Active Learning: Augment Student Engagement and Understanding

January 26, 2022
Online Seminar
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Meet Our Learning Science Team

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Seminar Topics and Applications of Learning Science

Cognitive Science & Neuroscience

Instructional Design & Learning Strategies

Durable Learning

Interleaving: A B C B C A C B A
Blocking: C C C A A A B B B
Spacing: A A A A
Massing: A A A
What Is Active Learning?

Active learning is when a student *Retrieves* a concept and *Relates* it to known information.
# Seminar Learning Outcomes

1. Participants will be able to **recall** active learning strategies, including elaboration, generation, and reflection.

2. Participants will be able to **interpret** cognitive science and neuroscience evidence that support active learning techniques as effective educational tools.

3. Participants will be able to **utilize** active learning methods from the educator’s and student’s perspective and **apply** the concepts of elaboration, generation, and reflection in their health education curricula.

4. Participants will be able to **utilize** technology to facilitate the delivery of active learning strategies.
Do you use active learning in your classes?

Answer the question in the poll.
Why Active Learning Works

Insights from cognitive science:

● Active learning enhances high-order thinking and metacognition.

● Learners’ effort to actively construct their knowledge is in line with the concept of “desirable difficulties.”

● Active learning techniques can help decrease students’ cognitive load.

Insights from neuroscience:

● Active learning allows for consolidation and reconsolidation of neural links.

● Active learning fosters formation and modification of schemas or mental models.

● The process of schema formation can be supported by scaffolding, resulting in better knowledge retention and mastery.
Active learning

1. Learning new information
2. Schema formation
3. Finding additional information
4. Active learning
5. Schema modification and enhancement

Elaboration
Generation
Reflection

Created by Lecturio
Dr. Z is a teacher at Y Academy.

He wants to motivate and engage his students more during his classes.

His students currently prefer studying on their own.

Dr. Z wants to improve his course, but isn’t sure where to start, so he comes to you for help.
Our Platform Today: Padlet

- Please scan the QR code with your phone, or click the link in the chat to open Padlet in your browser.
- If you have a second screen, please open the Padlet tab there.
What are some common causes of loss of motivation and disengagement in students?

Answer the question by sharing your thoughts and experiences in Padlet.
Dr. Z’s lectures contain a lot of information, in the form of both narrated and text material.

He sees students losing focus in his classes and finds it challenging to engage them in Q&A sessions.

He always expects his students to apply the concepts he presents, but he finds that they struggle to do so.

Some students have said that his tests are too challenging.
Why do you think Dr. Z’s students lose focus and find his examinations too difficult?

Answer the question by sharing your thoughts and experiences in Padlet.
If you encountered the challenges faced by Dr. Z, how would you try to solve them?

Answer the question by sharing your thoughts and experiences in Padlet.
Generation
Definition of Generation

**Definition**

- Involves the learner **generating a solution** or **defining a concept for himself or herself before or in addition to** being taught a concept\(^1\)
- Makes the mind **more receptive to new learning**\(^2\)

**Evidence**

- Students generating and independently answering their own questions achieved better retention.\(^3\)
- It has been found to work best when learners produce material during the encoding process. \(^3\)
- Under an fMRI scan, it has been observed to cause broader neural network participation than simple reading. \(^4\)

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Evidence for Generation


Adapted from The generation effect: Activating broad neural circuits during memory encoding by Rosner et al. (45)

*) Hit: accurate identification; **) HC = high confidence
Applications of Generation

- **Clinical Teaching:** Asking students to **generate** symptoms of a disease before explaining them

- **Simple Application(s):**
  - Asking students to **explain** a discussion point before the formal lesson commences
  - Implementing a problem-based learning approach
What are some common causes of loss of motivation and disengagement in students?

- **Question Structure:** Open-ended, comes before content and/or key information is given
- **Mechanism:**
  - It prompts students to **generate** a response to the question, making learning **effortful**.
  - Any information generated will be **encoded more strongly**.
  - Understanding can be strengthened by any relevant information shared afterward.
Elaboration
Definition of Elaboration

Elaboration:

- Involves the **learner’s enhancement** of information
- Is linked to **desirable difficulty** and is **part of the encoding process**.¹ 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**.

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Evidence for and Application of Elaboration

Students can:

1. Generate multiple cues for retrieval.  
2. Add new layers of meaning to concepts.  
3. Create better long-term memory.  
4. Experience better comprehension with elaboration and illustrative examples.

Why do you think Dr. Z’s students lose focus and find his examinations too difficult?

- **Question Structure:** Elaborative, utilizes “why” and “how” prompts

- **Mechanism:**
  - It prompts students to delineate *reasons for the fact*, encouraging them to utilize existing knowledge to *interpret and build on* available information.
  - Once answered, this builds on the existing knowledge gleaned from the case itself.
  - Elaborating creates more elaborate schemas and adds new layers of meaning to new concepts.
Reflection
**Definition of and Evidence for Reflection**

**Definition**
- **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

**Evidence**
- A short post-work reflection improved employee performance by 23%.
- Self-reflection strengthens the link between fundamental knowledge and prior patient experience to improve “diagnostic expertise and mastery.”
- It is an effective way to improve the learning of complex subjects and improve comfort in difficult medical situations.

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Application 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
If you encountered the challenges faced by Dr. Z, how would you try to solve them?

- **Question Structure:** Asks the respondents to reflect on past experiences or existing knowledge
- **Mechanism:**
  - It prompts students to reflect, leading them to self-introspection and actively encouraging them to synthesize better solutions.
  - It provides a framework for the reflection process, guiding learners in the appropriate direction relevant to the learning objectives of the course.
Breakout Sessions
# Implementation of Active Learning

<table>
<thead>
<tr>
<th>Active Learning Strategy</th>
<th>Brief Description</th>
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<tbody>
<tr>
<td><strong>Elaboration</strong>: Illness scripts(^1)</td>
<td>Students are asked to create <em>illness scripts</em>, or a cognitive organizer tables for pathophysiology, history, examination and labs/imaging/treatment, as well as three top differential diagnoses to present to the rest of the class.</td>
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<tr>
<td><strong>Reflection</strong>: Reflection breaks(^2)</td>
<td>Students are given time for <strong>focused thought</strong> at the beginning, middle, or end of class to create a framework for reflection.</td>
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<td><strong>Generation</strong>: Sabotage/sequence reconstruction(^3)</td>
<td>After a lesson is complete, the instructor <em>removes</em> a section or includes a deliberate error in the teaching material and asks students to <em>recognize the errors</em> or <em>generate</em> the correct version of the material.</td>
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</tbody>
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Breakout Sessions—Instructions for Participants

- This room is for you to share and discuss the use of active learning strategies in your classroom and the challenges you have encountered in implementing them.
- The discussion will focus on 2 topics:
  1. Active learning methods you use in your classroom; and
  2. Challenges you have faced when using them.
- Please keep your response to under 1–2 minutes so that your fellow educators can participate too, the time being limited.
- Try to stick to the question and avoid changing the topic.
- We will return to the main room in 15 minutes.
- Use Zoom’s “raise hand” feature when you would like to share an idea or question.
- Use the chat to share your thoughts if you would prefer not to speak.
- Don’t be shy—your colleagues are interested in your experiences and thoughts!
Head to your respective rooms, and we will **REFLECT** when we return from the discussion groups.
What active learning strategies do you use, and how might you apply them to motivate and engage students in your classroom?
What challenges have you encountered when applying active learning strategies in your classroom?
Sharing Outcomes and Takeaway Messages
Class time is precious. Make the most of it by creating an active learning experience in every class. Knowledge builds on knowledge—preparation before class is crucial for both faculty and students. Leverage technology to facilitate active learning.
Important Post-Event Information

- **Follow-Up:** We will share the active learning strategies handout 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 active learning strategies, including implementation tips and key points from the breakout sessions, will be sent to all participants next week.
“Education is the kindling of a flame, not the filling of a vessel.”

– Socrates
Are You Interested in Our Future Events?

Save the date for our upcoming Durable Learning Seminar

Metacognition—Do You Really Know What You Think You Know?
March 9, 2022, 9:00 PST | 12:00 EST | 18:00 CEST

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