

Interleaving: An Evidence-Based Study Strategy

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January 18, 2017

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By Maryellen Weimer, PhD

Interleaving is not a well-known term among those who teach, and it's not a moniker whose meaning can be surmised, but it's a well-researched study strategy with positive effects on learning. Interleaving involves incorporating material from multiple class presentations, assigned readings, or problems in a single study session. It's related to distributed practice—studying more often for shorter intervals (i.e., not cramming). But it is not the same thing. Typically, when students study and when teachers review, they go over what was most recently covered, or they deal with one kind of problem at a time.

There's a certain logic behind this usual approach. Content feels easier to handle if it's kept in the order in which it was presented. It feels better to get one kind of problem under your belt before moving on to the next. But here's the problem: most of us don't put test questions or problems on exams in the order in which they were presented. We mix things up. Typically, the first time that our students see the content out of order is on the exam—when the stakes are high and stress and anxiety make the new organization harder to handle.

But the value of interleaving extends beyond students' comfort with the order of our exams' content. It's about retrieval practice, having students regularly revisit recently acquired knowledge. The more often they find it, call back to it, review it, and connect it with what they already know, the more likely they are to understand and remember it. Beyond that is how mixing concepts or problems builds more and stronger connections between them. Students tend to see concepts as free-standing information bits. The connections that are obvious to us aren't necessarily apparent to them. But the regular review of previously covered material allows us to propose and them to discover how course content interconnects.

Now, we can propose this wonderful study technique to students and watch them yawn. They think they know how to study. They'll go over the content, starting from the last test, and save the serious review until the night before the exam. They're convinced that's the best way to study.

However, rather than merely talking about it, we can be demonstrating this and other effective study strategies. Rachael Blasiman describes a straightforward review technique she used in introductory psychology course sections that combined both interleaving and distributed practice. Every class session started with a five-to-ten minute review. It contained key concepts covered in the previous class session and randomly selected material from earlier sessions. The collection of concepts appeared on a PowerPoint slide, which she had students explain. She corrected or elaborated upon their responses as needed. Some of the concepts from previous sections came up for review once and some were reviewed multiple times.

That was it, and that application of interleaving and distributed practice resulted in students in the experimental sections performing 8 percent better on the final exam than

those in the sections without the review. Moreover, the more often a concept was reviewed, the better students performed on questions related to it. Can we use evidence like this to convince students? Maybe we could conduct a quasi-empirical trial in a class.

As always, there's the question of how much content we have to cover and whether we have the time to devote to it. What makes this technique persuasive is that most of us already begin class with some sort of review, so it could easily be transformed into a review of content presented several sessions ago, especially if that content has relevance to today's new material. If we explain the reasons for this shuffled review, if we encourage students to see if the technique makes understanding the content easier, and if we discuss it in terms of specific exam questions during the exam debrief, I'm thinking that some students might add it to their study repertoire.

There is one caveat: students need to be warned up front that this isn't a technique that makes studying easier. In fact, it makes studying harder, but it makes understanding and remembering easier, so the payoff comes on the exam, in the courses that follow, and in the learning they will be doing as professionals.

Reference: Blasiman, R. N., (2017). Distributed concept reviews improve exam performance. *Teaching of Psychology*, 44 (1), 46-50. [There's more about this study in the February issue of the *Teaching Professor* newsletter.]



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