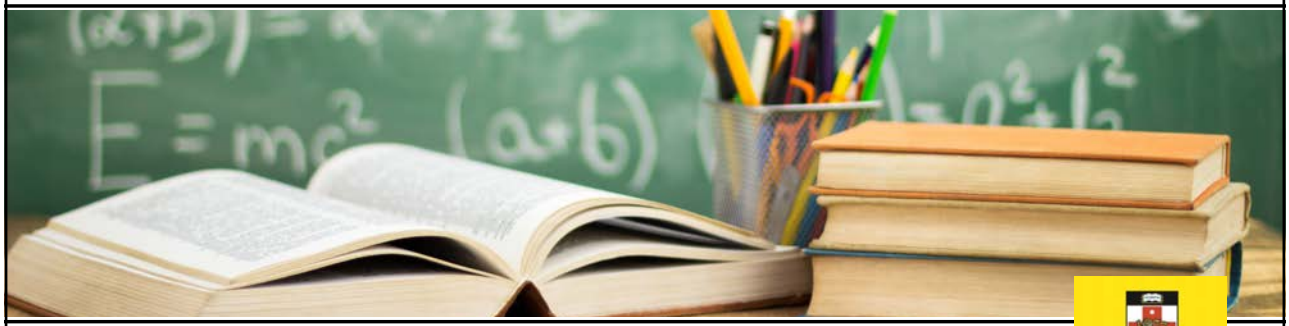
Steve is a cognitive psychologist and has received multiple awards for his teaching and mentoring at UNSW, Harvard, and the University of Delaware. Currently serving as President of the Australasian Society for Experimental Psychology, he is also co-author of the textbook *Cognition*, published by Oxford University Press, which received the 2022 Most Promising New Textbook Award from the international Textbook & Academic Authors Association. He is passionate about sharing his knowledge of cognitive science. Contact him for educational workshops and presentations to schools, organisations, and the general public.

https://bit.ly/3ZCWEs2

s.most@unsw.edu.au

1

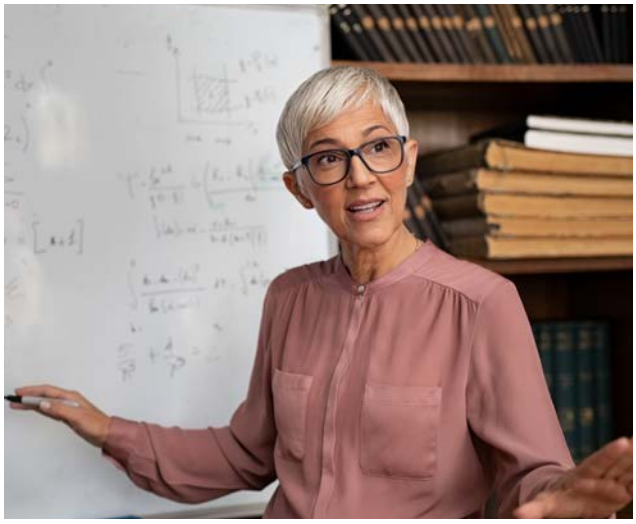
Cognitive science in the classroom



Steve Most

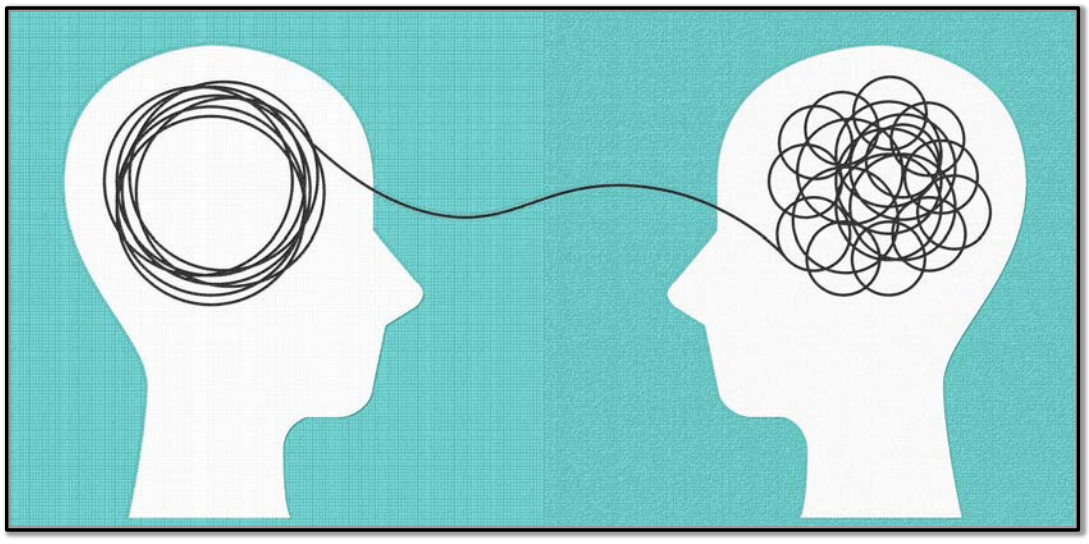
UNSW SYDNEY

2




The **Curse** of **Knowledge**

3



Cognitive Schema: How we have structured our knowledge

4

[Interactive Cognitive Schema Exercise]

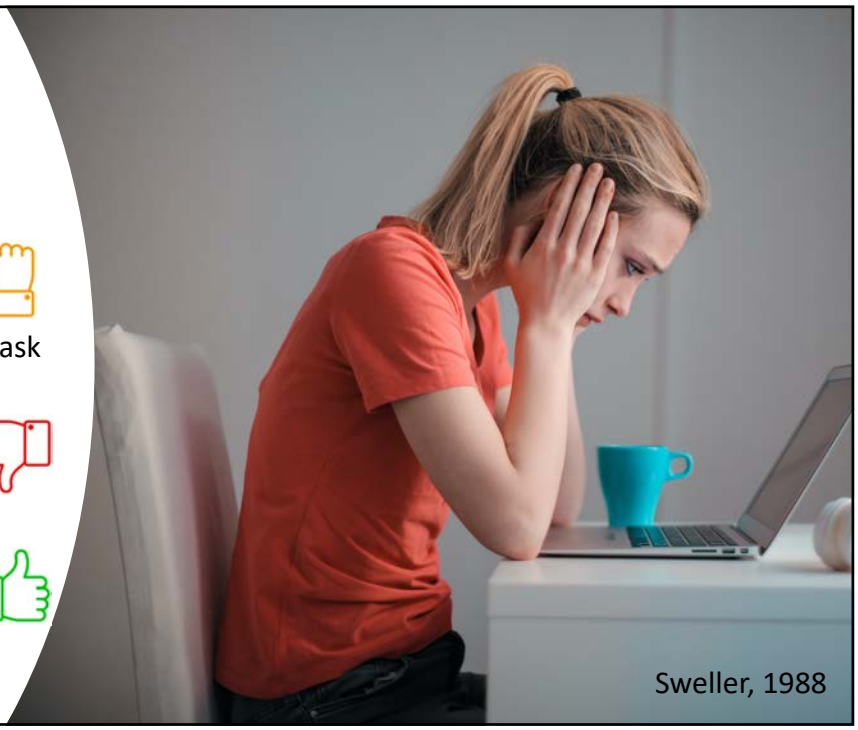
5

Cognitive Load Theory

Intrinsic Load
Complexity of information or task

Extraneous Load
Complex communication

Germane Load
Achieving new schemas



Sweller, 1988

6

Reduce Extraneous Load

Simplify your delivery

Trim out unnecessary information, text, and even visual flair

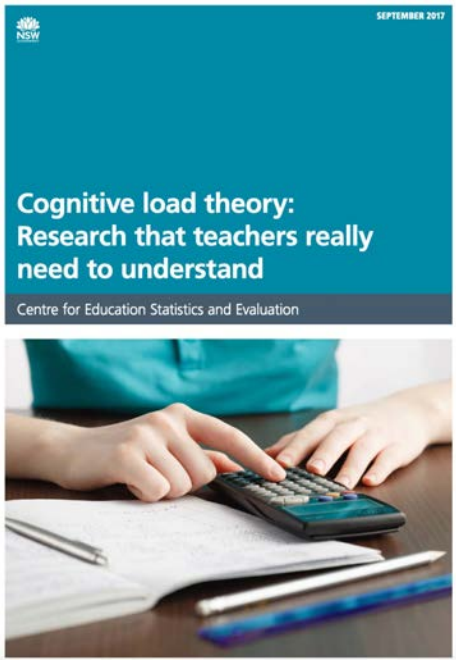
Manage Intrinsic Load

Break larger concepts into smaller, easier to understand pieces

Worked examples: walking step-by-step through a problem

→ Quicker learning and ability to apply skills to new problems

7

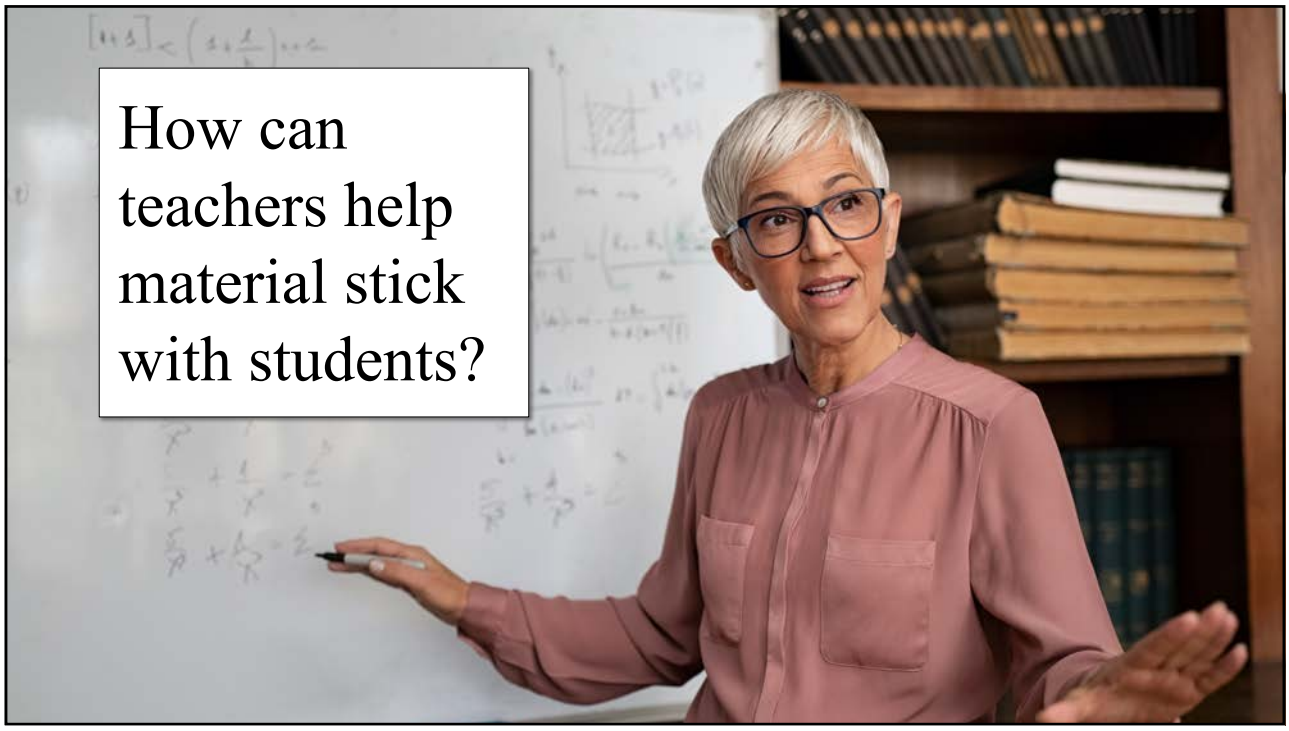


A NSW Government website - Education

NSW GOVERNMENT Education

https://bit.ly/3MTbJhE

8



9

3 Do's

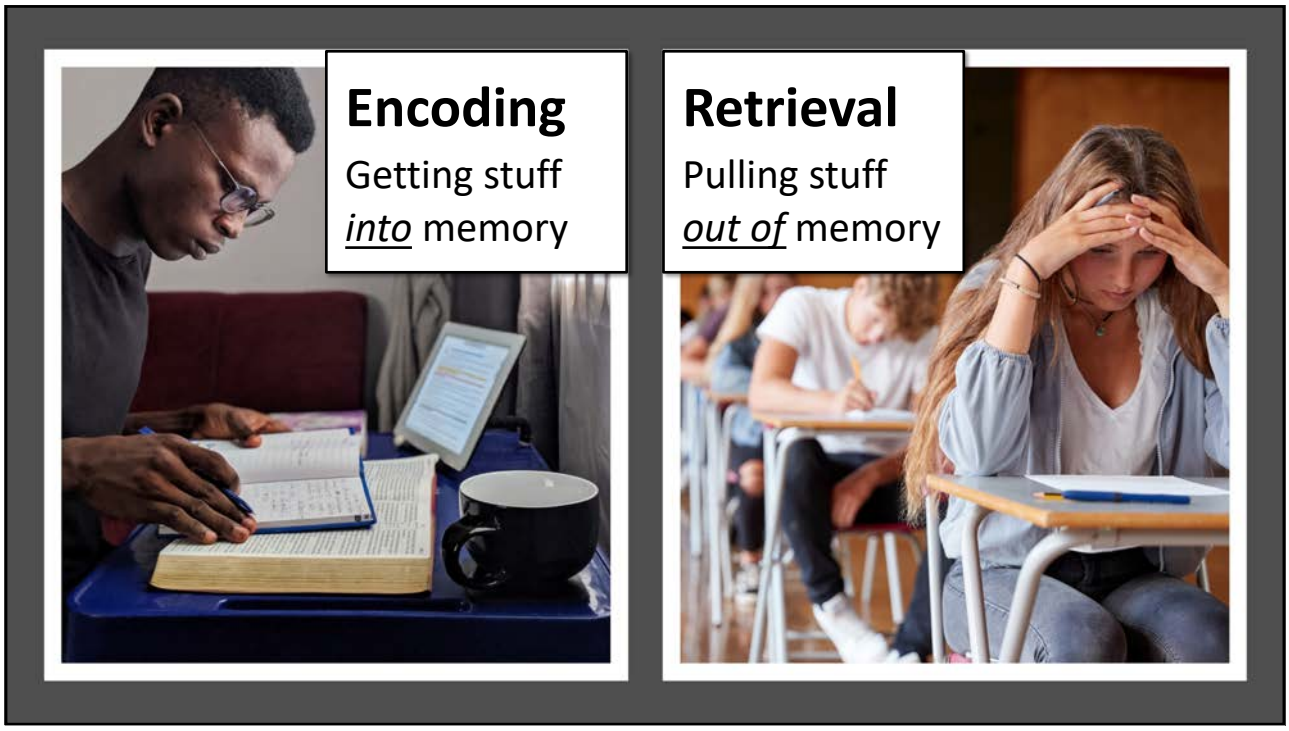
Desirable difficulties

Retrieval practice

Space study sessions apart

Elaboration

10



11

Research Article

Test-Enhanced Learning

Taking Memory Tests Improves Long-Term Retention

Henry L. Roediger, III, and Jeffrey D. Karpicke

Washington University in St. Louis

ABSTRACT—*Taking a memory test not only assesses what one knows, but also enhances later retention, a phenomenon known as the testing effect. We studied this effect with educationally relevant materials and investigated whether testing facilitates learning only because tests offer an opportunity to restudy material. In two experiments, students studied prose passages and took one or three immediate free-recall tests, without feedback, or restudied the material the same number of times as the students who received tests. Students then took a final retention test 5 min, 2 days, or 1 week later. When the final test was given after 5 min, repeated studying improved recall relative to repeated testing. However, on the delayed tests, prior testing produced substantially greater retention than studying, even though repeated studying increased students' confidence in their ability to remember the material. Testing is a powerful means of improving learning, not just assessing it.*

the future than if they had not been tested. This phenomenon, called the testing effect, has been studied sporadically over a long period of time (e.g., Gates, 1917), but is not well known outside cognitive psychology.

Most experiments on the testing effect have been conducted in the verbal learning tradition using word lists (e.g., Hogan & Kintsch, 1971; Izawa, 1967; McDaniel & Masson, 1985; Thompson, Wenger, & Bartling, 1978; Tulving, 1967; Wheeler, Ewers, & Buonanno, 2003) or picture lists (Wheeler & Roediger, 1992) as materials. There have been a few experiments using materials found in educational contexts, beginning with Spitzer (1939; see too Glover, 1989, and McDaniel & Fisher, 1991). However, the title of Glover's article from 17 years ago still sums up the current state of affairs: "The 'testing' phenomenon: Not gone but nearly forgotten."

Our aim in the two experiments reported here was to investigate the testing effect under educationally relevant conditions, using prose materials and free-recall tests without feedback (somewhat akin to essay tests used in education). Most previous research has

12

IDEA

Start each class with trivia questions about the previous one

Doubles as a way to get class engagement flowing

Trivia Questions:

What is the "memory palace" method of memorisation?

The brain's tendency to change based on experience is called _____

What is a mental "schema"?

Keeping track of where our memories came from is known as _____

13

Do's

Desirable difficulties

Retrieval practice

Space study sessions apart

Elaboration

14

Cramming

Spaced Learning

15

Consolidation

The “stablisation” of memories that have been encoded. Unfolds over time

(A bit like letting paint dry and settle before applying a second layer)

16

CHILD DEVELOPMENT

Full Access

Distributing Learning Over Time: The Spacing Effect in Children's Acquisition and Generalization of Science Concepts

Haley A. Vlach, Catherine M. Sandhofer

First published: 22 May 2012 | https://doi.org/10.1111/j.1467-8624.2012.01781.x | Citations: 68

The spacing effect describes the robust finding that long-term learning is promoted when learning events are spaced out in time rather than presented in immediate succession. Studies of the spacing effect have focused on memory processes rather than for other types of learning, such as the acquisition and generalization of new concepts. In this study, early elementary school children (5- to 7-year-olds; *N* = 36) were presented with science lessons on 1 of 3 schedules: massed, clumped, and spaced. The results revealed that spacing lessons out in time resulted in higher generalization performance for both simple and complex concepts. Spaced learning schedules promote several types of learning, strengthening the implications of the spacing effect for educational practices and curriculum.

APPLIED COGNITIVE PSYCHOLOGY

Research Article | Full Access

Spacing effects in real-world classroom vocabulary learning

Hailey S. Sobel, Nicholas J. Cepeda, Irina V. Kapler

First published: 22 September 2010 | https://doi.org/10.1002/acp.1747 | Citations: 100

SECTIONS PDF TOOLS SHARE

Abstract

As a primary goal, educators often strive to maximize the amount of information pupils remember. In the lab, psychologists have found efficient memory strategies for retaining school-related materials. One such strategy is the spacing effect, a memory advantage that occurs when learning is distributed across time instead of crammed into a single study session. Spaced learning is not often explicitly utilized in actual classrooms, perhaps due to a paucity of research in applied settings and with school-aged children. The current study examined the spacing effect in real-world fifth-grade classrooms. We taught 39 children unfamiliar English words using both massed and spaced learning. Five weeks later, we tested vocabulary recall. One-week spacing produced superior long-term retention compared to massed learning. This finding demonstrates that the spacing effect can be generalized to vocabulary learning in applied settings and middle-school-aged children. Copyright © 2010 John Wiley & Sons, Ltd.

IDEA

Revisit material across the year even after moving on to a new topic

17

3 Do's

Desirable difficulties

Retrieval practice

Space study sessions apart

Elaboration

18

Elaboration

Link parts of the material to each other and to student interests, generate new examples. Forces engagement with deeper meaning.

The more that you can actively form mental links, the better you'll remember the material.

19

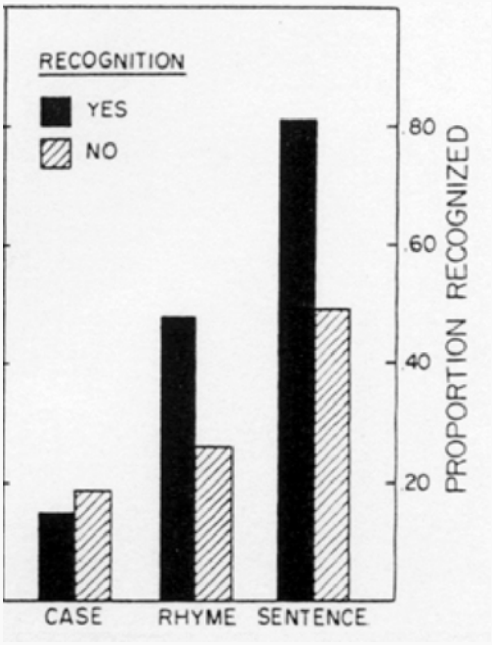
[Interactive Depth of Encoding Exercise]

20

Shallow processing	Medium processing	Deep processing
Case	Rhyme	Fits in sentence
TREE	party	DUCK
fox	COLOR	penny
flower	look	ROBIN
SNOW	HALL	HOUSE
MARKET	gate	window
book	SAFE	pupil

When you're able to process the meaning, you remember it better

21



Depth of Encoding

Shallow encoding
focusing on surface features

Deep encoding
focusing on meaning

Craik & Tulving (1975)
The deeper the encoding, the better the memory

22

Use “concrete”, easy-to-visualize examples

Read the following words

basically	axe	enough
zombie	pizza	bellybutton
antelope	although	baby
ever	since	binoculars
except	bathrobe	somewhat
armchair	lately	unknown

23

[Interactive Concreteness & Memory Exercise]

24

25

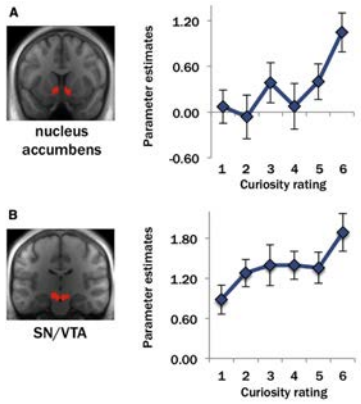
CellPress

Neuron

Article

States of Curiosity Modulate Hippocampus-Dependent Learning via the Dopaminergic Circuit

Matthias J. Gruber,[1,*] Bernard D. Gelman,[1] and Charan Ranganath[1,2]
[1]Center for Neuroscience, University of California at Davis, Davis, CA 95618, USA
[2]Department of Psychology, University of California at Davis, Davis, CA 95616, USA
*Correspondence: mgruber@ucdavis.edu
http://dx.doi.org/10.1016/j.neuron.2014.08.060



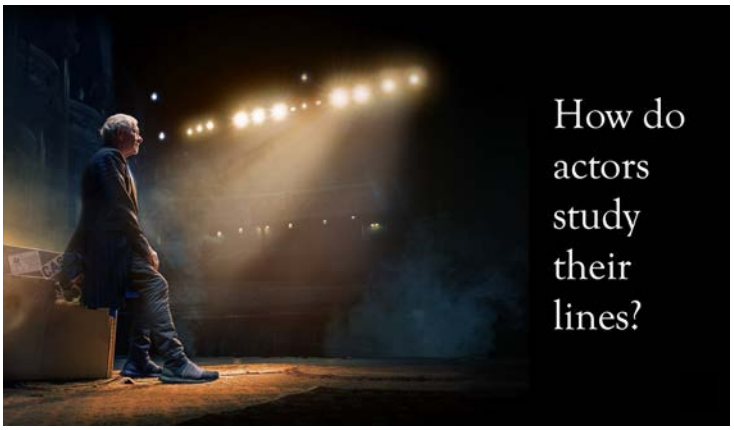
SUMMARY

People find it easier to learn about topics that interest them, but little is known about the mechanisms by which intrinsic motivational states affect learning. We used functional magnetic resonance imaging to investigate how curiosity (intrinsic motivation to learn) influences memory. In both immediate and one-day-delayed memory tests, participants showed improved memory for information that they were curious about and for incidental material learned during states of high curiosity. Functional magnetic resonance imaging results revealed that activity in the midbrain and the nucleus accumbens was enhanced during states of high curiosity. Importantly, individual variability in curiosity-driven memory benefits for incidental material was supported by anticipatory activity in the midbrain and hippocampus and by functional connectivity between these regions. These findings suggest a link between the mechanisms supporting extrinsic reward motivation and intrinsic curiosity and highlight the importance of stimulating curiosity to create more effective learning experiences.

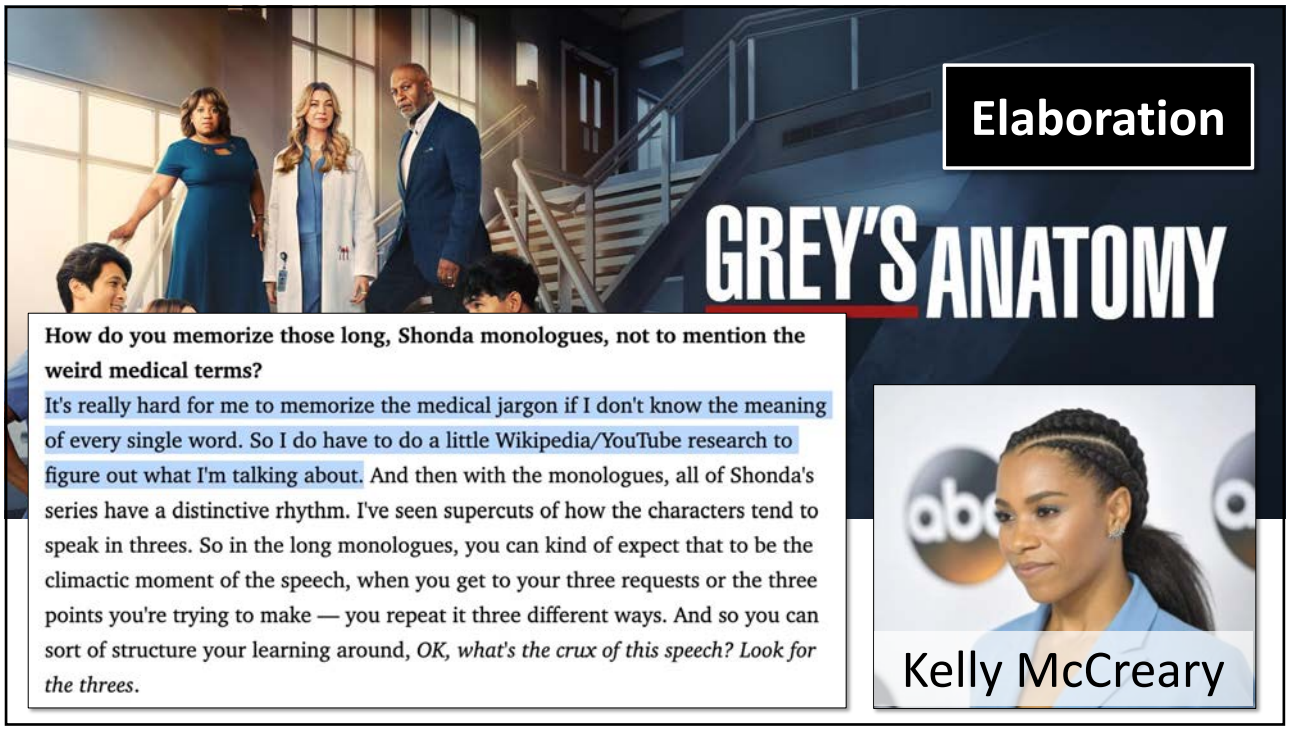
26

IDEA

Help students find links between the classroom material and concrete, real-world examples to spark their deep engagement and curiosity



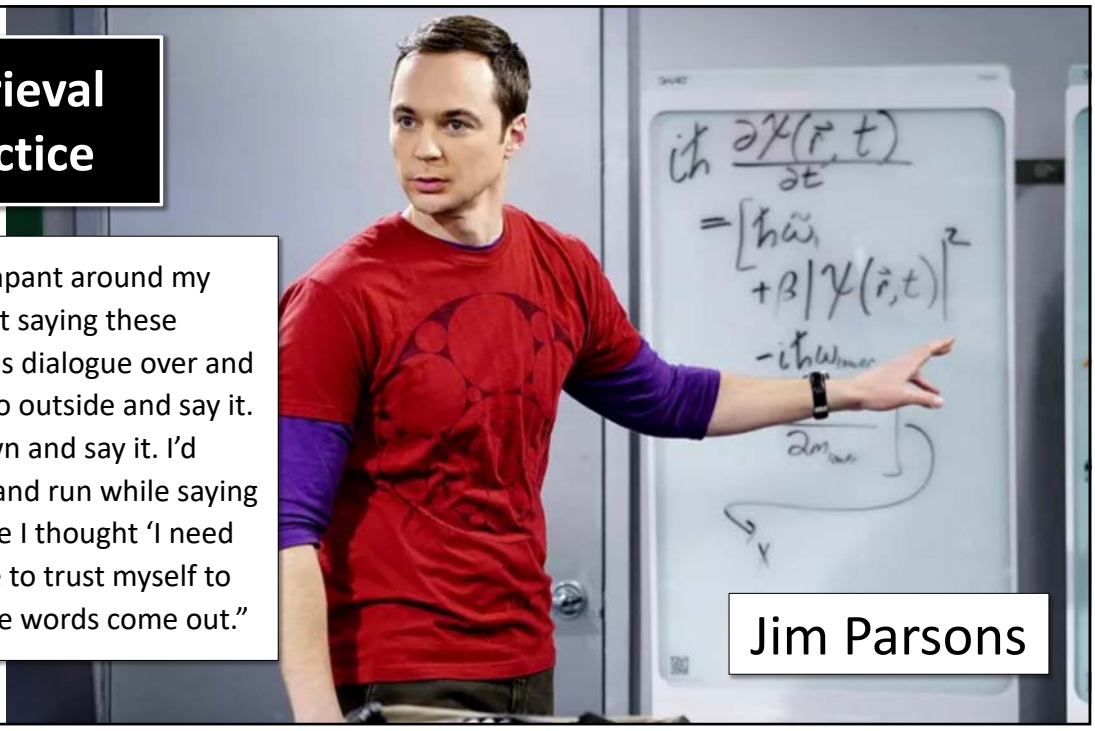
27



28

Retrieval practice

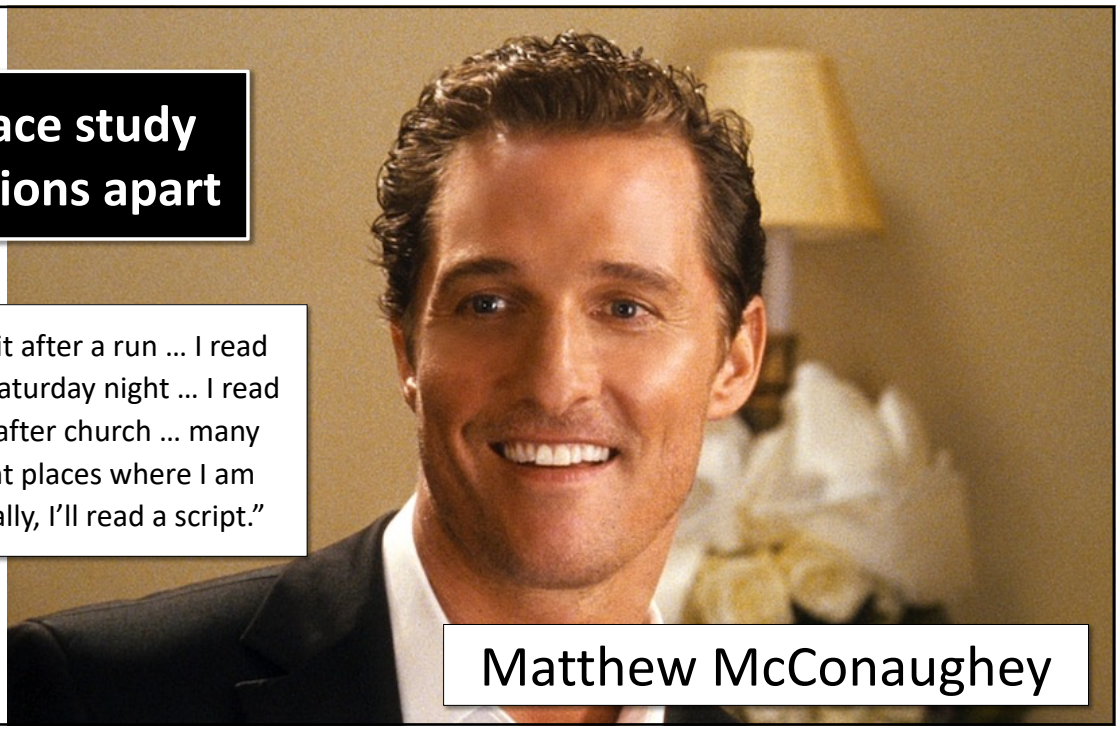
"I run rampant around my apartment saying these words, this dialogue over and over. I'd go outside and say it. I'd sit down and say it. I'd stand up and run while saying it. Because I thought 'I need to be able to trust myself to have these words come out."



29

Space study sessions apart

"I read it after a run … I read it late Saturday night … I read it right after church … many different places where I am personally, I'll read a script."



30

3 Do's

Desirable difficulties

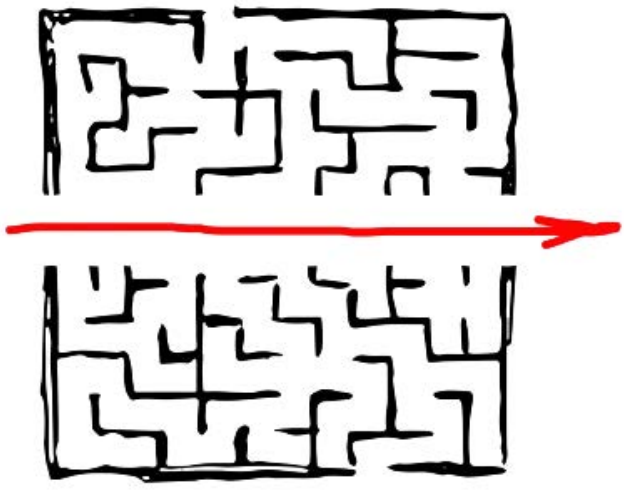
Share these tips with your students:
YouTube: https://bit.ly/3JaFpoB
TikTok: https://bit.ly/3xugI49

Retrieval practice

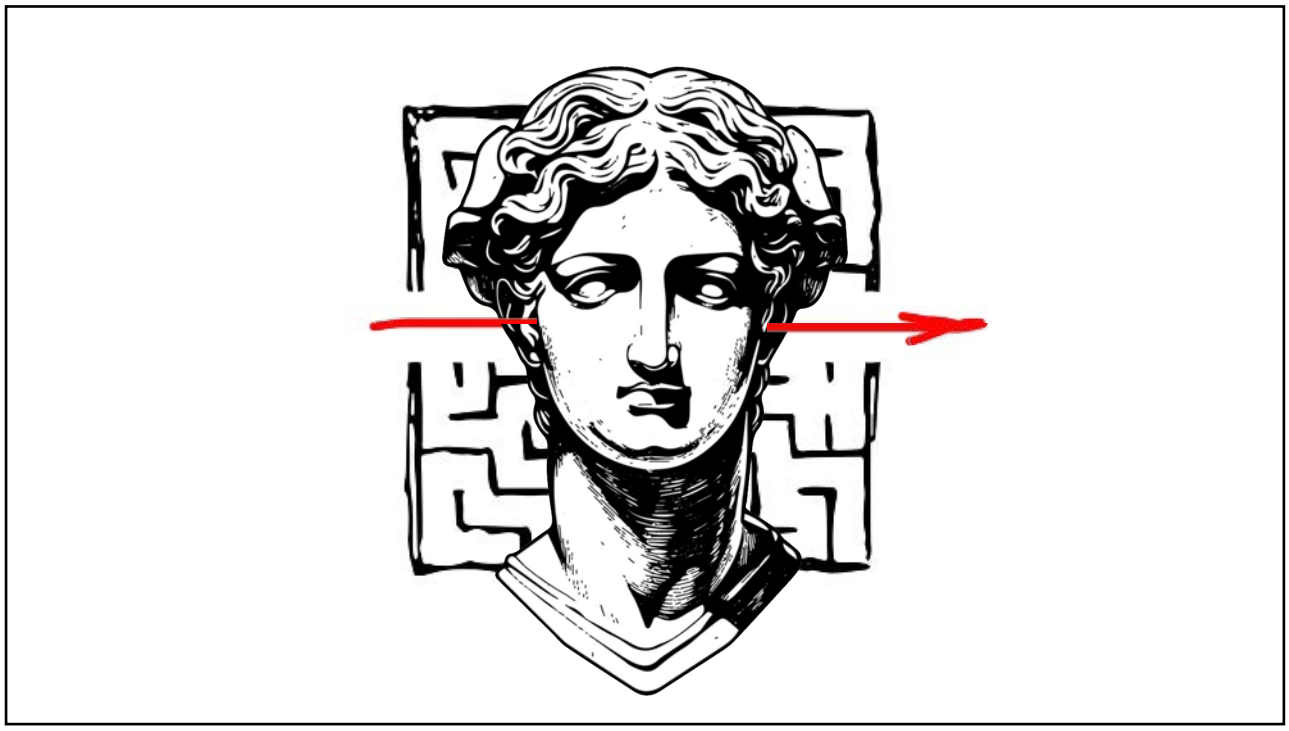
Space study sessions apart

Elaboration

31



32



33


“Education is not the filling of a pail, but the lighting of a fire
https://bit.ly/3ZCWEs2
s.most@unsw.edu.au

34