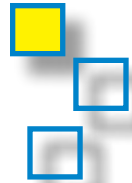




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## Interleaving: An Evidence-Based Study Strategy

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.

Maryellen Weimer, PhD; *Interleaving: An Evidence-Based Study Strategy; Faculty Focus; January 18, 2017* [ <http://www.facultyfocus.com/articles/teaching-professor-blog/interleaving-evidence-based-study-strategy/> ] January 18, 2017

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## Collaboration or Cheating: What Are the Distinctions?

THE LINE BETWEEN collaboration and cheating is fuzzy. It's still clear at the edges, but messy in the middle. When students are working in groups, searching for a solution to a problem, looking through possible answers for the best one, or sorting out material to include in a presentation, that's collaboration. When one student in the group solves the problem and everyone else copies the answer, that's cheating. When one student fails to deliver material she or he's been assigned and the rest of the group covers, that's cheating.

But what about when students study together? Given what we know about how much they can learn from and with each other, it makes sense to encourage students to work together on course content. To us that means collectively looking for answers, explaining things to each other, and using questions to test their knowledge. But what if they divide up the homework problems or study questions so that each person does only a few, but everyone gets the answers?

Collaboration on exams or quizzes further highlights the messiness of the distinctions. If a student admits to a group working on quiz questions that he doesn't know an answer and someone else in group identifies the right answer, explains what makes it right, and that explanation enables the first student to understand, has cheating occurred? For exams, must a student discover all answers working alone? The question can be framed more globally, when does collaboration cross the line and become cheating?

Teachers have the responsibility to assess individual mastery of the material. Grades provide a measure of how well an individual knows something. When students collaborate, when they produce work collectively, that makes it much more difficult to determine who knows what and how well they know it. Promoting collaboration and preventing cheating can feel like one of those spots between a rock and hard place.

The distinctions matter because collaboration is an expectation in

most professional settings. Professionals "cheat," as we usually define it. If they don't know an answer, they look it up. If they don't know how to do something, they ask someone to show them. Most decisions are group decisions. Who contributed what is of little concern; it's the quality of the decision that matters.

Are we conveying mixed messages if we put a problem on the board and tell students to work on it with someone seated nearby, but then silently expect all homework to be completed independently? Do they see what differentiates in-class collaboration from the individual work we require that they do for grades? As far as that goes, how clear is our own thinking about what makes them different?

If we don't understand the distinctions, then we don't have much hope of clarifying them for students. Students already have permissive attitudes about cheating—so many of them do it, despite our efforts to prevent it. If we're teaching students in that traditional 18-23-year-old cohort, then there's the added power of peer pressure. If the student asking for your answer is a friend, can you say no without doing damage to the friendship?

Unfortunately, it's also possible for groups to collaborate with the intent of cheating—the giving and taking of answers without any attempt at learning. We focus our efforts on

the person who's cheated—the one who's gotten the answer from somebody else. We don't pay much attention to those who enabled the cheating—the ones giving away the solutions and facing no consequences when they are in fact co-conspirators.

Finally, are we so focused on preventing cheating that we're neglecting to teach the skills of collaboration? I'm wondering if the place to start is by exploring with students what it means to work collaboratively, how everyone has the responsibility to contribute, and why it's everyone's responsibility to prevent the undeserved taking of ideas and information from others. That doesn't mean everyone must always know the answer, but everyone ought to have ideas about the possible answers or at least some thoughts about how to probe the problem further. Handing out an answer to somebody who hasn't done any work is different from trying to help someone who's struggling but still working to understand the content. Effort on the part of the receiver is key.

Please share your thoughts. Writing this post has stimulated a lot of thinking (and rewriting). I'm not sure I've gotten us to good answers yet.

*Maryellen Weimer, PhD; "Collaboration or Cheating: What Are the Distinctions?" Faculty Focus; January 11, 2017 [ <http://www.facultyfocus.com/articles/teaching-professor-blog/collaboration-cheating-distinctions/> ]; January 12, 2017*

