NEUROSCIENCE IN CLASSROOM

Science of Attention

CheckIT Learning

Neuroscience in Classroom

Science of Attention

WHITEPAPER

CheckIT Learning

May, 2026

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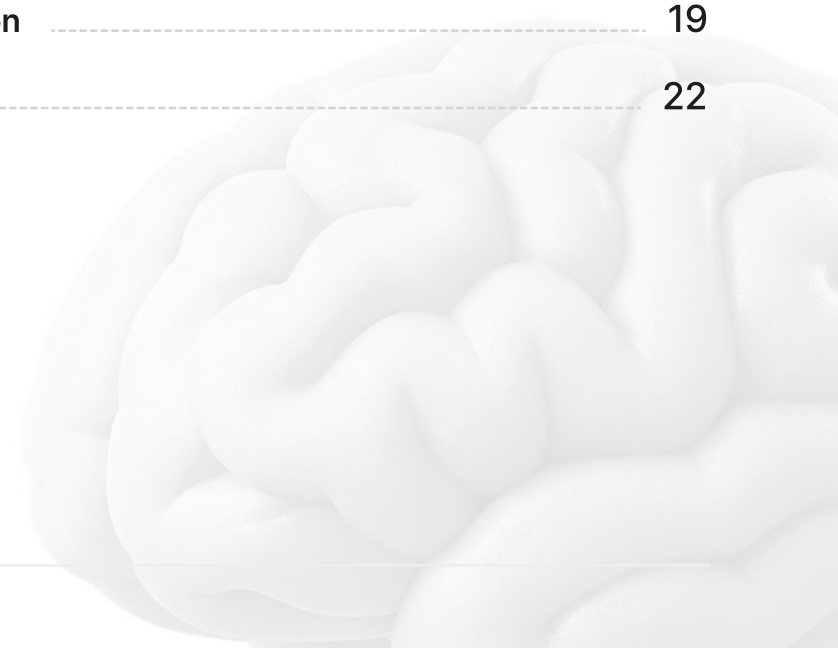


1 Introduction

You will learn about:

- The Crisis of Attention in the Classroom
- Attention and the Brain: More than Listening
- Practical Strategies for Managing Attention in the Classroom
- Evidence-Based Strategies to Ensure Effective Learning
- Recommendations for Consistent Application

Human attentional capacity is finite and largely shaped by factors outside an individual's control. In classrooms, capturing and sustaining attention is often a challenge for educators due to the complexity of cognitive, emotional, and environmental factors that shape students' ability to focus.

Decades of neuroscience research have offered an understanding of how attention functions in real-world contexts. These insights enable educators to refine their teaching practices and manage attention more effectively.

Relying on those insights, this white paper provides an introduction to the science of attention and delivers practical strategies for educators to foster focus and meaningful learning in their classrooms.

86%

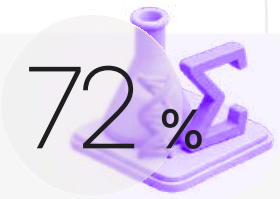
of students struggle to stay focused during class

2 The Crisis of Attention in the Classroom

The changing dynamics of students' daily life, and digital distractions in particular, are shaping the learning context of today. While sustaining attention in class has always carried a degree of challenge for educators, latest studies unveil the depth of the problem.

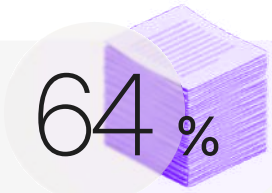
In 2024, The Institute of Education Sciences[1] reported that 26% of public schools find lack of focus from students as having a severe negative impact not just on learning, but on teacher and staff morale as well.
At a time when many teachers report feeling burned out and consider leaving the profession, this highlights another area where their experience could be improved.

To that note, the 2025 Cambridge International survey[2] provides insights from classroom observations on students' attention span. Namely, 88% of teachers believe their students' attention spans are getting shorter, impacting their learning.



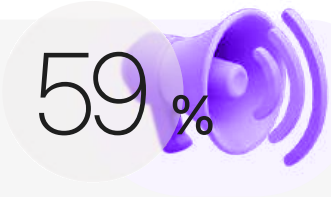
72%

said students are experiencing more difficulty in sustaining focus on complex topics



64%

said students are finding it more challenging to complete longer assignments



59%

linked a fall in attention to more classroom disruptions

1 National Center for Education Statistics (NCES), 2024. Available at: https://ies.ed.gov/learn/press-release/about-one-quarter-public-schools-reported-lack-focus-or-inattention-students-had-severe-negative

2 Ellen Peirson-Hagger, tes magazine, Are pupil attention spans really decreasing? 2025. Available at: https://www.tes.com/magazine/teaching-learning/general/pupils-finding-it-more-difficult-to-pay-attention-in-class

The challenges extend globally and are not limited to K-12 classrooms. Kaushik et. al.[3] surveyed over 600 students at the University of Jaipur, Rajasthan, to understand the depth and root causes of the problem.

Their research reveals that 86% of students report having their mind wander or getting distracted during class, while only about 16% say they always remember what they learned in class without any review or revision.

Attention span of students	% Strongly Agreed (5)	% Agreed (4)	% Neutral (3)	% Disagreed (2)	% Strongly Disagreed (1)
Easily focus during class lectures or discussions	18	9.34	15.33	25.33	32
My mind keeps on wandering or getting distracted during class	42	44.36	3.64	4.33	5.67
I feel engaged and attentive when studying or completing assignments in class	8.33	12	19	25.33	35.34
Always feel bored or lose interest during class activities or presentations	30	34.33	11.33	11.67	12.67
Always remember what I've learned in class without any review or revision	10.67	5.33	10.67	32	41.33

Table: Students' self-assessment of their attention spans; Level of Attention Span of Students (N=600); Source: Kaushik et. al.

To understand the context influencing student attention and engagement, Kaushik et. al. looked into three key variables: student abilities, teacher, and teaching methodologies.

One thing that stood out regarding student abilities is that 90% believed their critical thinking and problem-solving skills had a positive impact on their attention.

3 Kaushik et. al., Unravelling the Attention Crisis: Investigating Student Engagement in Contemporary Classrooms, 2024. Available at: https://www.researchgate.net/publication/381924919_Unravelling_the_Attention_Crisis_Investigating_Student_Engagement_in_Contemporary_Classrooms

Below are additional factors that students believe influence their attention the most:

78% prior knowledge related to the topic

78% area of interest

74% self-discipline

These findings provide a cue into what makes lessons engaging for students.

The science of learning further explains how to make lesson content more impactful using surprise, novelty, and the varying attention peaks.

3 Attention and the Brain: More than Listening

"Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others."

– W. James, The Principles of Psychology

Everyday conceptions of attention often reduce it to the ability to listen. In reality, the underlying cognitive process involves not only focusing on what is relevant but also filtering out distractions. Both mechanisms are central to understanding attention, as highlighted even in its earliest definitions.

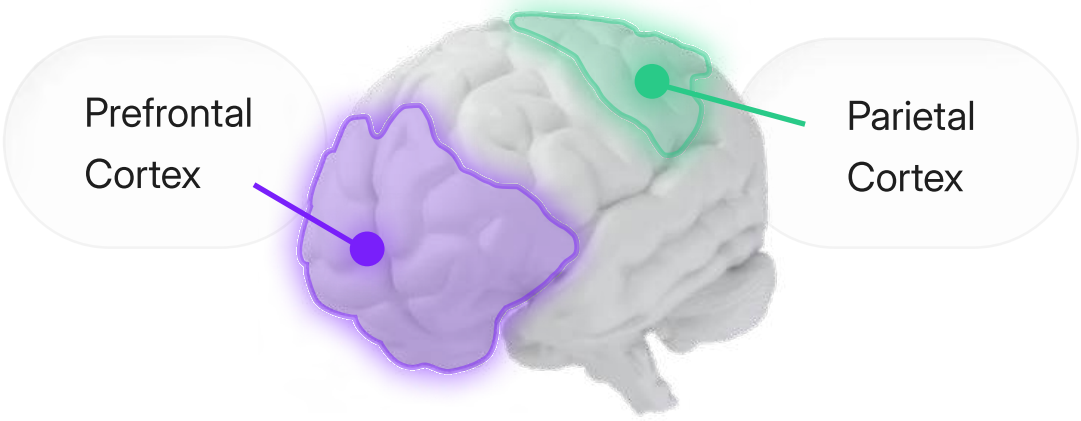
By continually balancing relevant and less relevant sensory information, the brain consumes substantial mental energy. This explains why maintaining focus is not simple and why it requires deliberate skill and, in the classroom context, neuroscience-based strategies.

3.1. The Neural Basis of Attention

Attention is primarily linked with the following two parts of the brain:

The Prefrontal Cortex – an area that manages willful concentration when a person is focusing on a specific task like studying, reading or writing.

The Parietal Cortex – the part that activates when there is a sudden event that requires our focus.



The brain's ability to simultaneously manage voluntary and involuntary attention implies the multitude of mechanisms that make up the process. As a result, learning experiences are rarely straightforward, even under optimal conditions such as low noise and minimal distractions. Any sudden change in the environment can activate the parietal cortex, disrupting the primary task.

This, however, also provides the ground for educators to use targeted strategies to capture students' attention and anchor them in the immediate surroundings. By calling out a person's name or asking students to change seats, they can drive focus back to the lesson. Attention networks explain how this activates the brain.

3.2. Attention Networks in Learning

By understanding how different neural systems work together to direct attention, educators can design lessons that successfully combat drops in focus and ensure stronger retention.

The Alerting System

WHAT IT DOES?

Triggers an awareness to a particular event or information

HOW IT ACTIVATES IN CLASSROOM:

When a student hears their name or notices a sudden shift in environment

The Orienting System

WHAT IT DOES?

Drives focus to a relevant detail

HOW IT ACTIVATES IN CLASSROOM:

Filters out background noise and wandering thoughts to sharpen focus on the lesson

Executive Control

WHAT IT DOES?

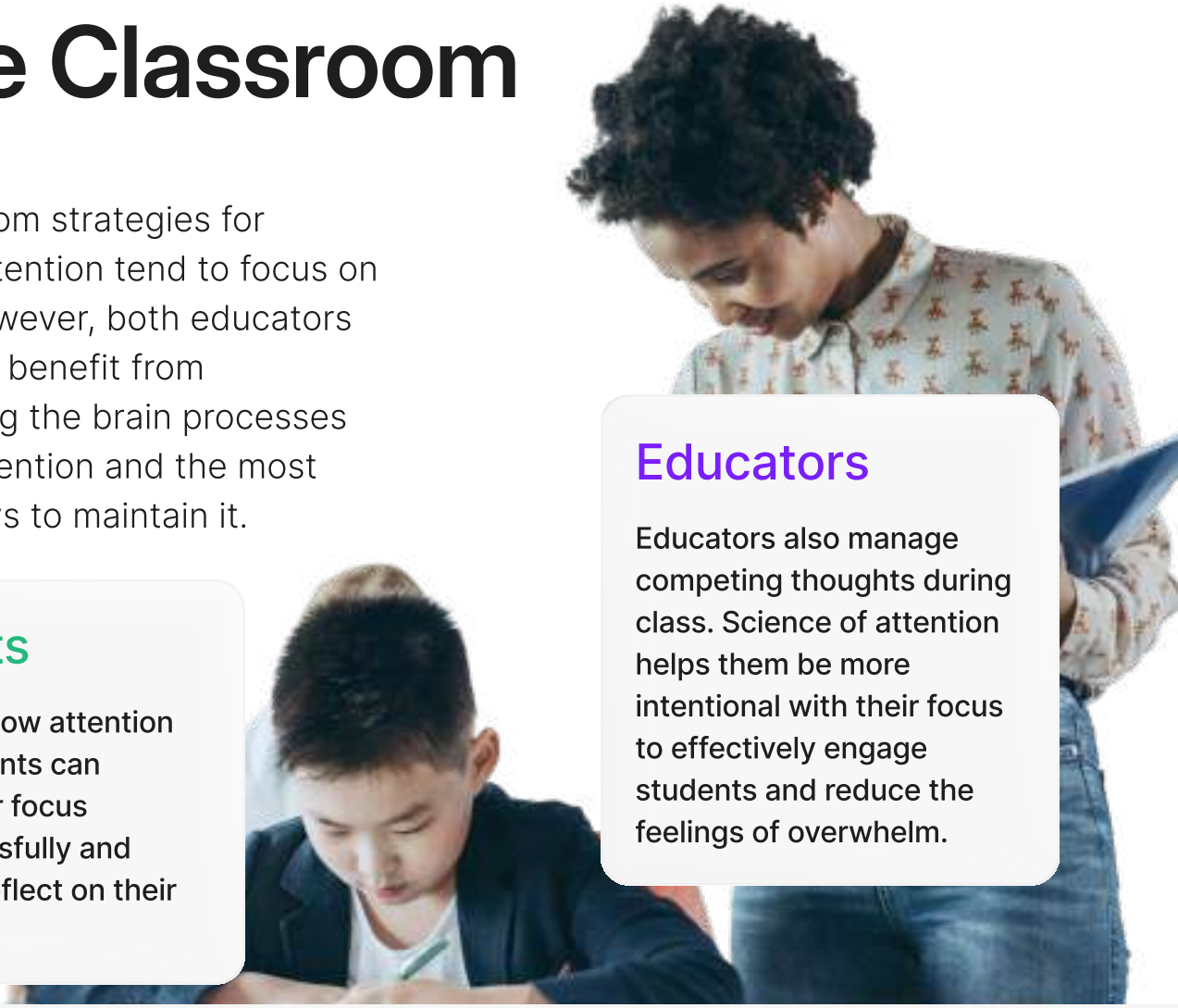
Empowers self-regulation

HOW IT ACTIVATES IN CLASSROOM:

Helps students deliberately avoid reaching for their phone or entertaining thoughts unrelated to the lecture

4 Managing Attention in the Classroom

Most classroom strategies for sustaining attention tend to focus on students. However, both educators and students benefit from understanding the brain processes that drive attention and the most effective ways to maintain it.



Students

By learning how attention works, students can manage their focus more successfully and effectively reflect on their learning.

Educators

Educators also manage competing thoughts during class. Science of attention helps them be more intentional with their focus to effectively engage students and reduce the feelings of overwhelm.

The science of attention helps deconstruct the complex cognitive processes behind this concept and transform this knowledge into a life skill that extends beyond the classroom.

By applying these insights, both teachers and students can better regulate their focus in everyday tasks, improve decision-making, and enhance learning across all areas of life.

4.1. Driving and Sustaining Students' Focus

Based on the primacy and recency effect, class time can be structured to better align with students' natural attention peaks. Research shows that information presented at the beginning (primacy) and end (recency) of a learning episode is retained more effectively than information presented in the middle.

With students' attention being strongest at the beginning and again toward the end of class, teachers can use these peaks to introduce new material when students are most receptive. Yet many teachers introduce new material midway through the lesson, when attention may already be declining.

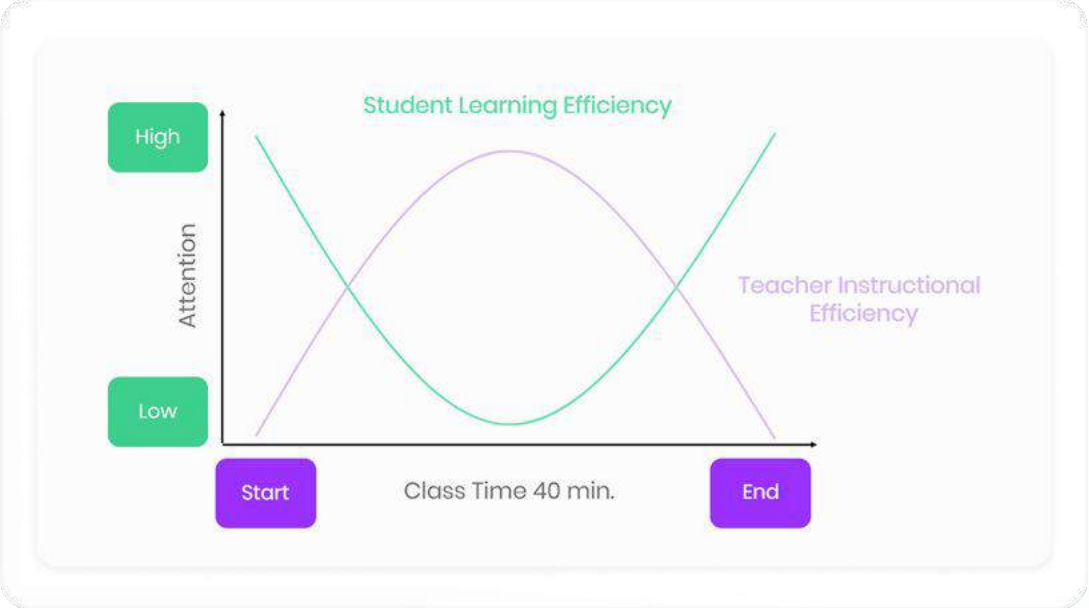


Figure 1: Yi Ou, Strategies for Applying BOPPPS Model Supported by Intelligent Algorithms in Blended Teaching of College English, 2024[4]

The neuroscience approaches recommend starting with key new information to leverage the early attention spike. By structuring lessons around these natural rhythms, teachers can more effectively capture and sustain student focus.

4 Yi Ou, Strategies for Applying BOPPPS Model Supported by Intelligent Algorithms in Blended Teaching of College English, 2024. Available at: https://www.researchgate.net/publication/381658299_Strategies_for_Applying_BOPPPS_Model_Supported_by_Intelligent_Algorithms_in_Blended_Teaching_of_College_English

Effective Techniques

Avoid starting the class with routine announcements or homework corrections. Instead, use a hook to drive surprise and interest.

- Start the class with a bold question or a brief movement activity.
- Drive engagement when attention begins to dip mid-class with a new interactive activity, movement or unpredictable statements.
- Strengthen retention by ending with a reflective, thought-provoking summary.

Classroom Example

Start a lesson on gravity by holding up an object—and then dropping it.

Instead of following with a textbook definition, ask students to predict whether heavier objects will fall faster.

By turning learning into an interactive experience, you make it more engaging and more effective.

4.2. Strategies to Capture and Sustain Attention

In addition to practical tips provided in the sections above, below are classroom-ready recommendations from our Science of Learning Micro-Course. In the full lesson focusing on attention, our educators discussed the principles of the science of attention and shared very specific techniques and resources to use in classroom.

The below strategies are part of Lesson 4 in our 12-module course on The Science of Learning designed to help educators effectively apply neuroscience in class.

Free access to this micro-course available via this link.

Strategy	Example	Why it Works
Provocative Statement	"What if I told you that the course of history could have been completely different if one small event had gone a different way?" "A single book changed the way millions of people see the world." "Did you know plants can communicate with each other?	Unexpected statements spark curiosity and make students wonder what the lesson is really about.
Incredible Fact	"Dean Karnazes ran 350 miles without sleeping!" "Did you know color and light can affect mood, heart rate, and impulsivity?"	Surprising facts grab attention and make students curious.
Unexpected Sound	Drop something, ring a bell, music clip, animals sound, whistle -make a sound that you usually don't use in the classroom.	Sudden sounds can interrupt current mental state and redirect focus.
Unexpected Challenge	"You have 10 seconds to write down three different musical time signatures. Go!" "Name 3 major events of the story in 15 seconds. Go!"	Challenges ignite the brain's competitive and problem-solving areas, increasing attention.
Intriguing Video Clip	"Show a clip that relates to your topic but don't disclose an explanation. Let the students discuss what the connection could be. Then propose questions: What do you think this video has to do with what we're learning today? What might be the connection between this footage and (topic)?"	Using visual stimuli captures attention and this also sparks curiosity.
Mystery Box	Have a co-worker knock on your door and give you a sealed envelope. Have a package delivered mid-class. Tell them you'll open it later –but not too much later.	Sense of anticipation captures and holds attention.
Odd Prop	Examples: Fake mustache, juggling balls, deck of cards, toothbrush, old shoes, sunglasses, pool noodle, glow in the dark paint, a stuffed animal, 3D model. Seek out vintage or futuristic items—the more unique and unusual, the greater the engagement. The greater the contrast to who you are, the more curious they will become.	Props grab attention by piquing curiosity about how something unusual is relevant to the lesson.
Humor	Tell a joke!	Unexpected humor can capture students' attention right away.

5 Beyond Attention: Memory Encoding and Consolidation

When a sensory input (lesson content) reaches a student's brain, it is not immediately retained. To ensure it is remembered, educators need to strategically activate the cognitive processes in charge of transferring information to long-term memory. Otherwise, any unattended information will be lost within days, according to the principles of the Ebbinghaus's *The Forgetting Curve*.

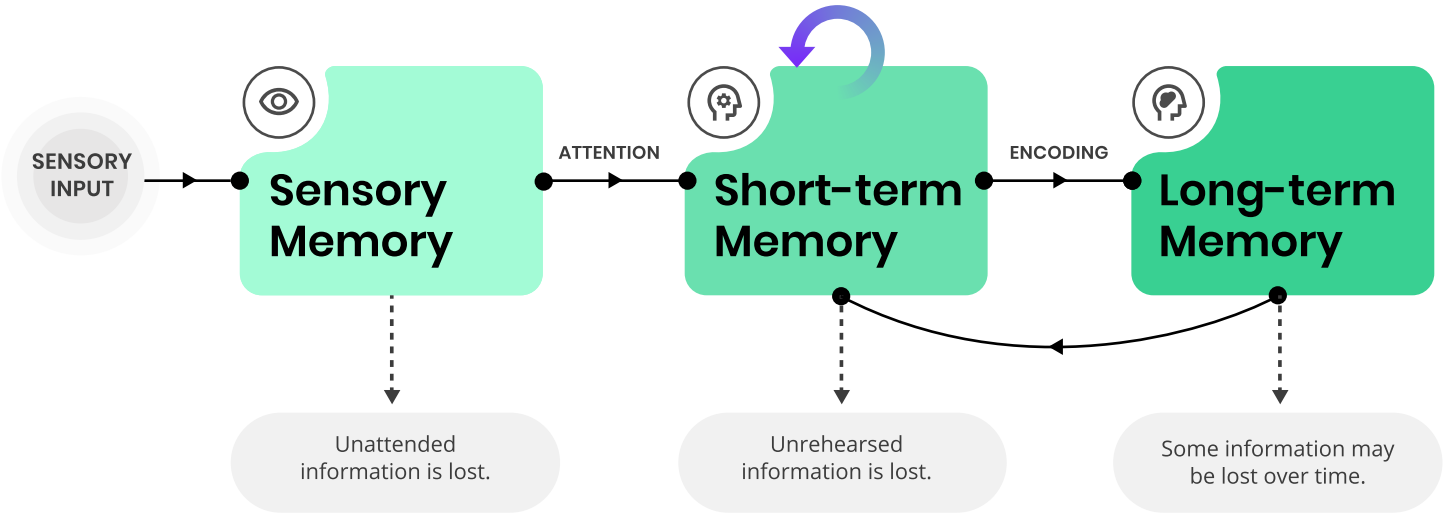


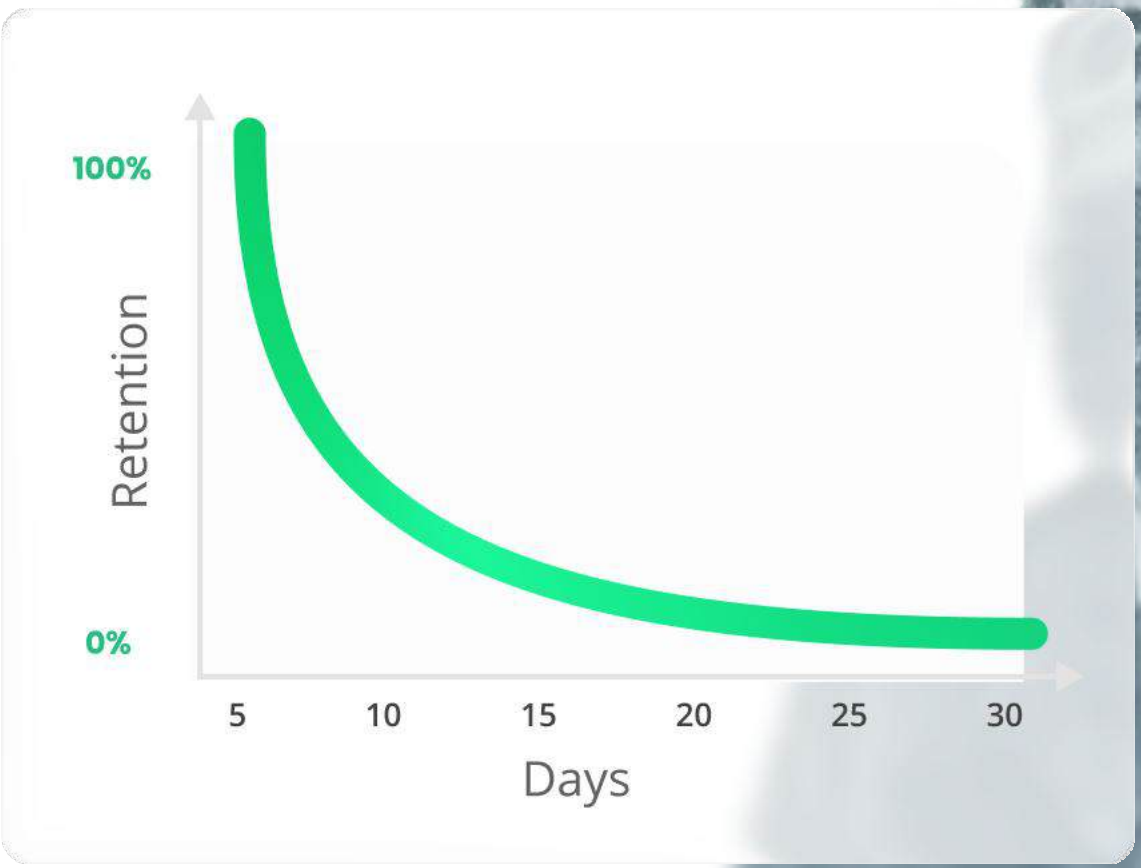
Figure 2: Memory Duration. BCampus adaptation from Atkinson & Shiffrin (1968)[5]

5 Available at: https://opentextbc.ca/introductiontopsychology/chapter/8-1-memories-as-types-and-stages/

The Forgetting Curve

According to Ebbinghaus' memory theories, 50% of all new information is lost within a day, and up to 90% within a week. This means a significant portion of unattended information or lesson content may be lost by the next class.

This is why it is essential for educators to revisit key information at strategic intervals to reinforce learning.



6 Evidence-Based Strategies to Ensure Effective Learning

A vast body of research has explored the most effective strategies to ensure information retention. Among classroom techniques, spacing and retrieval practice have the strongest evidence supporting their use.

When integrated into lesson and unit plans, these strategies help unlock the brain's capacity not only to store information long-term but also to strengthen the neural pathways that support faster and more reliable retrieval.

6.1. Spaced Learning

Revisiting lesson content at regular intervals across classes has been shown to reduce cognitive fatigue and improve information retention. This is the founding principle of spaced learning, one of the most reliable teaching techniques for fostering long-term memory. Numerous studies have demonstrated that it is more effective than re-reading, both on immediate assessments and over the long term.

Classroom Techniques

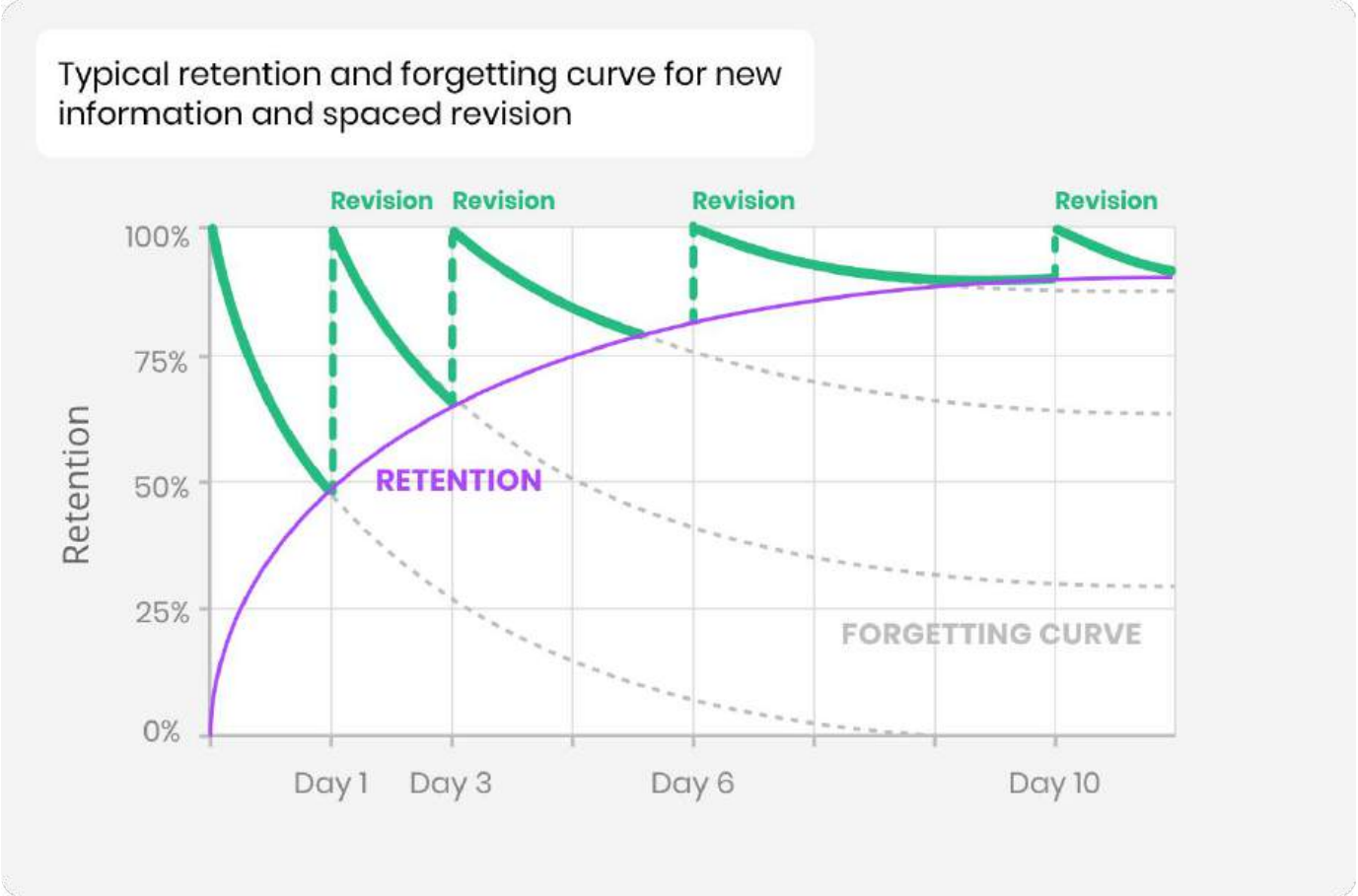
Educators can reinforce this approach in the following ways:

- Guide students to break their study time into shorter, distributed sessions
- Discourage students studying for a test in one sitting
- Assign regular cumulative tasks that recall previous information
- Reintroduce earlier concepts in new units

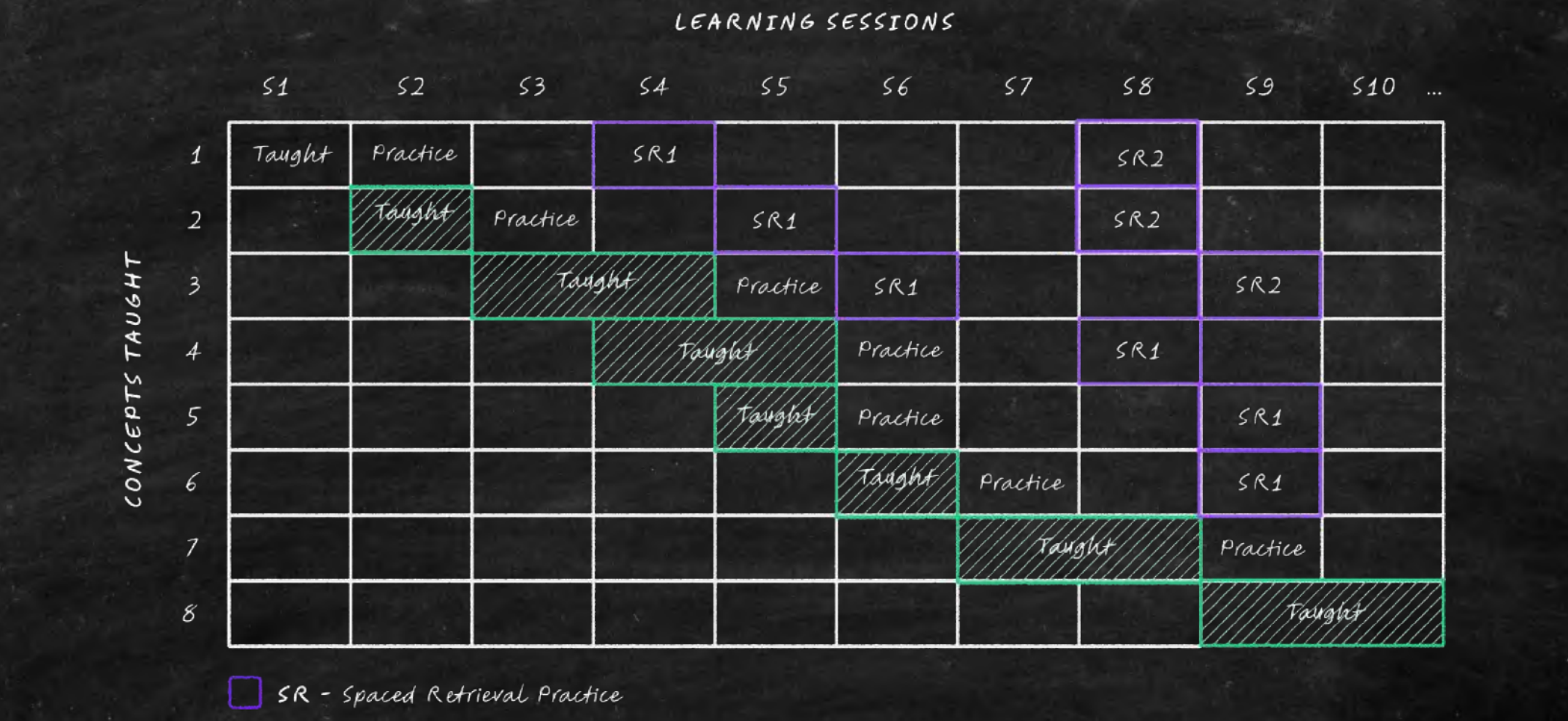
6.2. Retrieval Practice

Spaced learning is most effective when combined with retrieval practice. This approach emphasizes the active recall of information from memory rather than passive review, thereby strengthening retention.

At the neural level, retrieval supports the formation of new and more efficient pathways to information by linking it to existing knowledge and building more associations, which ultimately leads to easier access in the future.



To blend spacing and retrieval practice in their lesson plan, teachers need to take a long-term approach to content review and reinforcement.



Recommended Resource

This table was provided by Dr. Cynthia Nebel, a cognitive psychologist currently working as the Director of Learning services, at St. Louis University School of Medicine, as part of CheckIT Learning webinar focused on spacing and retrieval practice.

Full webinar is available on this link.

7 Recommendations for Consistent Application

The last decade has seen a significant rise in research exploring the intersection of neuroscience and education. However, while many teachers apply related strategies intuitively in their classrooms, most are still unaware of the full impact educational neuroscience can have on learning outcomes.

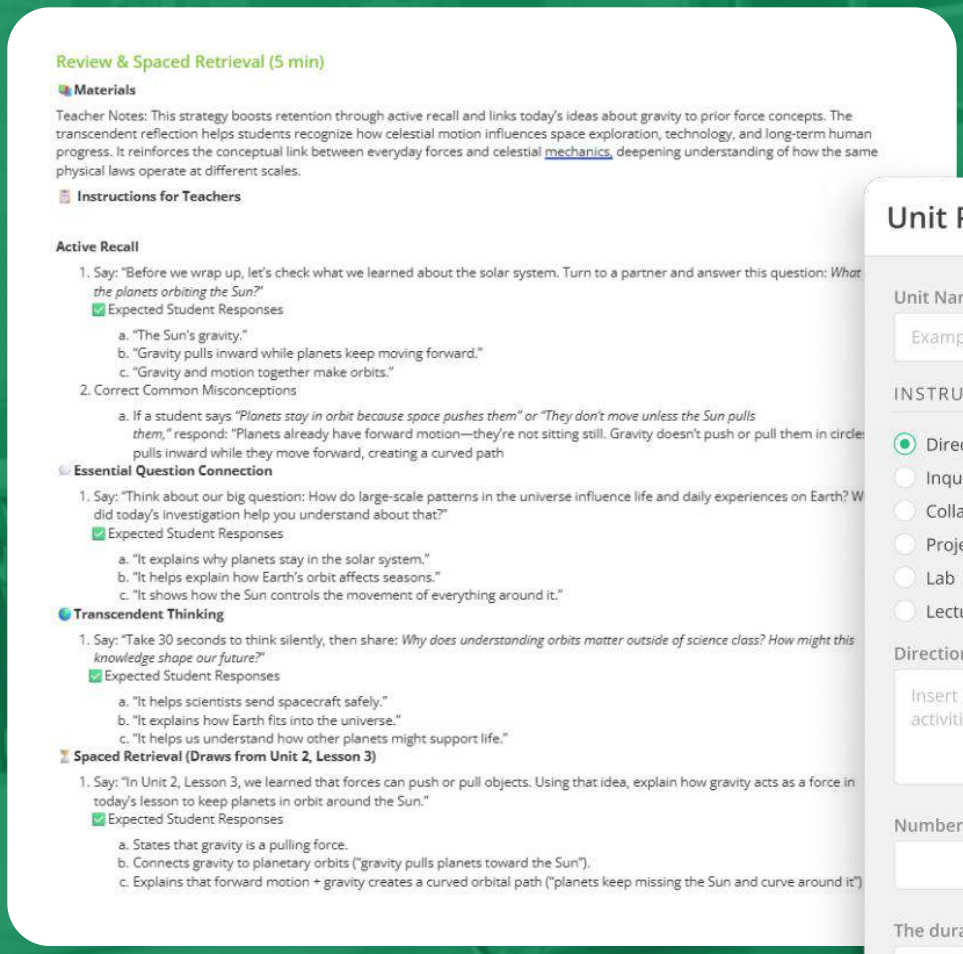
only

31%

of teachers are familiar with educational neuroscience

Earlier research by YouGov on Teachers' *attitudes towards educational neuroscience*[6] revealed that only 31% of teachers are familiar with the field. A substantial majority of those (76%) consider it useful for teaching, and 39% believe it could form the foundation of the future of education.

6 YouGov. Teachers' attitudes towards educational neuroscience, 2022. Available at: https://www.learnus.co.uk/LSREducationalNeuroscience.pdf



Review & Spaced Retrieval (5 min)

Materials

Teacher Notes: This strategy boosts retention through active recall and links today's ideas about gravity to prior force concepts. The transcendent reflection helps students recognize how celestial motion influences space exploration, technology, and long-term human progress. It reinforces the conceptual link between everyday forces and celestial mechanics, deepening understanding of how the same physical laws operate at different scales.

Instructions for Teachers

Active Recall

1. Say: "Before we wrap up, let's check what we learned about the solar system. Turn to a partner and answer this question: *What the planets orbiting the Sun?*"
   - Expected Student Responses
     a. "The Sun's gravity."
     b. "Gravity pulls inward while planets keep moving forward."
     c. "Gravity and motion together make orbits."
2. Correct Common Misconceptions
   a. If a student says *"Planets stay in orbit because space pushes them"* or *"They don't move unless the Sun pulls them,"* respond: "Planets already have forward motion—they're not sitting still. Gravity doesn't push or pull them in circles pulls inward while they move forward, creating a curved path

Essential Question Connection

1. Say: "Think about our big question: How do large-scale patterns in the universe influence life and daily experiences on Earth? W did today's investigation help you understand about that?"
   - Expected Student Responses
     a. "It explains why planets stay in the solar system."
     b. "It helps explain how Earth's orbit affects seasons."
     c. "It shows how the Sun controls the movement of everything around it."

Transcendent Thinking

1. Say: "Take 30 seconds to think silently, then share: *Why does understanding orbits matter outside of science class? How might this knowledge shape our future?*"
   - Expected Student Responses
     a. "It helps scientists send spacecraft safely."
     b. "It explains how Earth fits into the universe."
     c. "It helps us understand how other planets might support life."

Spaced Retrieval (Draws from Unit 2, Lesson 3)

1. Say: "In Unit 2, Lesson 3, we learned that forces can push or pull objects. Using that idea, explain how gravity acts as a force in today's lesson to keep planets in orbit around the Sun."
   - Expected Student Responses
     a. States that gravity is a pulling force.
     b. Connects gravity to planetary orbits ("gravity pulls planets toward the Sun").
     c. Explains that forward motion + gravity creates a curved orbital path ("planets keep missing the Sun and curve around it")

Unit Plan by Cleo

Unit Name *

Example Name

INSTRUCTIONAL APPROACH

- (•) Direct Instruction
- ( ) Inquiry
- ( ) Collaborative
- ( ) Project-Based
- ( ) Lab
- ( ) Lecture

Directions for Cleo *

Insert unit goals, student objectives, required accommodations, and planned activities or assessments...

Number of Lessons (min 1 - max 25) *

The duration of class period in minutes

Cleo's Choice

MEDIA

+ Add Media

STANDARDS & SKILLS

+ Add Standards & Skills

COGNITIVE STRATEGIES & TOOLS

- Select All
- Assess Prior Knowledge
- Formative Assessments
- Essential Questions
- Spaced Learning & Retrieval

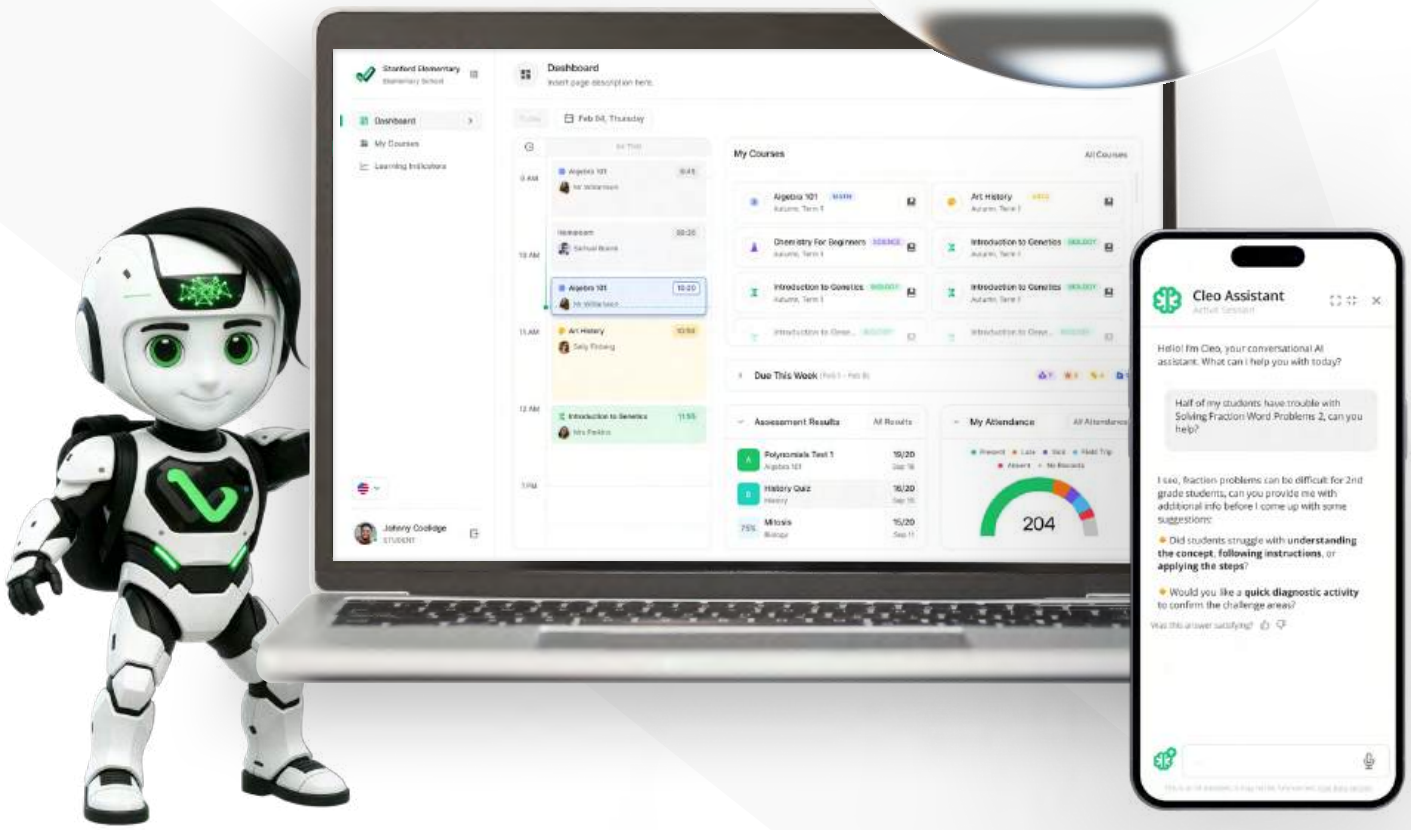
Figure: Screenshots from Cleo: Lesson planning with spacing and retrieval practice applied

Recognizing current teacher workload and the lack of guidance as key barriers to consistent application of these methods, **Cleo** provides a platform that supports them in this effort. Powered by a neuroscience-trained AI companion, the solution enables automated unit and lesson plan creation grounded in neuroscience.

Get a free demo of Cleo:

Discover how Cleo can help educators at your school consistently apply the Science of Learning, while also reducing their workload.

cleo



[Click here to schedule a demo.]

7 Conclusions

Decades of research in neuroscience have provided insights into how the brain learns, retains information, and sustains attention. When educators apply these findings in the classroom, they move beyond intuition and ground their practice in evidence-based strategies that measurably improve learning outcomes. Beyond deepening understanding and strengthening student retention, these strategies help students develop essential life skills such as self-regulation and executive functioning, which help them successfully manage distractions in an increasingly demanding world. These are not just classroom competencies; they are foundational skills for lifelong learning, professional success, and personal growth.