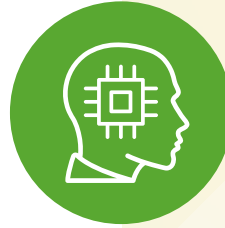


Learning Science Metacognition

Do You Know What You Think You Know?



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The Learning Science team

is pleased to share this summary information from our recent seminar “Metacognition: Do You Know What You Think You Know” with our international 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.



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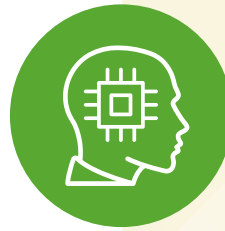
What is Metacognition?

The term “metacognition” refers to thinking about cognition, or to the knowledge, monitoring, and evaluation of one’s thinking.



Learning Science

Metacognition Strategies for Medical Education



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METACOGNITION DOMAIN

BRIEF DESCRIPTION

Metacognitive Knowledge

One minute writing⁽¹⁾ After an instructor sets a timer for one minute, students are asked to create a short essay, audio recording, or video on a topic. Students could be asked what they already know about a topic, their strengths and weaknesses, and their planned study strategies for the new topic.

Graphic organizers Graphic organizers can help students identify what is known, what is not known, and help them plan learning strategies. Graphic organizers such as concept maps show relationships among multiple concepts. For example, students might diagram the relationships among normal organ function, dysfunction, clinical presentation, and diagnostic tests that can be used⁽²⁾. Creating graphic organizers has proven to alter student study habits by encouraging them to plan early and monitor their progress throughout learning⁽³⁾.

Planning

Explicit learning objectives⁽⁴⁾ Having clear objectives help prime students for learning. It helps them plan for the topic ahead and primes them for what information is most important.

Create a personalized learning plan Encourage students to make personalized learning or mastery goals. This will make learning relevant for them and studies show students who have mastery goals have increased metacognition, decreased procrastination, and increased help-seeking behaviors^(4,5) over students who have performance-oriented goals.

SMART goals (specific, measurable, attainable, realistic, and timely) can help learners attain their goals^(6,7)

Create a study plan Students who space out their learning and practice have higher durable learning than those who do not but many students fail to plan and end up cramming at the last minute. The creation of regular study groups, study sessions, or a personalized study plan helps students regulate their learning.

Pre-tests Pre-tests help learners identify important concepts that are upcoming and help them identify what they do and don't know about the new topic. Pre-tests can take the form of quizzes or generative questions.

Monitoring

Five Whys⁽⁸⁾ When presented with a problem, students challenge themselves to ask why five times. This process can challenge assumptions and reduce cognitive bias.

Muddiest Point⁽⁹⁾ At the end of a lesson, students identify concepts they found difficult. They can also be asked to rank these in order of difficulty. Not only does this help students monitor their cognition, but provides feedback to educators on student progress.

Think Aloud^(4,10) Have students reason through a case, a problem, or other scenario in pairs or small groups. Thinking aloud helps students identify any gaps in their thought processes and listening to others models different ways of thinking. Instructors can also practice thinking aloud to model expert thought processes for the students.

Evaluating

Reflection After an assessment, have students reflect on their performance and their methods for preparing⁽¹¹⁾. Identify places where they can change their study habits. Having a post-test review session can provide immediate feedback so that students can discuss their thought processes⁽¹²⁾.

Feedback Have students reflect on feedback given to them, whether the feedback is in the form of a grade, rubric, or performance assessment. Reflect on possible causes of overconfidence.

Technology-enhanced Metacognition

Low or no stakes quizzes Practice and feedback give students a chance to test their knowledge and make corrections before summative assessments. Giving students a chance to “calibrate” their expectations vs their performance can help reduce issues of overconfidence (poor performers) and underconfidence (high performers) as well as raise performance for both groups⁽¹³⁾

Polling/clickers The use of polling or clickers during class can give students a non-threatening way to participate and monitor their knowledge, especially for lower to middle performing students who may be more reluctant to perform in front of peers⁽¹⁴⁾

E-learning platforms and LMS^(15,16) Platforms and LMS can be used to gather data about student behavior and progress. Instructors can monitor the student use of spaced retrieval and interleaving which have been shown to help students improve metacognition and retain their learning. Platforms allow for consistent collection of performance data to inform educational design of future sessions.

Some Inputs from our Webinar Breakout Rooms

Self-quizzing and peer quizzing Creating quiz questions help students determine what they already know and test their knowledge. Peer quizzing can help learners in the same way as think aloud activities, by having learners share thought processes.

Recall of previous material Like the one minute writing activity above, participants cited methods to recall previous material as valuable in helping students assess their metacognitive knowledge.

Use of LMS and course data Some programs monitor LMS and other course data to identify students who may need additional help or mentoring

Engaging in direct discussion and evaluation Some discussion participants proposed being transparent with students and explaining clearly what metacognition is and how they can regulate it in their learning. They also suggested that educators actively engage their students in self-evaluation of these techniques and discuss how it can be implemented better depending on the results of these evaluations.

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