

Online Tools for Durable Learning

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In our [previous article](#), we explored retrieval practice, spaced practice, and metacognition as strategies that provide more durable learning experiences for students. In our work as learning designers in the Colleges of Earth and Mineral Sciences and Business at Penn State University, we incorporate all three strategies in the design of face-to-face, online, and hybrid courses.

The following are tools that we or faculty with whom we work have used to incorporate retrieval practice, spaced practice, and metacognition into courses. An added benefit of these tools is that they add an active learning component and encourage engagement through friendly competition and interaction with peers.

Kahoot! is a fun, game-like interactive tool for practicing recall using a multiple-choice quiz format. Students are shown a question and are rewarded not only for answering quickly and accurately, but also for streaks of correct answers. This technology can be used on mobile devices as well as laptops, and in a classroom or individual format. There is even a feature where Kahoot! can be set up for students to use on their own for later studying and review.

Faculty have found that starting off class with a Kahoot! quiz is a good way to focus students on the essential concepts from course readings. Student volunteers can be called upon to explain answers to challenging questions. And students can even be asked to create Kahoot! questions to help with reviewing course material.

Plickers is a low-tech way to incorporate polling in a classroom without the need for mobile devices or laptops. Students hold up unique cards to answer questions, and you can use a mobile device to quickly scan their answers. This allows you to share responses and easily identify how many students answered correctly or incorrectly.

For questions that are challenging, you might ask students to turn to a neighbor and explain their thought process. This typically leads to an increase in correct responses. The conversation with peers also helps students create another pathway for recalling information.

Poll Everywhere is a polling tool that easily integrates into PowerPoint, Keynote, and Google presentations. Students use their mobile devices or laptops to answer teacher-created questions. Different question types can be used, including short-answer, multiple choice, live word clouds, clickable images, and rank order. LaTeX syntax can also be used in creating questions for math formulas. Short-answer and live word clouds encourage metacognition. This tool has also recently added gamification to create a low-stakes competitive environment.

Try adding a confidence of understanding ranking at the end of a lesson to help students reflect on their learning. Use open-ended questions to allow students to recall or reflect on their learning.

Piazza supports classroom discussions. It can be easily integrated within the learning management system as another way of collecting students' questions and reflections. Subject lines and folder creation help everyone stay organized and able to find what they need. In addition to being asked to identify essential questions from the material, students can also be asked to make connections between course content and what they already know, which can create additional pathways for memory.

Learning management system quizzing tools (such as Canvas) can also be used for creating low-stakes quizzes, which typically include multiple ways of providing feedback to students. Adding open-ended questions that allow students to reflect on their confidence in each answer will provide even more metacognitive opportunities for students. These tools offer many different question types and formula options to give the maximum flexibility in question generation. Some learning management systems not only allow students multiple attempts at practice quizzes but also allow faculty to build in spacing so that students have to wait before attempting quizzes again. In addition, question banks can be used to offer students multiple attempts at different questions. Faculty often make these quizzes worth at least a few points to motivate students to use them. These points could be based on correct answers, an average of scores, highest scores, or simply participation. The message you want students to hear is that these quizzes are for them to practice retrieving content from memory. This learning activity will not be as effective if students look up the answers.

H5P is a powerful plug-in that allows you to create interactive content that easily can be added to a learning management system or web space. It allows you to create everything from quizzes to interactive videos to sets of flashcards for students to practice retrieving information. These activities can be embedded right within the content of the material so that students can test their understanding immediately after reading or watching content. Creating these activities is done easily on the web with options to copy and modify activities. Online faculty especially appreciate using this tool to add interaction to online lecture content in ways that replicate a face-to-face course.

Flipgrid is an easy-to-use tool that allows students to respond to prompts by sharing short videos. Microsoft recently purchased Flipgrid, and institutions with Office 365 integration may also already have access to it. Educators can get free accounts as well. The videos are private, and instructors can provide feedback to individual students or to everyone. You could prompt students to discuss topics, recall information, reflect on experiences, provide summaries, or create short presentations to share what they have learned.

Many of these tools offer a free version with the opportunity to upgrade to paid enhanced features.

Hopefully, these ideas will inspire you to incorporate a new approach to teaching that helps students identify good study strategies and solidify their learning. Retrieval practice, spaced practice, and metacognition all provide students with additional opportunities to reinforce their learning. Practice makes perfect—or, at least, more proficient!

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