

Learning Science Retrieval-Based Strategies for Medical Education



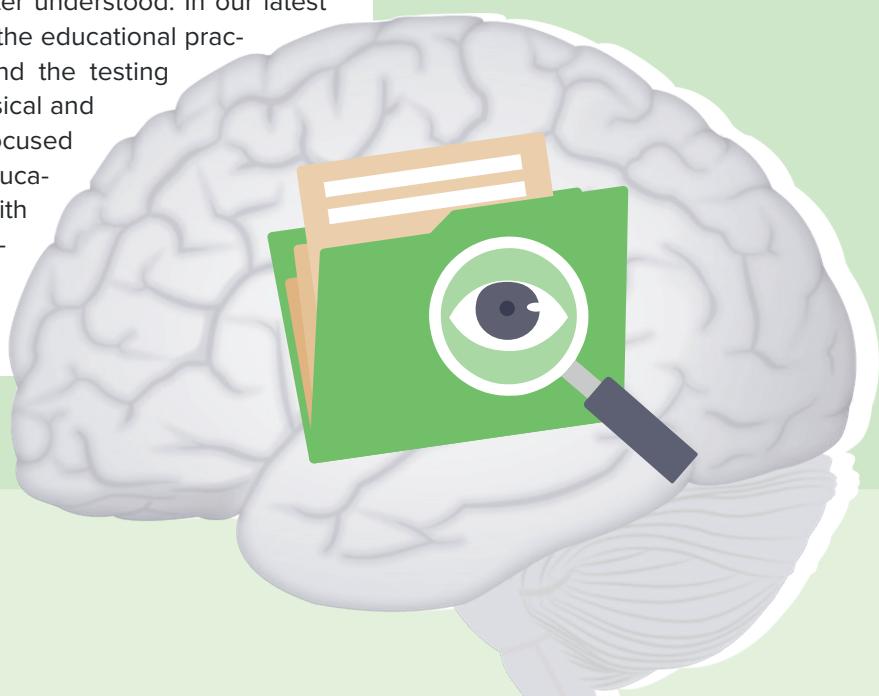
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The Learning Science team

is happy to share this summary information from our recent seminar “Retrieve to Retain: Applications for Modern Medical Education” with our educator community. We hope that by reading this material you will be inspired and better equipped to implement these helpful learning methods into your teaching practices.

What is Retrieval?

Retrieval is an important evaluative tool in knowledge testing and one of the most practical ways to make learning durable. The effectiveness of retrieval-based strategies has been convincingly demonstrated in numerous cognitive science studies, and the neurophysiological basis of this effectiveness is also becoming better understood. In our latest webinar, we examined the science behind the educational practices of spaced retrieval, active recall, and the testing effect, and suggested applications for physical and digital classrooms. We then had a quick focused discussion in breakout rooms where educators shared experiences and challenges with implementing retrieval strategies. This report summarizes the outcomes of those discussions.



Where do the participants of the Retrieval Seminar come from?

17.4%

Europe

15.1%

South America & Caribbean

14.0%

Asia

5.8%

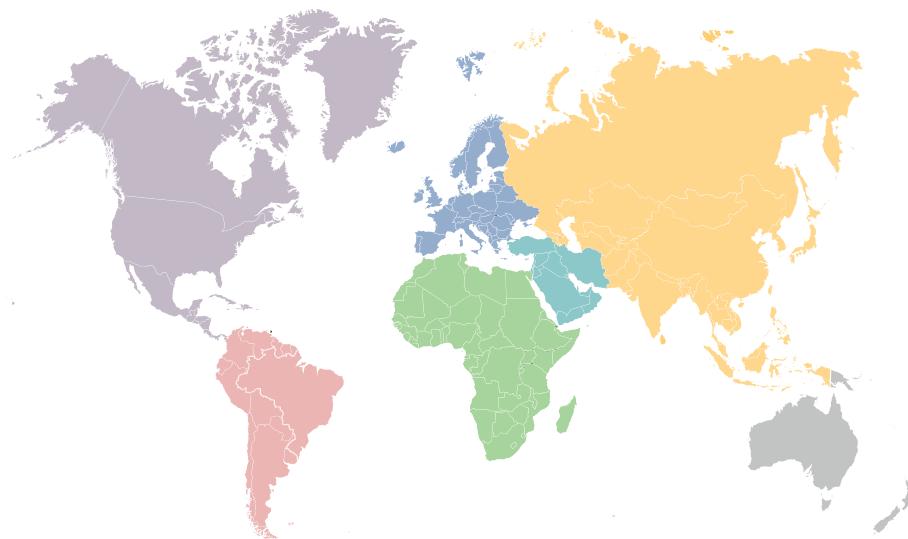
Africa

39.5%

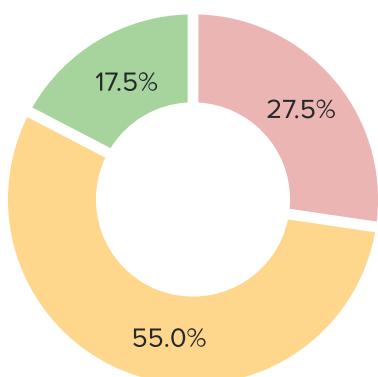
North America

8.1%

Middle East



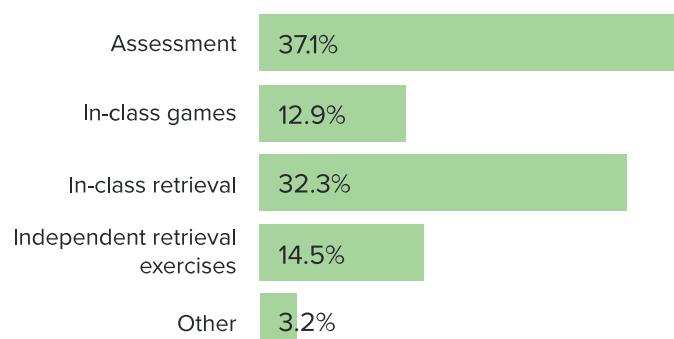
Overall use of retrieval methods in face-to-face and/or online classes (data: seminar poll)



- I do not currently use retrieval strategies in my classes
- I use retrieval strategies in some of my classes
- I use retrieval strategies in all of my classes

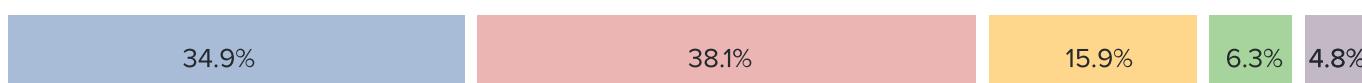
Use of retrieval strategies by type

(data: seminar breakout rooms and survey)



Over 70% of the participants use some type of retrieval with their students. Understandably, most take the form of assessment, but the other notable majority was in-class retrieval methods. Many participants shared their experience of using polls or other tools to review material from prior classes, while others encouraged free recall exercises at the end of classes. The following handout summarizes some strategies.

Challenges faced in implementation of retrieval strategies (data: seminar breakout rooms and survey)



- Time for prep & planning for implementation or finding materials is inadequate
- Student motivation/participation is low
- Technical/logistical challenges
- Faculty/administrative support is inadequate
- Other

The majority of participants reported challenges with student motivation or participation in these retrieval strategies. Several attendees mentioned difficulty with deciding how to encourage students to participate and finding a balance. Although some have tried to not grade these exercises, they saw that students were less likely to participate. Moreover, students do not seem to understand the reasoning or importance of implementing these strategies, which brings to light the importance of explaining metacognitive strategies to students.

Many faculty members spoke about the time and effort needed to implement such changes, not to mention the lack of support and inability to implement changes alone. It was also mentioned that it was difficult to find resources and materials, which we hope to help with this summary document and future events.

Connectivity and technical issues were also brought up frequently. Finding suitable alternatives and solutions is thus also necessary to allow educators to leverage retrieval strategies.

RETRIEVAL STRATEGY	BRIEF DESCRIPTION
Assessment	
Final exam/midterm exam	Instructors assign practice final/midterm exams in addition to traditional final/midterm exams (paper+pencil or digital). Feedback should be provided.
Weekly/daily quizzes	Instructors assign weekly and/or daily low-stakes quizzes (paper+pencil or digital). Feedback should be provided.
iRAT and gRAT	Individual Readiness Assurance Test and Group Readiness Assurance Test are mini-assessments to monitor student preparation that use retrieval skills.
Oral, procedural, or practical quizzes	Instructors can utilize retrieval style questions during oral or procedural/practical quizzes (individual or group).
In-class retrieval	
Jot strategies ¹	Students put away their work and are then asked to summarize information by jotting down what they can recall, making sketches of anatomical structures, or recapping older material from previous days/weeks/months.
Think–pair–share	Instructors pose a question and students first think independently about the answer, then discuss answers with another student, and lastly share their responses with the class.
Power ticket template ²	Instructors create a table “What did we talk about today/last week/last month/last quarter?” and students summarize 3 facts in each cell.
Brain dump	Instructors ask students to write/say everything they’ve learned on a topic as a form of recall—students can be given requirements such as a word count or a timed response.
Whip/quickfire	Instructors ask review questions at the beginning/end of class and require all students to record their answers—provide keys or have students correct their answers—or use it as a verbal exercise with individual students, going around the classroom.
Ticket out the door/most valuable point (MVP)	Instructors ask students for their most valuable point/concept of the day/week/month—can also be used as an end-of-class practice with recent or older material.
Adapted lectures	Instructors adapt lectures to include retrieval elements e.g. polls, retrieval open-ended discussion questions, clicker questions, or learning extensions.
In-class games	
Beach ball review	Instructors write generalized questions on a blow-up beach ball and students toss it to each other, answering the question that their right thumb lands on. E.g., “What structure is immediately superior to ...?” and “List 3 hormonal controls of ...?”
Jeopardy (or other adapted review games)	Instructors can design review games for individual or team practice. Alternatively, a student team can provide questions for the other team.
Platform-based interactive learning tools	Instructors can use such platforms as Kahoot!, Quizizz, Quizlet Live, Edpuzzle, and Socrative to provide individual or team-based quiz games.

Independent retrieval exercises

Algorithm-driven retrieval Students use spaced repetition decks, such as Lecturio and Anki.

SQ3R³	Students use this structured technique for improving reading comprehension. Students should: Survey the text (headings, titles) for clues of content before reading; generate Questions that guide his/her reading (such as “What is the main topic of this section?”) before reading; Read the text; Recite (either with a self video, audio recording or in a written format) the most important points of the content after reading; Review the content after reading and answer the questions that were generated.
Build a memory palace/ mnemonics	Students use mnemonics and/or build a mental image associated with the concepts to be memorized, such as a room that is familiar to students with multiple objects visualized in it. These mental images become the cues for the retrieval of specific information.
Leitner system of flashcards	Students structure their flashcard use to practice cards covering well-known concepts at longer intervals and cards covering lesser-known concepts more frequently.

Instructional designs to facilitate retrieval

Flipped Classroom/ blended learning	Instructors deliver content outside of the normal class and instead use in-person engaging learning methods during class time which can include retrieval strategies.
Problem-based learning/ case studies/role-playing	Instructors can utilize these instructional approaches to incorporate retrieval strategies.

1. Oakley B, EdD BR, Sejnowski TJ. Uncommon Sense Teaching: Practical Insights in Brain Science to Help Students Learn. New York: Tarcher-Peregrine; 2021. 12p.
2. Agarwal PK, Bain PM. Powerful Teaching: Unleash the Science of Learning [Internet]. 1st ed. Wiley; 2019 [cited 2021 Dec. 7]. Available from: <https://onlinelibrary.wiley.com/doi/book/10.1002/978119549031>
3. The Learning Scientists- SQ3R or Read, Recite, Review [Internet]. The Learning Scientists. [cited 2021 Nov 4]. Available from: https://www.learningscientists.org/blog/2021/3/4-1?utm_source=newletter&utm_medium=email&utm_campaign=new_post_from_the_learning_scientists&utm_term=2021-03-05SQ3R

Further Resources

- **Online seminar library for health professions educators:** <https://www.lecturio.com/re-envision/online-seminars/>
- **Educational webinars for health professions students:** <https://www.lecturio.com/medical/global-student-events-on-demand/>
- **Pulse Articles:**
Retrieval-Based Learning Strategies in Medical Education ►
Implementing a Flipped Classroom in Medical Education ►



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