Welcome to the Durable Learning Seminar Series

Thank you for completing the poll!

Tell us in the chat:

- What's the time in your location now?
- If you are an educator, what was the last class you taught?

Peter Horneffer,
M.D.

Executive Dean, All American Institute
of Medical Sciences, Jamaica

Cardiothoracic surgeon, Maryland, U.S.

Meet our Learning Science Team

Adonis Wazir, M.D.

Satria Nur Sya'ban, M.D.

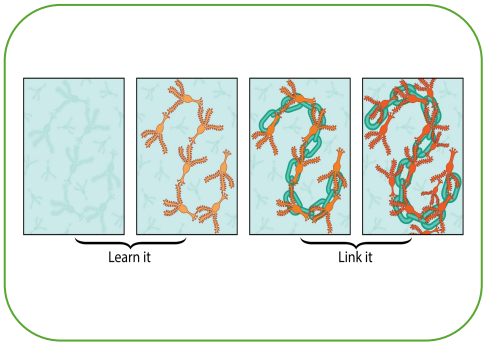
Sara Keeth, Ph.D, PMP

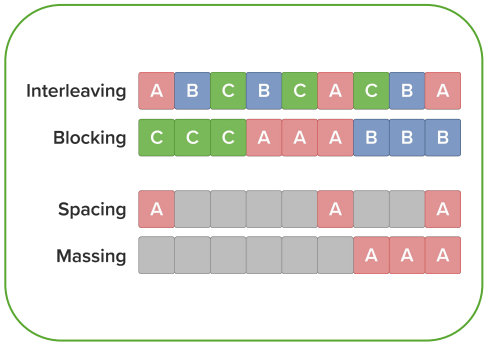
Meredith Ratliff, M.S., M.A.T.

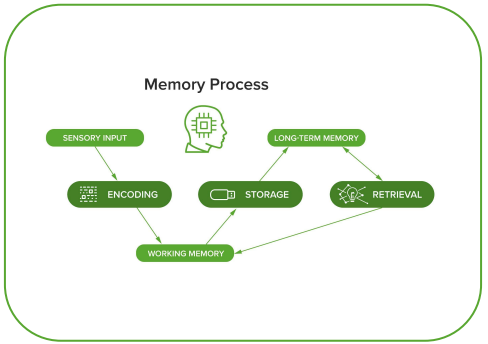
Sarah Haidar, M.Ed., T.D.

Seminar Topics and Applications of Learning Science

Cognitive Science & Neuroscience → **Effective teaching & learning methods** → **Durable Learning**







Lecturio

Year in Review: How to Turn Lessons Learned into Actionable Steps for Success in 2023

December 14, 2021
Online Seminar

Learning Objectives:

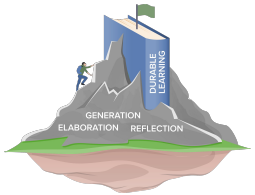
1. **Recall** basic learning science concepts from our webinar series in 2022.
2. **Reflect on** their understanding of the topics we have presented this year.
3. **Evaluate** where they want to be on these topics next year.
4. **Identify** and **prioritize** areas of improvement for their teaching.

A Timeline of our Events

1

26 January 2022

Active Learning



2

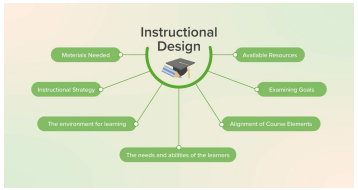
9 March 2022

Metacognition

3

11 May 2022

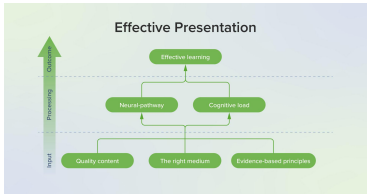
Instructional Design



4

11 May 2022

Effective Presentations



5

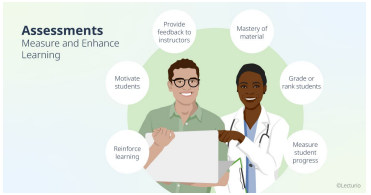
14 Sept 2022

Learning Objectives

6

2 November 2022

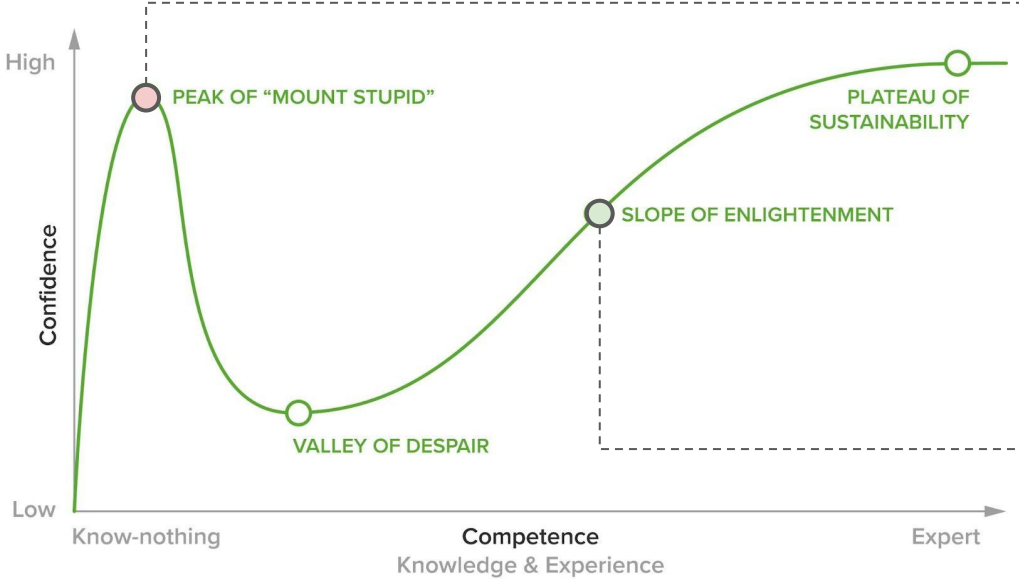
Assessment



1. Metacognition

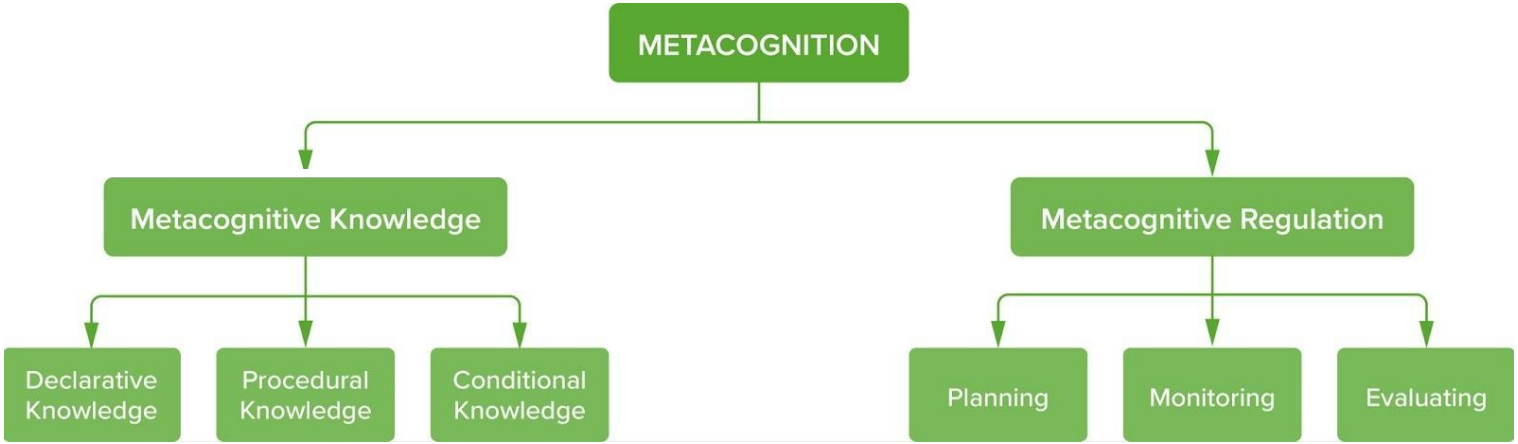
What is Metacognition?

The act of **thinking about cognition**, or to the knowledge, monitoring, and evaluation of one's thinking



Graphic based on and translated from Sciencia58, CC0, via Wikimedia Commons

Elements of Metacognition [1-4]



- **Metacognitive knowledge:** understanding of the what, how and which of their learning
- **Metacognitive Regulation:** ability to regulate their cognition by combining *metacognitive knowledge* with their assessment of the task, resources at hand, and goal setting

1. Stanton JD, Sebesta AJ, Dunlosky J. Fostering Metacognition to Support Student Learning and Performance | CBE—Life Sciences Education. [cited 2022 Feb 10];20(2). Available from: link
2. Medina MS, Castleberry AN, Persky AM. Strategies for Improving Learner Metacognition in Health Professional Education. Am J Pharm Educ [Internet]. 2017 May 1 [cited 2022 Feb 10];81(4). Available from: link
3. Artino ARJ, Dong T, DeZee KJ, Gilliland WR, Waechter DM, Cruess D, et al. Achievement Goal Structures and Self-Regulated Learning: Relationships and Changes in Medical School. Acad Med [Internet]. 2012 Oct [cited 2022 Feb 10];87(10):1375–81. Available from: link
4. Tanner KD. Promoting Student Metacognition. CBE—Life Sci Educ [Internet]. 2012 Jun 1 [cited 2022 Feb 10];11(2):113–20. Available from: link

Evidence for Metacognition

- More focused on **mastery learning**, have **higher motivation,** and **better performance**.
- Explicit instruction on **metacognition** positively affects **critical thinking skills** and **diagnostic accuracy**.
- May prove to be **conducive to reducing diagnostic errors** and **improving patient safety**.

1. Artino ARJ, Dong T, DeZee KJ, Gilliland WR, Waechter DM, Cruess D, et al. Achievement Goal Structures and Self-Regulated Learning: Relationships and Changes in Medical School. Acad Med [Internet]. 2012 Oct [cited 2022 Feb 10];87(10):1375–81. Available from: link
2. Royce CS, Hayes MM, Schwartzstein RM. Teaching Critical Thinking: A Case for Instruction in Cognitive Biases to Reduce Diagnostic Errors and Improve Patient Safety. Acad Med J Assoc Am Med Coll. 2019 Feb;94(2):187–94.

POLL

1

To what extent did you practice metacognition in 2022 by **reflecting on your own teaching**?

Share your answer through our poll!

POLL

2

Did you incorporate **metacognitive strategies for students** into your teaching in 2022?

Share your answer through our poll!

QUESTION

How do you plan to reflect or help your students practice metacognition in 2023?

Tell us in the chat!

Implementation of Metacognition

Target element	Technique Name	Implementation
Metacognitive Knowledge	One Minute Writing[1]	1. **Set a timer** for one minute 2. **Ask students** about what they **already know**, their **strengths & weaknesses** and planned study strategies

1. Michael J. Where's the evidence that active learning works? Adv Physiol Educ. 2006 Dec 1;30(4):159–67.
2. Medina MS, Castleberry AN, Persky AM. Strategies for Improving Learner Metacognition in Health Professional Education. Am J Pharm Educ [Internet]. 2017 May 1 [cited 2022 Feb 10];81(4). Available from: https://www.ajpe.org/content/81/4/78
3. Liao J, Kunberger T, Papkov GI, Badir A, O'Neill R, Nguyen LD. Exam Wrappers, Reflection, and Student Performance in Engineering Mechanics. In 2018 [cited 2022 Feb 23]. Available from: link

Implementation of Metacognition

Target element	Technique Name	Implementation
Metacognitive Knowledge	One Minute Writing[1]	1. **Ask students** to make personalized learning / mastery goals 2. **Request** that they refer to these goals as they go along the course
Planning	Personalized Learning Plan[2]	

1. Michael J. Where's the evidence that active learning works? Adv Physiol Educ. 2006 Dec 1;30(4):159–67.
2. Medina MS, Castleberry AN, Persky AM. Strategies for Improving Learner Metacognition in Health Professional Education. Am J Pharm Educ [Internet]. 2017 May 1 [cited 2022 Feb 10];81(4). Available from: https://www.ajpe.org/content/81/4/78
3. Liao J, Kunberger T, Papkov GI, Badir A, O'Neill R, Nguyen LD. Exam Wrappers, Reflection, and Student Performance in Engineering Mechanics. In 2018 [cited 2022 Feb 23]. Available from: link

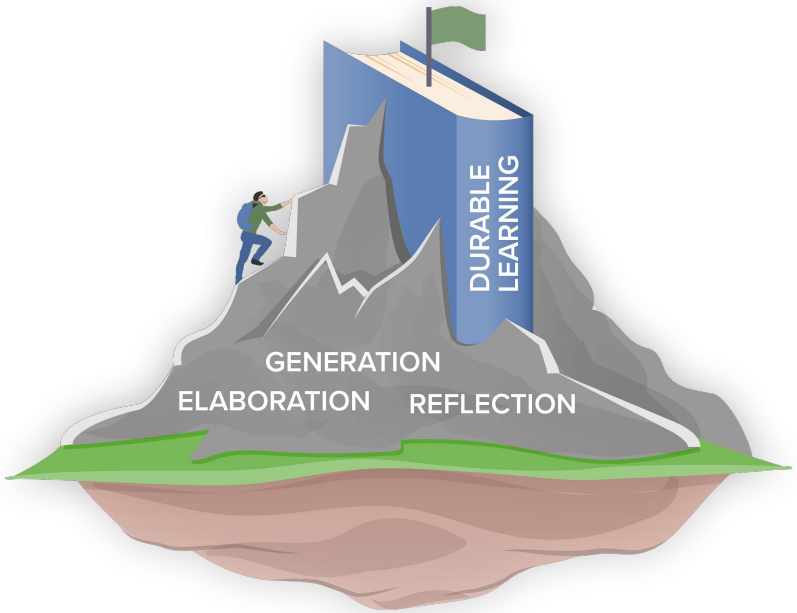
Implementation of Metacognition

Target element	Technique Name	Implementation
Metacognitive Knowledge	One Minute Writing[1]	After an assessment event: 1. **Ask students** to **reflect** on their performance 2. **Ask** students to **reflect** on their preparatory methods 3. **Request** that they identify places in their study habit to improve
Planning	Personalized Learning Plan[2]	
Monitoring & Evaluation	Reflection[3]	

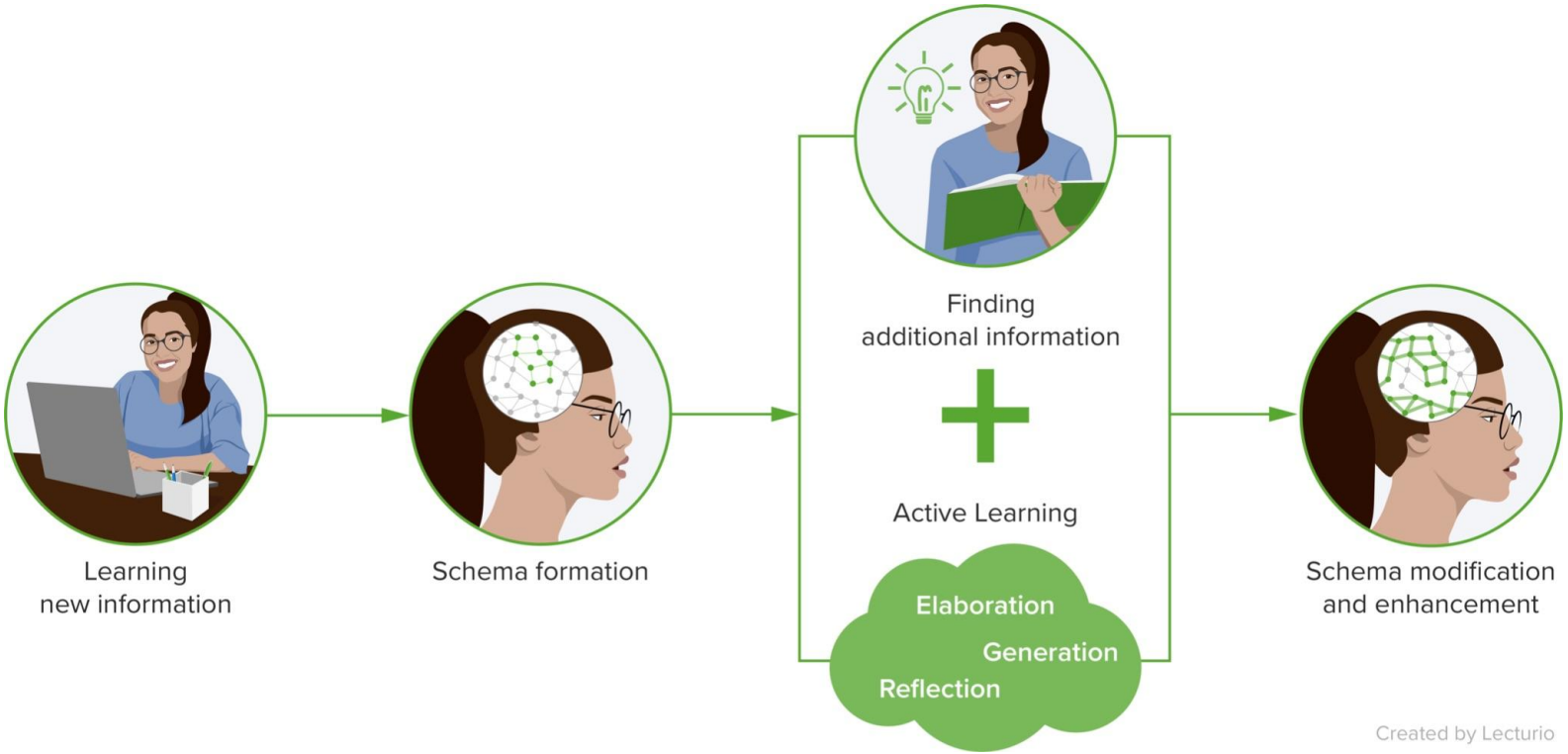
1. Michael J. Where's the evidence that active learning works? Adv Physiol Educ. 2006 Dec 1;30(4):159–67.
2. Medina MS, Castleberry AN, Persky AM. Strategies for Improving Learner Metacognition in Health Professional Education. Am J Pharm Educ [Internet]. 2017 May 1 [cited 2022 Feb 10];81(4). Available from: https://www.ajpe.org/content/81/4/78
3. Liao J, Kunberger T, Papkov GI, Badir A, O'Neill R, Nguyen LD. Exam Wrappers, Reflection, and Student Performance in Engineering Mechanics. In 2018 [cited 2022 Feb 23]. Available from: link

2. Active Learning

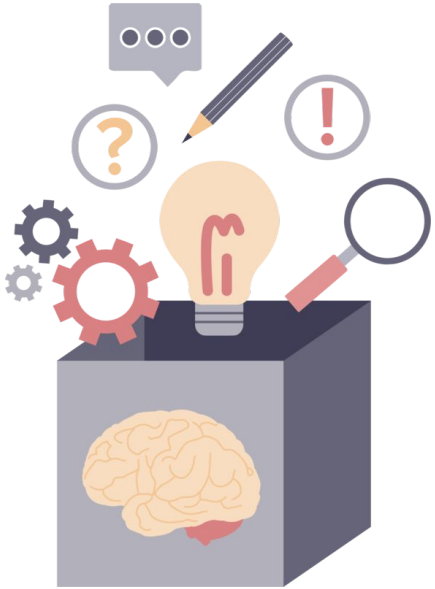
Definition of Active Learning



Active learning is when a student ***retrieves*** a concept and ***relates*** it to known information.


Learning
new information
Schema formation
Finding
additional information
+
Active Learning
Elaboration
Generation
Reflection
Schema modification
and enhancement
Created by Lecturio

Definition of Generation



- An active learning strategy where students **integrate** new **information** with **existing knowledge** and experience[1]
- May involve the learner **generating a solution** or **defining concept for himself or herself** *before* or *in addition to* being taught a concept[2]
- Makes the mind **more receptive to new learning**[3]

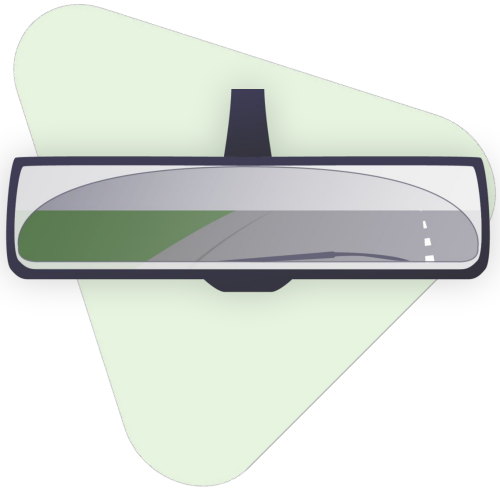
1. Hall SM, Lieto J, Martin R. How Using Generative Learning Strategies Improved Medical Student Self-Competency in End-of-Life Care. TPJ [Internet]. 2018 Mar [cited 2022 Nov 4];22(1):17–064. Available from: http://www.thepermanentejournal.org/doi/10.7812/TPP/17-064
2. McCurdy MP, Viechtbauer W, Sklenar AM, Frankenstein AN, Leshikar ED. Theories of the generation effect and the impact of generation constraint: A meta-analytic review. Psychon Bull Rev. 2020 Dec;27(6):1139–65.
3. Brown PC. Make it stick: the science of successful learning. Cambridge, Massachusetts: The Belknap Press of Harvard University Press; 2014. 313 p.

Definition of Elaboration

- A strategy that involves the **learner's enhancement** of information[1]
- Students *clarifies* or *specifies* relationships between new information with existing knowledge[2]
- Enhances **schema** development by connecting **new content** to **established content** in **long-term** memory.[3]
- Can be implemented by means of an **inference**, **image**, **comparison, illustration**, or **overall summary**.

1. Bjork RA. Memory and metamemory considerations in the training of human beings. In: Metacognition: Knowing about knowing. Cambridge, MA, US: The MIT Press; 1994. p. 185–205.
2. Hamilton R. Elaboration Effects on Learning. In: Seel NM, editor. Encyclopedia of the Sciences of Learning [Internet]. Boston, MA: Springer US; 2012 [cited 2021 Dec 4]. p. 1103–5. Available from: http://link.springer.com/10.1007/978-1-4419-1428-6_170
3. American Physiological Association. APA Dictionary of Psychology [Internet]. 2020 [cited 2021 Nov 4]. Available from: https://dictionary.apa.org/

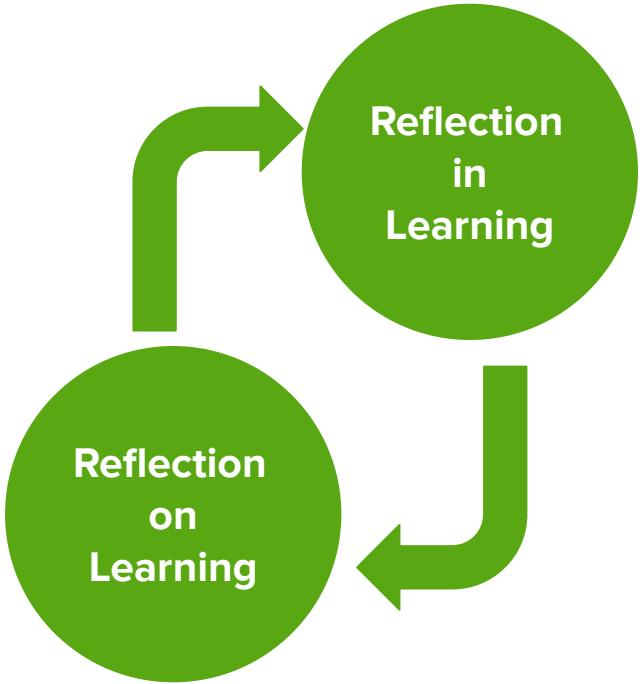
Definition of Reflection



- **Intentional pausing** to give the brain time to **contemplate** observations and experiences, **consider** possible **interpretations**, and **synthesize meaning and context**
- **Involves** another important concept: **metacognition**, or thinking about one's thinking

1. Brame, Cynthia J. Active Learning [Internet]. Vanderbilt University Center for Teaching; 2016. (Active Learning Center for Teaching). Available from: https://cft.vanderbilt.edu/guides-sub-pages/active-learning/

Definition of Reflection



Reflection in Learning

- Happens **during** learning
- It can act as a teaching strategy, prompting students to reflect on the content.

Reflection on Learning

- Happens **after** learning
- It leads to improvements in learning and in the use of better study strategies for the future

1. Mukhalalati BA, Taylor A. Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators. J Med Educ Curric Dev. 2019 Jan;6:238212051984033.
2. Schön DA. Educating the reflective practitioner: toward a new design for teaching and learning in the professions. 1st ed. San Francisco: Jossey-Bass; 1987. 355 p. (The Jossey-Bass higher education series).

POLL

3

Did you use any of the active learning concepts in your classes in 2022?

Share your answer through our poll!

Application of Active Learning

Generation | Self Explanation

Asking students to **self-explain** their learning by **identifying** core information, **restating** them in their words, and **generating** inferences, as well as **integrating** current learning with prior knowledge.

Elaboration | Elaborative Interrogation

Asking students to **create explanations** for a stated fact based on what they have learned, i.e., answering questions such as:

1. **How** did this come to pass?
2. **Why** is this true but not the other way around?

1. Fiorella L, Mayer RE. Eight Ways to Promote Generative Learning. Educ Psychol Rev [Internet]. 2016 Dec [cited 2021 Dec 23];28(4):717–41. Available from: http://link.springer.com/10.1007/s10648-015-9348-9
2. Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. Psychological Science in the Public Interest [Internet]. 2013 [cited 2021 Nov 23];14(1):4–58. Available from: https://www.jstor.org/stable/23484712

Application of Active Learning

Reflection | Clinical Portfolio

Asking students to **reflect on their clinical experience** by noting down the **situation,** resulting **emotion, outcome** of the interaction w/ the patient, the **process** of said interaction, and **plan** to improve future interactions

1. Harden RM, Laidlaw JM. Essential skills for a medical teacher: An introduction to teaching and learning in medicine. Edinburgh: Elsevier; 2021.
2. Fernsten L, Fernsten J. Portfolio assessment and reflection: enhancing learning through effective practice. Reflective Practice [Internet]. 2005 Jan [cited 2022 Nov 4];6(2):303–9. Available from: http://www.tandfonline.com/doi/abs/10.1080/14623940500106542

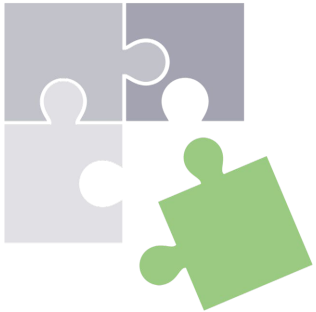
How do you plan to implement active learning strategies such as generation, elaboration, or reflection in 2023?

Tell us in the chat!

QUESTION

3. Instructional Design

Definition



- Prescribes **actions** to optimize learning outcomes
- Links learning theory to educational practice
- Considers every aspect of the teaching and learning process

1. Reigeluth CM. Instructional Design Theories and Models: An Overview of Their Current Status. Routledge; 1983. 494 p.

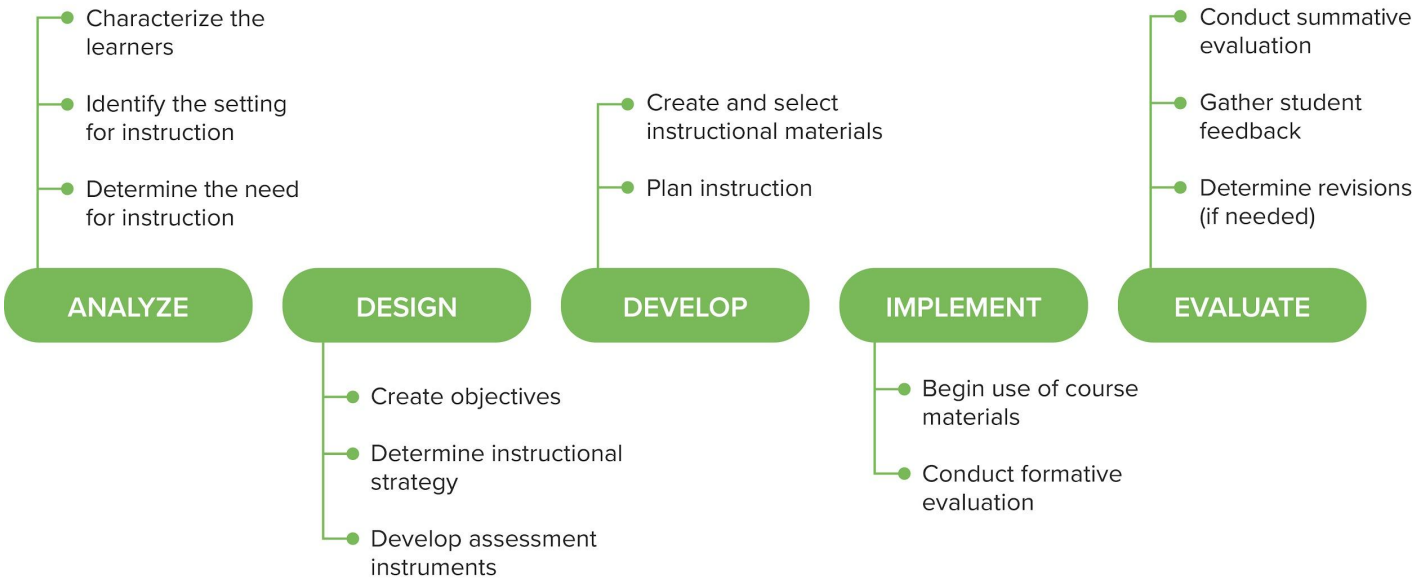
Definition

Elements considered through instructional design

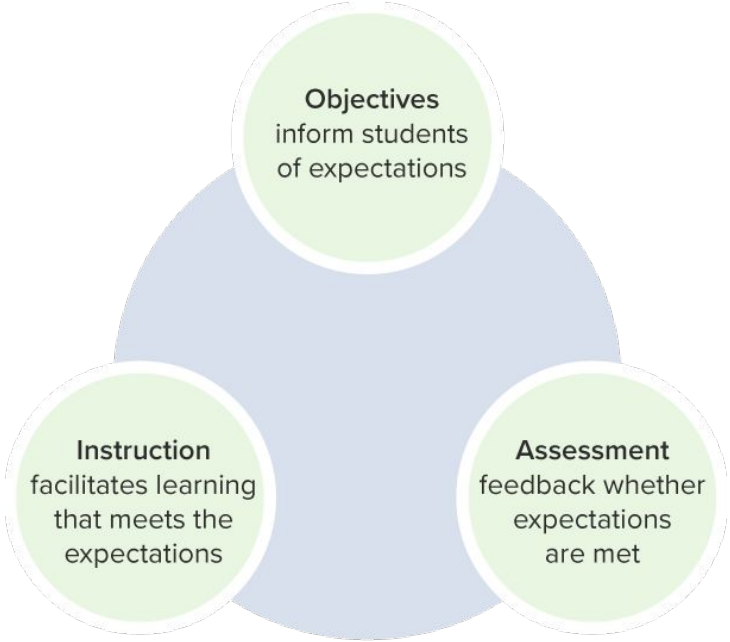
1. Materials Needed
2. Instructional Strategy
3. Environment for Learning
4. Needs and Abilities of Learners
5. Alignment of Course Elements
6. Examination Goals
7. Available Resources

Instructional Design Models

There are **different** models through which instructional design principles can be applied. The following is an example of one called **the ADDIE** model:



Alignment



The Golden Triangle: Alignment of objectives, assessment, and instruction

- One of the most important benefits of Instructional design
- Avoids frustration from students and improves learning outcomes

1. Chatterjee D, Corral J. How to Write Well-Defined Learning Objectives. J Educ Perioper Med JEPM [Internet]. 2017 Oct 1 [cited 2022 Jul 27];19(4):E610. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5944406/
2. Dick W, Carey L, Carey, James O. The Systematic Design of Instruction. 8th ed. Boston: Pearson; 2015.

POLL

4

Did you incorporate instructional design in your classes during 2022?

Share your answer through our poll!

Implementing Instructional Design

- When creating or adjusting material, use a **systematic process** to ensure effective instruction.
- Be sure to **align** objectives, content, and assessments.
- Instruction should be based on empirically validated **evidence.**

How do you plan to implement instructional design strategies in 2023?

Tell us in the chat!

QUESTION

4. Effective Presentations

What are effective presentations?

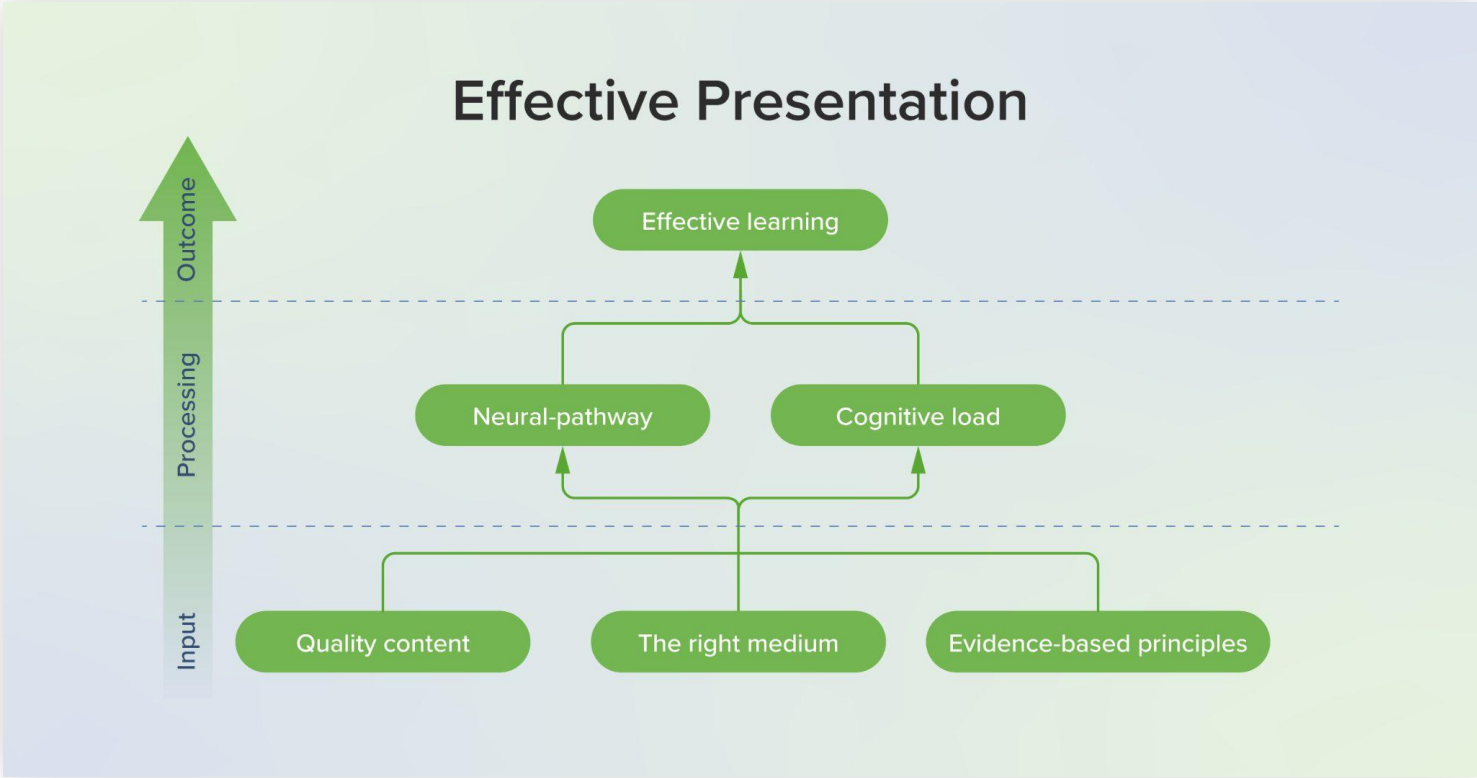
Qualities

- Appealing
- Engaging
- Informative
- Concise

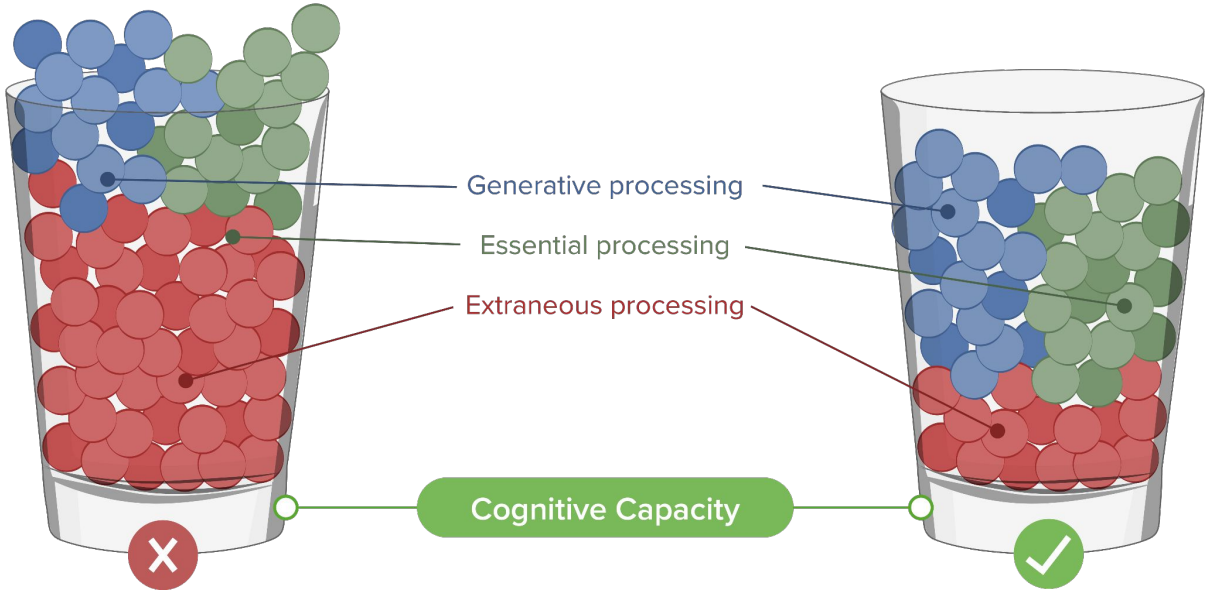
Goal

Convey information and ideas memorably

How they lead to Effective Learning



How they lead to Effective Learning



Effective presentations is processed more effectively, avoiding an overload of a learner's cognitive capacity

POLL

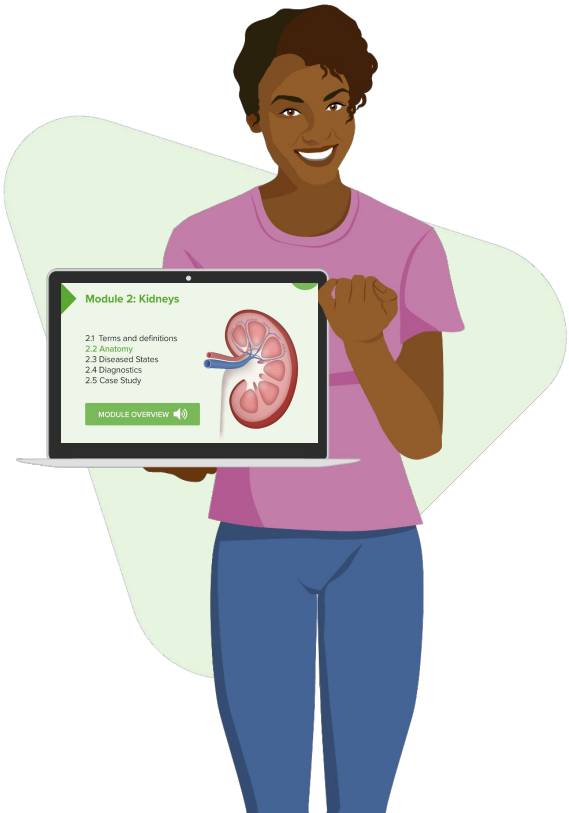
5

Did you incorporate effective presentation principles in your classes during 2022?

Share your answer through our poll!

Practical Implementations in the Classroom

- **Limit** the amount of information presented in a slide
- **Highlight** important concepts
- Videos should be no longer than **6-10 minutes**
- **Limit extraneous** information, graphics, and sounds.
- Apply the **5/5/5 rule** as much as possible



What is one aspect you plan to improve in your presentations in 2023?

Tell us in the chat!

QUESTION

5. Learning Objectives

How they work

Learning Objectives help **educators:**

- **Organize** content to clarify instructional goals
- **Create** good, useful assessments
- **Select** the right instructional materials
- **Communicate** what students need to know / do

How they work

Learning Objectives help **learners:**

- **Clarify** course and instructional expectations
- Help them **organize** and **prioritize** learning
- **Prime** students to receive knowledge
- **Augment** understanding of assigned content

The ABCD Model

The ABCD model allows the development of well-defined learning objectives

Audience: Who are the learners?	**B**ehavior: What will they do?	**C**ondition: What are the resources, tools, or environment?	**D**egree: What determines success?
Students	will describe	how DNA probes can be used to detect specific nucleic acid sequences in clinical specimens	at a level of detail sufficient for another student to complete the procedure.

1. Khan T, Hande S, Bedi S, Singh T, Kumar V. Learning Objectives: "Perfect is the Enemy of Good!" Int J User-Driven Healthc [Internet]. 2012 Jul 1 [cited 2022 Jul 29];2(3):44–62. Available from: https://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/ijudh.2012070105
2. Heinich R, Molenda M, Smaldino SE, Russell JD. Instructional Media and Technologies for Learning. Merrill; 2002. 404 p.

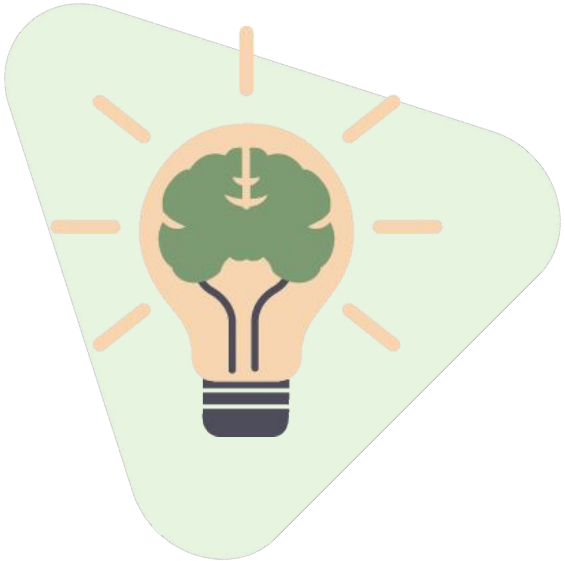
POLL

6

Did you use these strategies to develop and align learning objectives in 2022?

Share your answer through our poll!

Practical Implementation for **Instructors**



- Create well-defined objectives using **measurable verbs** to define observable behaviors.
- Ensure there are a **reasonable number** of objectives: not too many, not too few.
- Confirm that objectives **align** with course goals, professional competencies, national standards, and research on teaching and learning.

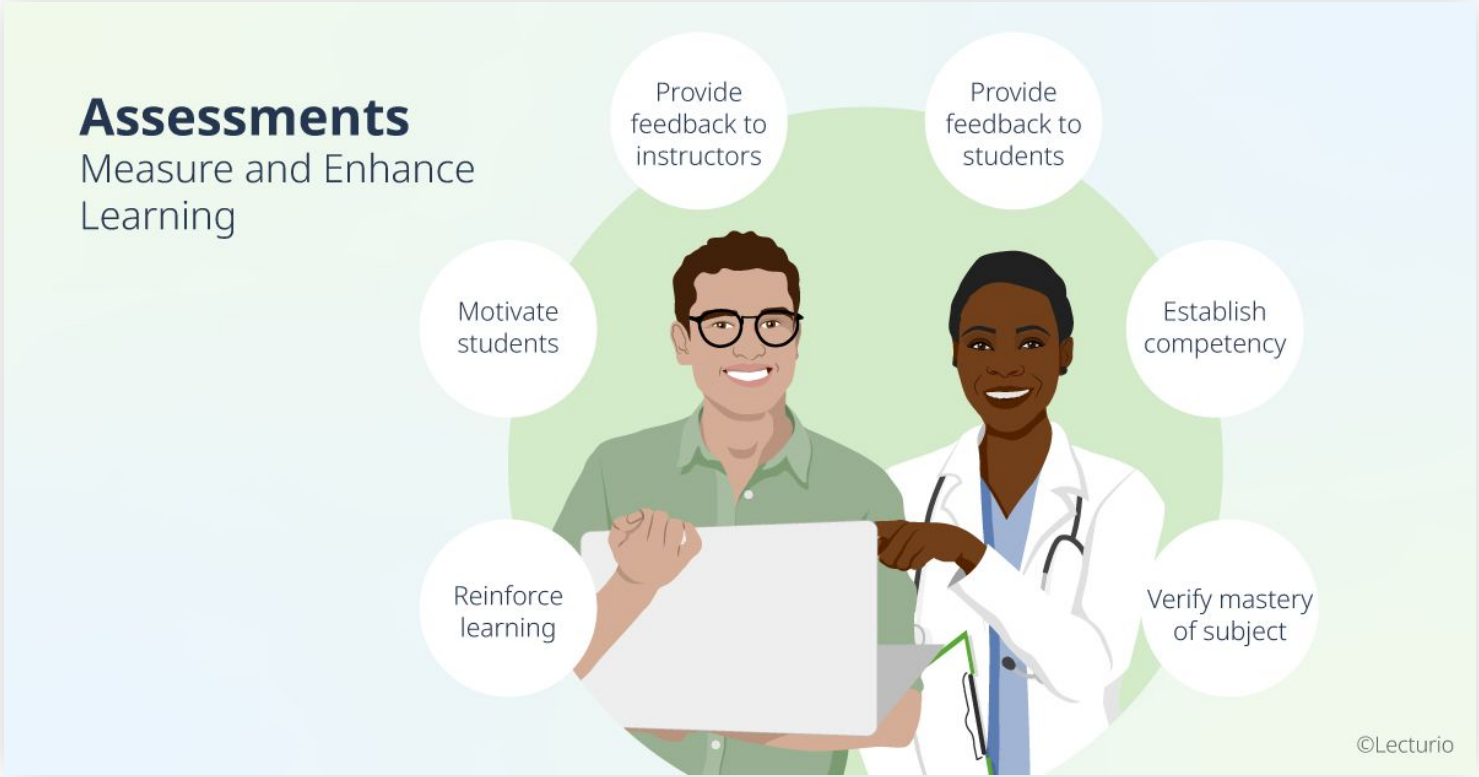
How do you plan to use learning objectives in your course planning and teaching for 2023?

Tell us in the chat!

QUESTION

6. Assessments

The Purpose of Assessments

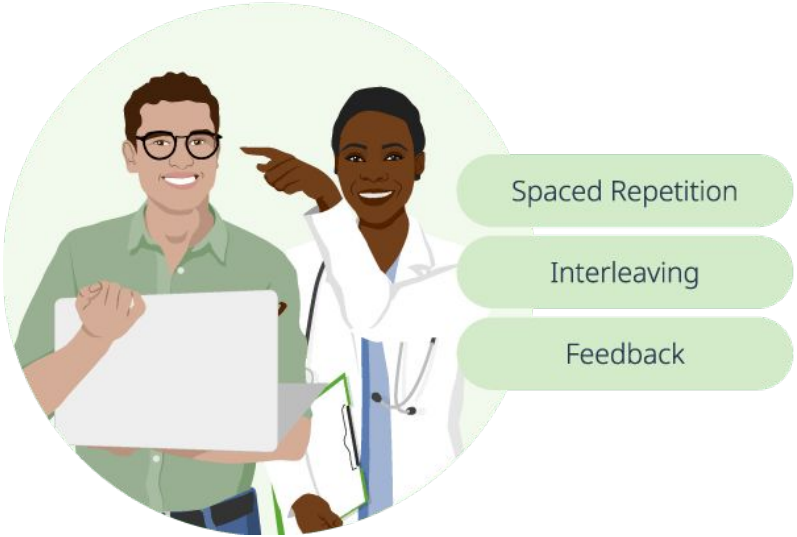


Cognitive Foundations

- Formative assessments can be used to scaffold skills and improve **metacognition**
- Incorporate **spacing** and **interleaving** to improve retention and comprehension
- **Feedback** corrects misconceptions, reinforces correct answers, and improves metacognition

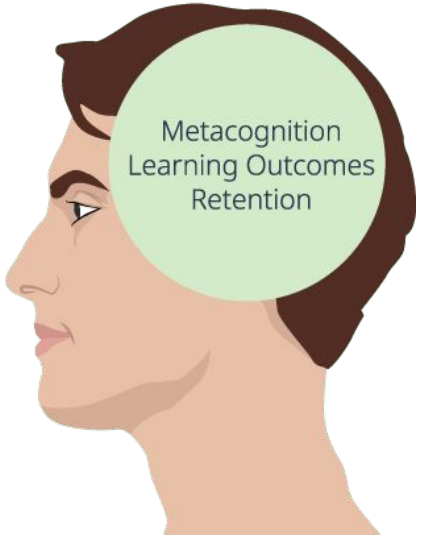
Test-Enhanced Learning

When assessments promote:



Test Enhanced Learning

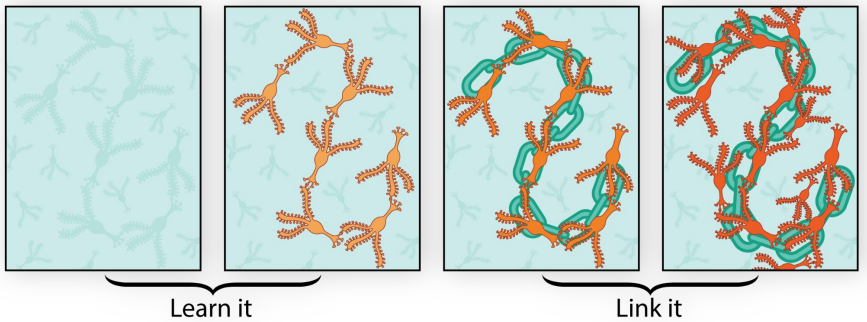
We see improved results in:



Test-enhanced learning uses concepts such as spaced repetition, interleaving, and appropriate feedback to improve metacognition, learning outcomes, and retention.

Insights from Neuroscience

- As information is retrieved, neural pathways are strengthened by changes in several cellular processes.
- Spacing of retrieval events allows for consolidation of neural pathways.
- Retrieval with feedback helps establish effective neural cross linkages.



POLL

7

Did you use assessments as a learning tool this year?

Share your answer through our poll!

Practical Implementation for **Instructors**

- **Harness** the power of **technology**.
- **State** your **expectations** clearly and comprehensively
- **Ensure** proper **alignment** of expectations (LOs) and assessments
- **Design** and space tests for **maximum effectiveness**
- **Test often** and in **multiple ways**

How can you make better use of assessments in your courses in 2023?

Tell us in the chat!

QUESTION

Q&A Session

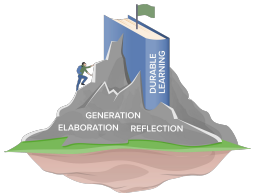
Raise your hand or leave your questions in the chat

A Timeline of our Events

1

26 January 2022

Active Learning



2

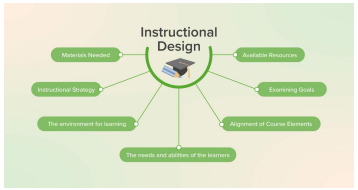
9 March 2022

Metacognition

3

11 May 2022

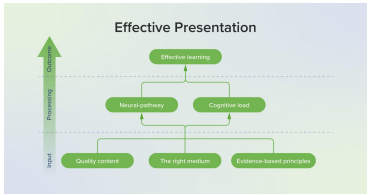
Instructional Design



4

11 May 2022

Effective Presentations



5

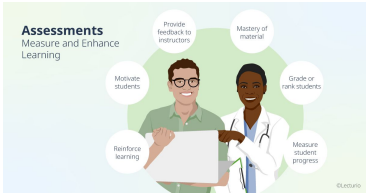
14 Sept 2022

Learning Objectives

6

2 November 2022

Assessment



Key Takeaways

1. **Metacognition** is a key step in achieving accurate judgement of one's need for a knowledge upgrade
2. **Active components** in education improve outcomes greatly
3. **Effective presentations** improve knowledge transfer and promotes effective learning

Key Takeaways

4. With proper **instructional design**, learning becomes more **aligned**, **effective**, and **relevant**
5. Setting **good objectives** that align well with examination events makes for a learning environment that **prepare**, **support**, and accurately **evaluates** the **knowledge** and **ability** of your learners

Closing

Post-Event Information

- **Follow-Up:** We will share the handouts along with our follow-up survey, which we encourage you to complete.
- **Certificates:** An attendance certificate for the seminar can be requested on the survey form.
- **Summary Document:** A summary document of key strategies, including implementation tips and key points will be sent to all participants next week.

Interested in our Future Events?

Save the date for our upcoming
Durable Learning Seminar
[Title]
February , 2022, 9:00 PST | 12:00 EST | 18:00 CET

Are you interested in contributing to learning science?
Join our Learning Science team's research endeavors!
Contact us: learning-science@lecturio.com

Lecturio Implementation

Join our **regional demonstration sessions** to learn how you can use Lecturio to to **effectively implement evidence-based educational strategies** in your courses.

To participate, please choose a breakout room for one of the following **regional sessions**:

- USA, Canada, and Caribbean
- Europe and Middle East
- Latin America
- Africa
- Asia, NZ, Australia (Main Room)

If you are having trouble joining your preferred room, please let us know in the chat and we will transfer you to the correct session.

Contact us

Learning Science Team
learning-science@lecturio.com