CBE Life Sciences Education

Feature: Evidence-Based Teaching Guide to Four Strategies to Foster Student Metacognition

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STUDENT METACOGNITION: FOUR STRATEGIES TO IMPLEMENT IN ANY COURSE

The following evidence-based strategies should be relatively easy to implement and should also have an immediate impact on your students' metacognition and learning. Summaries of the articles leading to these recommendations can be found in the *LSE* Evidence-Based Teaching Guide on Metacognition: https://lse.ascb.org/evidence-based-teaching-guides/student-metacognition/.

Some of the recommendations involve training your students to use what some instructors may believe are basic study strategies that students should already be aware of. Unfortunately, most students report that they have not received any training in how to prepare for their college courses. As a result, providing instruction about how to learn content within a specific course can have a meaningful impact on student success.

Instruct Students About the Power of Practice Tests for Improving their Retention and Exam Performance

Many students likely underuse retrieval practice (which involves attempting to retrieve to-be-learned content from long-term memory) while preparing for exams because they view practice testing more as a monitoring tool than as a method to improve retention. When used as a monitoring tool, retrieval practice (or using practice tests) can help students evaluate what content they are retaining versus content that they have forgotten or have not yet learned, but it also can improve retention as well. Thus, instruction aimed at explaining the value of retrieval practice could be valuable. For instance, any content that students must retain and easily access from memory are excellent choices for practice tests. Thus, explaining the impact of practice tests on retention, and modeling how students could test themselves over key content, could encourage students to consistently use practice tests while preparing for exams.

Encourage Students to Space their Practice

Many students do not use a spaced practice schedule when they study, which involves studying the *same* content in two or more sessions that are spaced across time. Spaced practice is essential for mastering difficult course content. Students use spaced practice when they master any other skill outside of academia (e.g., playing sports, music, video games), so most students have experienced its benefits but do not realize that spaced practice can substantially benefit their learning of course content. To use spaced practice, students will need to manage their time and plan when to return to each topic multiple times across study sessions. To help them out, consider encouraging your students to use a weekly calendar to schedule multiple study sessions for your class, where each session involves studying the most recently presented material in class and engaging in practice tests for content presented earlier (that students have already studied). Combining spaced practice with retrieval practice is especially beneficial, and you can demonstrate the benefits in class by using practice tests and repeating some questions across class sessions.

Develop Practice Questions that Help Your Students Accurately Monitor their Learning

To help your students monitor their progress, develop practice questions that allow them to test their knowledge of content that will appear on a high-stakes exam. The benefits of developing practice questions that simulate the questions on high-stakes exams are substantial: (a) students can monitor what content they are understanding and what they are struggling to understand; (b) when they correctly answer a question, doing so will itself boost their retention of that content, and after incorrectly answering, feedback can help them learn the content; and (c) many students will appreciate getting experience with the kinds of questions that will appear on high-stakes exams. Consider developing a bank of practice questions that you take from prior exams, resources on the web, and textbooks. You should also repeat questions across sessions – it is the repeated practice across time that leads to robust and long-term learning.

Prompt Students to Develop Study Plans and to Evaluate Their Approaches After an Exam

To improve both metacognitive knowledge of strategies and metacognitive regulation, guide students in making a study plan, and follow up with an evaluation on how they studied. After discussing expectations for an exam and available learning resources, prompt students to choose specific strategies and resources, and have them explain how, when, and why to use them. This approach enables students to be more intentional with their study efforts. After students receive their graded exam, ask them: What strategies worked, or did not work? Why or why not? When students reflect on what they did, and how their approach affected their outcomes, they can more readily identify what actually works and what does not. Once students evaluate what they can do differently, they can set new goals and make a specific plan to reach those goals. Doing so can improve their monitoring and control over their own learning, and set them up for success.