

TEST-ENHANCED LEARNING

Adapted from: Pyc, Agarwal, and Roediger (2014)

A wealth of research has shown that tests are potent learning events. In particular, research studies have shown that implementing low-stake practice tests in the classroom can lead to a significant boost in student performance. Researchers have concluded that actively and frequently retrieving information from memory increases the likelihood that information will be recalled at a later time. In other words, students need to practice retrieval several times after they think they know the material, for them to actually be able to do it.

Test-enhanced learning, also referred to as testing effects, retrieval practice effects, and retrieval-enhanced learning, has been widely researched through a range of experimental designs across disciplines and subject matters. This pedagogical approach has little to do with the use of standardized tests, but rather, calls for the frequent incorporation of retrieval practice into the classroom and into students' study habits.

POTENTIAL BENEFITS OF TEST-ENHANCED LEARNING

- Enhanced performance in high-stake tests or exams.
- Improved long-term retention and ability to recall learned information.
- Greater proportion of recalled information when compared to study practice alone.
- Relevant for learners of all ages.
- Helps instructors identify concepts or topics that students are struggling with.
- Helps students identify which information they need to concentrate on more heavily when studying on their own.
- Open-ended practice tests can improve students' organization of information.
- Benefits of testing can extend beyond the particular item under study. Information recall skills have been shown to transfer to information not specifically tested.
- Benefits of practice tests are not dependent upon the type of test implemented (e.g. multiple choice, essay questions) or the match between the format of the practice test and final test.

FACTORS INFLUENCING THE IMPACT OF TEST-ENHANCED LEARNING

FREQUENCY:

- Recurrent practice testing will enhance learning as well as the likelihood that information will be recallable at a later time. Also, as the number of practice tests increases, the amount of information learned during a subsequent study trial also increases.

INTERVALS:

- The benefits of practice testing are more pronounced as the delay between the first learning episode and final test increases.

TIMING:

- Spaced retrieval opportunities reinforces learning. The amount of time between correct recalls influences the likelihood that information can be recalled on a later test.

FEEDBACK:

- The benefits of practice tests are greater when feedback is offered after the practice test and correct answers are clearly provided, giving students the opportunity to correct any misconception.



SUGGESTIONS ON HOW TO INCORPORATE TEST-ENHANCED LEARNING THROUGH PRACTICE TESTS

A) BY INSTRUCTORS, IN THE CLASSROOM

QUESTIONING DURING COURSE INSTRUCTION

- Pose a question and wait for students to generate a response. The key of this practice is to push all students to generate answers so that everyone benefits from the testing. It is important for the instructor to provide feedback and correct any wrong answers. This can be implemented using different methods:
 - » Randomly selecting students or asking for volunteers to verbally share their responses with the group.
 - » Using clickers to engage all students. This can also provide information about how many students understand a given concept or topic.
 - » Using coloured index cards representing answer options for students to hold up every time a question is posed.

LOW-STAKE QUIZZES AT THE BEGINNING OR END OF CLASS

- Test students in every class session. They will be encouraged to study frequently because they know they will be tested. Quizzes also offer instructors immediate feedback regarding how much information students are learning.

B) BY STUDENTS, DURING SELF-REGULATED LEARNING (STUDY TIME)

FLASHCARDS

- Students continue to review facts and concepts until they can correctly recall items multiple times at spaced intervals.

QUESTIONS AND WORKSHEETS AT THE END OF BOOK CHAPTERS

- Students answer the questions to the best of their ability without looking up the answers and check for accuracy afterwards.

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