



## Wandering Minds: Improving Retention through Retrieval Practices, Interleaving, and Microactivities

### SPEAKERS

Deborah Herold, Tierney King, Wren Mills, Lauren Hays

#### **Tierney King** 00:01

This is the Faculty Focus Live podcast sponsored by the Teaching Professor Conference. This year, join us in New Orleans from June 7th through the 9th, where you'll collaborate with other educators, gain innovative teaching solutions, and hear bold ideas from some of higher ed's most respected voices. I'm your host, Tierney King, and I'm here to bring you inspiration, energy and creative strategies that you can utilize in your everyday teaching. Have you ever looked at your students and saw their eyes glaze over, knowing they most likely are not retaining anything you're saying? So what tools can you give to your students and implement into your course to help improve the retention of your content? Today, we're going to go through study skills you can provide to your students to enhance their recall, and we'll go over interleaving and microlectures. Research says you have 15 minutes of attention span before mind start to drift and wander. So what can you do to increase long term memory skills within your students? To start, Deborah Herold will discuss the power of retrieval practices and demonstrate the long-term benefits of retrieval over passive retrieval.

#### **Deborah Herold** 01:10

Retrieval practice is an approach that is derived from a finding known as the testing effect. This finding has shown that memory is improved when we test ourselves on information more than when we reread or review information. Now, this is something that students often find is counterintuitive. Many students will come to me after they struggle on an exam and say, I don't understand why I did so poorly. I read the chapter multiple times, or I looked over my notes many many times. And when I got to the test, I just seem to forget everything. The reason that this happens is that by looking over information multiple times, we create a sense of familiarity, which can be a little bit dangerous when it comes to memory. When you create a sense of familiarity, we often confuse being familiar with something without actually knowing it. A well known study that has demonstrated the importance of practicing retrieval was done by Roediger and Karpicke. In their study, they had participants read a passage, then there was a two minute break, and then participants either got to read the passage again - we'll call them the rereading group - or they weren't allowed to see the passage at all a second time, they were just asked to recall as much of the passage as possible - we'll call them the recall group. They were simply given a blank piece of paper and told to write down as much of the passage as they could. Then participants were tested on how much of the passage they could recall both groups. Now the test occurred either after

only five minutes, after two days, or after one week. If the test occurred right away, after only five minutes, the participants in the rereading group had a slight advantage. They were able to remember about 81% of the passage, while participants in the recall group remembered about 75% of the passage. However, this benefit for the rereading group disappeared if the test was after a longer interval. So if participants were tested after two days, the participants who only got to see the passage once and then were asked to recall it, the recall group, remembered more than people in the rereading group. In fact, those in the recall group still remembered 68% of the passage, while those in the rereading group only remembered about 54% of the passage. If the test occurred after one week, the recall group, the one who only saw the passage once, still remembered 56% of the passage, while those in the rereading group had dropped to remembering only 42% of the passage. So what can we do to promote retrieval practice in our classes? Well, one thing that we can do is to just pause frequently during lectures and ask students to try to retrieve information. They can simply turn to somebody sitting near them, and ask them to remember what have we talked about so far in class. You can also ask them to pull out a blank sheet of paper and to write down as much as they can recall what were the concepts that we've covered so far. Another thing that you can do is both begin and end class with retrieval practice. Ask students to think about what did we cover during our last class session? And then when the class is over again, ask them to take a minute and think or write down. What did we cover today? What were some of the key concepts and terms that were talked about? Another thing that you can do is incorporate frequent low stakes quizzes. Interestingly, research on retrieval practice has shown that there are strong benefits, even in the absence of feedback. So if you're starting to think that if I'm asking my students to do all this retrieval practice and to write down all these things that they can remember, that sounds like it's going to be creating a lot of more grading for me. But in fact, research shows that even in the absence of feedback, retrieval practice has strong benefits. So even if they're not corrected for errors, they're more likely to remember information if they practice recalling it. By forcing yourself to retrieve information, you're actually strengthening memory traces in the brain, and making it more likely that you'll retain that information in the future.

### **Tierney King 05:55**

Another way you can enhance long-term memory is through interleaving. Interleaving is the concept of alternating between different topics during learning, instead of practicing one skill or topic at a time. As Lauren Hays explains, she uses the analogy of a fruit salad. When you're making a fruit salad, you may put in strawberries and blueberries and raspberries, but you don't put in broccoli or brussels sprouts. Instead of interleaving things that are too different or don't taste good together, think about instead mixing up similar types of things like a fruit salad.

### **Lauren Hays 06:27**

So let's take a minute and discuss why interleaving works. First interleaving forces learners to pay attention to context. And this makes learning it easier to learn how to transfer knowledge from one domain or context to another, so that there's that idea of transfer of learning. That's really beneficial with interleaving. So second, interleaving helps learners notice similarities and differences between content. And third, interleaving forces learners to pay attention to the skills they need to solve problems, and the strategies they need to use to complete certain types of work. So now, before we jump into discussing how to use interleaving, I want to mention what interleaving is related to, because I think it gives a bigger picture of what interleaving is, and is not. So interleaving is related to the Spacing Effect.

And the Spacing Effect refers to the finding that long term memory is enhanced when learning events are spaced apart in time, rather than masked in immediate succession. So in other words, the spacing effect is the idea of studying a concept over the course of days, weeks, or even years in order to remember it. Often, learning time of concepts is shortened to a few study sessions before a test. However, research tells us that for long-term memory, we need to space out our learning. So to implement interleaving, you must first start by identifying the content you want to interleave. So another way of thinking about the content you want to interleave is to ask yourself, what do I want my students to remember? There are two ways to incorporate interleaving. One is to build the course around using an interleaved approach. So in other words, it's incorporating interleaving directly into your course design. The second way to incorporate interleaving is by encouraging students to use interleaving when studying or to create study materials for them that have interleaved components. So you could, you know, create some different types of note taking skeleton notes that just some other study materials that have them pull content from again, it could be previous courses that are scaffolded. It could be all within your course it could be from other courses in the program.

**Tierney King 09:23**

In the full version of this program, Lauren explains both how you can incorporate interleaving by building a course around it and encouraging students to use it. In this shortened podcast episode, we'll focus on how you can encourage students to implement interleaving practices and promote retention.

**Lauren Hays 09:39**

If you are choosing to use interleaving by encouraging students to use it in their own study sessions, I do really think it's also just as important for you to share that research though you might approach it in a different way and give different examples of how they can use interleaving in their own work outside of class, to help them learn in your class, of course, but also in other classes that they are taking. So once students know about interleaving, you could encourage them to do some of the following things, you can encourage them to use flashcards. For example, students learning a subject such as anatomy, may develop flashcards on each new system as they cover it in the course. Instead of just practicing on the new cards, they add the new flashcards their existing stack, so that they're always returning to those prior topics while studying. Second, encourage students to study more than one topic at a time. Have them jump around to different aspects of a topic that help with memory retention. Remember, earlier I shared that research has shown that going through content in a random order that includes repetition, had been found to produce better learning outcomes. So have them develop ways to jump around in kind of a random way. Maybe have them you know, work in peer groups, and have it their groups create a study session or study notes that that jumps around in a random order so that students that are as they go through that content are forced to refer to different material in the course, at different times. Third, encourage study groups to quiz each other, and pull from content learn throughout the entire course, and not focus only on new newly learned content.

**Tierney King 11:43**

Lastly, we've talked about attention spans and how you have 15 minutes before mind start to wander. In this program, Wren Mills explains how it can be important to break up lectures into chunks and why you should implement micro activities to help students process information and move it into their long-term memory.

**Wren Mills** 12:01

Most people have heard before that we have about 15 minutes of attention span before our minds start to drift and wander. And that even happens to the best of us. That's not just a myth. That's actual science. And so we need to consider this when we're structuring our class lessons or recording a video lecture or whatever it might be that we're doing, because our students brains will start to wander even if they are interested in the topic. It's just the way that the brain works. So considering this as well, whenever we're learning materials for the first time, we need to try to distribute our practice out and not just give our students a chance to practice it in one class period. Because while our brains will do well with it after a break for a few minutes to reconsider, and work through and process the material, and then go back to the lecture if we need to. If we just do that for one day, we don't follow that rule of making sure we touch it multiple times we have frequent review and we accumulate practice with the subject. And so how do you engage in court encouraged us to have multiple times that we come back to the material within a unit within a class so that we keep seeing linkages between the materials that we're discussing in one day and the stuff from previous days, and even start pointing towards how it's going to link up with information on the next day. The steps from short-term to long-term memory and learning are actually ones that surprised me the most. I think when I read this chapter, for the first time, when we get introduced to new information, we have just five to 20 seconds to get that information and start doing something with it before it starts disappearing into the ether. And while we might be familiar with the mention of it again, we won't be able to do anything with it. So our metacognition on that would be, I think I've heard that term, but I really don't know what it means. And that's okay. It just means that you need to keep remembering that you think you know that term, you don't know what it means, and you need to go back to it again. So as teachers, what this means is that we can't just mention a concept, a term or a theory and name, and then go on with our lecture, we need to stop and we need to take time to explain it and keep going over what it means and have our students practice with it. If we don't do this, then it starts disappearing. Again, if we can tie it to a student's prior knowledge, not just the prior knowledge of the class, but their prior experiences as well, we are even more likely to move that material to long term memory. Another concept that was discussed that's important to metacognition are the primacy and recency effects. This was new information for me, and I'm going to bet it's new information for you too. You probably already know what these effects are, you just didn't know the names for them, we're most likely to remember what we hear at the very beginning of a presentation or lecture and at the very end of a presentation or lecture, but the stuff in the middle gets kind of muddy. And part of that is because our attention span starts to wane after that 15 minute time slot. With that in mind had he initiates and a lot of other people have recommended that we break up our lectures into probably about 15 to 20 minute chunks at the most to allow more of those primacy and recency memory points. And where micro activities comes in is that we're going to stick those micro activities in the middle of these lectures where we break it up. And we're not going to ask about the things we talked about first and we're not going to ask it Other things we talked about last, we're going to touch on the things in the middle of the lecture to help our students pull those back into their recent memory and help them move it into long term memory. There are lots of books in addition to Hattie and Yates book that helped us to learn how we should use micro activities. And James Lang's Small Teaching is one of them. He broke his book into several chapters, each talking about a different type of activity that we can do with our students that works our memory in different ways to help us move things from short term to long term memory and retain and use that information better at later dates.

The ones that I like best practices of retrieval, predicting practice and interleaving, but the entire book is valuable. And the best thing about it is that he does call it small teaching for a reason. These are small practices, micro activities that we can put into place in our classes in order to break up our lectures and help students get the processing time and activity with the new concepts that they need. The micro activities that I like to focus on come from Moran's Mindful Moments Activities which is a list of 50 activities that she pulled together for a presentation at a psychology conference. She's a psychologist by discipline. And so the list of activities that you see in the supplement sheet all refer to psychology, but you can use them for any discipline, it's very easy to see how well most of them will transfer into your own discipline. She broke them into seven categories for us. And that way, we can start to see how we might want to use them. They are all meant to be very quick, hence why I call them micro activities. You can do them all in less than five minutes. But at the same time, if you wanted to spend more time on them, you can certainly develop them to be 10, 15 or even 30 minutes long. It's however you want to use them. But the important thing is that you're using them to the appropriate places in the appropriate ways remembering those concepts from Hattie and Yates, practicing multiple times in different ways, each time doing them across different class periods to help students tie in interleave the information together.

**Tierney King 16:48**

Whether you're driving to work, or you just need 15-minute think session, we hope the Faculty Focus Live podcast will inspire your teaching, and offer ideas that you can integrate into your own course. For more information on the resources included in this episode, please check out the links provided in the episode description.