

## *Research-based teaching tip*

# Frequent practice

*Give students opportunity to frequently practice course information during class, and space out practice opportunities to maximize learning.*

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### **Rationale:**

Frequent, distributed practice of course material in-class has been associated with student performance and learning outcomes.

### **Evidence:**

- Student performance is positively associated with increased practice frequency via clicker questions in biology classrooms.<sup>1</sup>
- Students practicing activities via creating their own explanations of course material using background knowledge, instead of utilizing pre-existing explanations, resulted in higher test scores.<sup>2,3</sup>
- Repeated practice of assessments increases student's consideration of their own learning processes<sup>4</sup>, which increases academic performance.<sup>5</sup>
- Spacing out practice over time is more effective for learning than having all practice for a topic lumped together.<sup>6</sup>

### **Implementation:**

Allow students frequent opportunities to answer in-class questions, and in particular questions that rely on prior knowledge. Space out opportunities over time instead of distributing practice all at once. This can be done through in-class activities or clicker-type questions, by asking students to explain the logic behind their answers, and by designing questions and activities that utilize prior knowledge.

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### **Sources:**

<sup>1</sup>Preszler RW, Dawe A, Shuster CB, Shuster M. 2007. Assessment of the effects of student response systems on student learning and attitudes over a broad range of biology courses. *CBE Life Sciences Education* 6:29-41.

<sup>2</sup>Willoughby T, Wood E, McDermonnt C, McLaren J. 2000. Enhanced learning through strategy instruction and group interaction: is active generation of elaborations critical? *Applied Cognitive Psychology* 14:19-30.

<sup>3</sup>Wood E, Willoughby T, Kaspar V, Idle T. 1994. Enhancing adolescents' recall of factual content: the impact of provided versus self-generated elaborations. *Alberta Journal of Educational Research* 40:57-65.

<sup>4</sup>Thomas AK, McDaniel MA. 2007. Metacomprehension for educationally relevant materials: dramatic effects of encoding-retrieval interactions. *Psychonomic Bulletin & Review* 14:212-218.

<sup>5</sup>Tanner KD. 2012. Promoting student metacognition. *CBE Life Sciences Education* 11:113-120.

<sup>6</sup>Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. 2013. Improving students' learning with effective learning techniques: promising direction from cognitive and educational psychology. *Psychological Science in the Public Interest* 14:4-58.