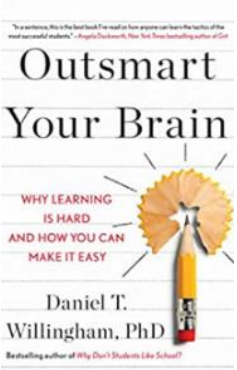
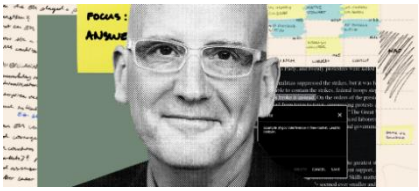
Why Studying Is So Hard, and What Teachers Can Do to Help

Beginning in the upper elementary grades, research-backed study skills should be woven into the curriculum, argues psychology professor Daniel Willingham in a new book.





By Laura McKenna
February 10, 2023

When psychology professors Angela Duckworth and Ethan Kross began working on a secondary school curriculum that merged the science of academic self-regulation and the latest research on student learning, they felt that a critical piece was missing: the development of good study habits.

“That’s when they called me and said: ‘Would you be interested in working on this project?’” says Daniel Willingham, a psychology professor at the University of Virginia specializing in neuroscience and education—with a focus on memory and learning—and author of the new book, *Outsmart Your Brain: Why Learning is Hard and How You Can Make It Easy*.

Once Willingham joined the team, developing and distributing a research-based study skills curriculum geared to middle and high school students, teachers began asking him for printed resources. “It would be great to have something written, something to put in our hands so that when you’re not here, we have another resource,” Willingham says, recounting a typical conversation with teachers. “I did a pretty exhaustive search of what was available on study skills, and I didn’t love any of them. There really was a need for something that’s up-to-date and comprehensive.”

The additional context for Willingham's new book is that students often don't know the best methods to study for tests, master complex texts, or take productive notes, and it's difficult to explain to them *why* they should take a different tack. In the book, Willingham debunks popular myths about the best study strategies, explains why they don't work, and recommends effective strategies that are based on the latest research in cognitive science.

I recently spoke to him about why listening to lectures isn't like watching a movie, how our self-monitoring of learning is often flawed and self-serving, and when it's too late to start teaching students good study skills.

McKenna: In the introduction to *Outsmart Your Brain*, you write that it's intended as a "user's guide to your brain that will allow you to fully exploit its learning potential." Part of your inspiration for writing it is based on your own experiences in classrooms, is that right?

Willingham: Yeah, absolutely. I started my professional life as a researcher, at the intersection of neuroscience and cognitive science, looking at questions in memory theory that were pretty technical.

As a professor, my students were coming to me because they were frustrated in my class, and things weren't going that well. I started to offer advice about trouble spots, but I was struck by the fact that their grades weren't getting any better. So I followed up and asked, "Okay, so we had that meeting. I suggested you do X, Y, and Z. Just be honest with me: Are you doing that? Does it feel like it's helping?"

And what I frequently heard was, "Yeah, I know you told me that. And I tried it, and it just seemed stupid. It didn't feel like it was working at all."

That's an aspect of memory that's so interesting and so puzzling: we have this self-monitoring where it feels like we know what's going on with our memory—but we frequently don't. What you're doing feels like it is working, feels natural and maybe somewhat effective, but it's not really the optimal way to perform that task.

McKenna: Why do we do that?

Willingham: Suppose that you've got a friend who wants to be able to do lots of pushups. So one day you watch him train and he's doing pushups on his knees, and you say, "Why are you doing pushups on your knees? If you want to be able to do a lot of pushups, you should be doing regular pushups. In fact, it's even better if you practice really difficult pushups, like the ones where you launch yourself off the floor and clap."

Then your friend says, "I want to be able to do a lot of pushups. But when I do those really hard ones, I can barely do any of them. But look, when I do pushups on my knees, I can do lots of them, and I can do them really fast!"

Students gravitate towards cognitive strategies that are the mental equivalent of pushups on your knees. It feels like things are going great, and it's also not that difficult, so it seems like a great strategy—but a more challenging approach will pay off more in the long run.

McKenna: What grade levels did you have in mind when you wrote the book?

Willingham: I was writing for high school students, and I would argue that some of these tasks really start in middle school or even upper elementary.

By the time children are in grade 12, our expectations are very high regarding independent learning. They're supposed to know how to resist distraction. If we send them home with complicated reading and they don't understand it, we expect them to be resourceful and try some things to comprehend it. They're supposed to be able to avoid procrastination and commit things to memory.

But the brain doesn't come with a user's manual, and independent learning calls for many separate skills. Once they're expected to read something and commit it to memory because there's going to be a quiz, for example, we need to be *teaching* them how to read hard texts and commit things to memory.

McKenna: Your first chapter is about lectures. In high school, what should students know about understanding lectures?

Willingham: I'll start with what they're likely to do and then explain why it's not optimal.

Students are likely to listen to a lecture the way they watch a movie: It’s a performance and their job is to pay attention. A movie is meant to be easy to understand, and you’re going to see Event A lead to Event B, which makes Event C happen, and so on. So it's all very straightforward to follow.

Lectures are not structured that way, they’re structured as a hierarchy, not a narrative. So if you envision a tree diagram in your mind, lectures typically have a main topic and between three and seven main conclusions.

Every lecture has facts and connections among those facts. The connections are very important to instructors: I don't just want you to know the details of the experiment, I want you to understand that there's a causal connection between those details and the conclusion of the experiment. But because these points are presented at different times in the lecture, it's hard for students to make those connections.

As the teacher, that hierarchy is in my head, but I can't lecture in a hierarchy—so it's up to the student to reconstruct the hierarchical organization. That's actually serious mental work. Once students understand the way lectures are structured, they can make headway on aligning the facts and understanding the teacher.

McKenna: Students often struggle to take good notes, ones that will actually help them study and recall information later. Why is that, and how can teachers help?

Willingham: Note taking is mostly a problem of pace; there's a lot of mental work that has to be completed.

You have to listen to content which is new to you—and usually quite complicated. You have to decide what's important enough to write down, and then decide how you're going to phrase it. You have to then either type it or physically write it out.

You're shifting attention between the instructor and your notes and visual aids. And crucially, you don't get to decide how quickly or slowly you do it. The teacher is setting the pace. So most students are in mental overload, so they cut corners.

Sometimes they just write down exactly what the teacher is saying. They think, “I actually don't even need to understand it right now. I'll understand it later, but right now I need to make sure I get all of these details.” The consequences of that are pretty predictable.

One piece of advice for students is that instead of trying to write down exactly what the instructor says, you should write down what *you're* thinking. That will ensure that the notes are actually serving the purpose. You're actually going to be listening, processing, and understanding, and that's going to help you remember better.

McKenna: You say that when students spend hours reviewing and highlighting their notes, it gives them the “illusion of mastery.” They really should be using different tools to study—like flashcards or Quizlet. Why?

Willingham: You need to actively engage with content for it to stick in memory. You need to think about what it actually means. Actively trying to retrieve things from memory is a good way to cement things into memory.

As a student, there are two things you want to do: You want to think about meaning, and you want to test yourself, not just to see whether or not you know the material, but actually as a way of committing things to memory.

This is where we go back to pushups on your knees versus pushups where you're launching yourself off the floor. Studying this way is mentally difficult. Thinking about what things mean is hard. Quizzing yourself is hard when you are still learning the content. It's unpleasant. It feels like it's not going very well as you're doing it, but it's really, really good for memory.

McKenna: And simply reading over notes—even good notes—just isn’t enough?

Willingham: We've all had the experience of reading something, but your eyes are just passing over the words and you get to the bottom of the page and you're like,

“Oh my God, I've been thinking about lunch. I have no idea what I just read.” So you can “read” something and not really think about what it means or cement information into memory.

Reading over notes may make content feel more familiar, but it won’t help students pull stuff out of memory and explain it to other people. Reading over your notes and re-reading the textbook is like a double whammy: It doesn't really support memory, but it makes you feel like you're learning.

McKenna: Students tend to cram the night before a big test—how effective is that?

Willingham: The research shows there is very rapid forgetting when students cram. The opposite of cramming is what's called distributed practice, where if you’ve got a quiz on Friday, you don't just study Thursday night. You're studying a little bit Monday, a little bit Tuesday, and so on. And doing that requires planning—and a lot of students are not very good with planning.

It's a steep ask for students to suggest that they don't cram, because they have the sense that it's effective. Refraining from cramming requires skills that a lot of them don't have.

Another problem with cramming is you might do okay on the test, but then you’re going to completely forget everything.

McKenna: You dedicate an entire chapter to focus. It’s pretty typical for students to do homework with their phones nearby, reading texts from friends and watching videos in the background. This probably isn’t an optimal way to do homework?

Willingham: The research is pretty clear on this: There's always a cost to multitasking.

This is, again, an instance where your brain is going to fool you. Most students think, “I'm just ignoring it; it’s background noise and doesn't affect my ability to get my work done.” But we know from experiments, that's not the case. Demanding tasks, like texting your friend, have huge costs.

For listening to music, the story is a little more complicated. It turns out that music has two effects simultaneously that conflict with one another. On the one hand, music distracts you just like all the other content, but music is also arousing. It leads to autonomic nervous system activity. There's an increase in your heart rate and you feel a little more pep. Whether it ends up helping or hurting academic work depends on a bunch of things, including how hard the work is, how energetic you are feeling, and how motivated you are to work.

McKenna: Starting in middle school, kids are expected to read increasingly complex texts—often without much reading support built into the curriculum. How can teachers prepare students to manage tougher reading and really comprehend it?

Willingham: Readings, like lectures, are structured hierarchically. Students tend to have reading habits that were groomed by reading narratives, but textbook chapters with very complex material are organized hierarchically.

You need to apply some strategies when you are engaged in this type of reading. SQ3R is probably the best known, but if you look at the research literature, there's not one strategy that's superior to others.

There are two common threads that are effective. You should do some preparation before you plunge in. Look at the headings and subheadings and generate some questions. What is this going to be about? What am I likely to learn from this? What questions can I expect will be answered by the time I'm done reading this?

Also, make sure you're mentally engaging: You're thinking about, comparing, and connecting the ideas. You're not just slogging through sentence by sentence; you're actually trying to make sense of the whole.

Then, if you've generated questions, as you read you can be looking for answers. Students should be asking themselves: Did I ask good questions? Did my prediction turn out to be wrong?

And students, of course, don't just sit and read, they also have a highlighter in their hand.

McKenna: Right, there’s a lot of research about how students use highlighting for studying.

Willingham: Generally, the evidence on highlighting is that it’s not very effective if you are a beginner and it’s your first time through unfamiliar content. You probably don't have the background and expertise to select the important ideas for highlighting. Students usually highlight a bunch of stuff, but it's not necessarily the most important ideas.

Highlighting makes sense if you've got a lot of background and expertise. For example, if you're an experienced teacher reading a book about teaching, you can highlight with fair confidence because your understanding of the text is going to be quite deep.

But if you're an absolute novice in the topic of the book, there's no reason to be confident that you're highlighting the right thing.

McKenna: Do you think we should be doing a better job in middle and high school teaching students about studying and learning? Should there be standalone classes on study skills, for example?

Willingham: When you ask students why they study a certain way, their answer is usually “I just sort of figured it out on my own” or they got some advice from YouTube or a friend. They’re not taking study skill classes in high school and they’re not using optimal strategies.

You could do a standalone class, but I think it makes much more sense to weave study skills into the curriculum. And high school is probably late to be doing that anyway.

I think of it in terms of: in what ways are they being asked to be independent in fourth grade? How does that increase in grades five, six, and so on? As you watch the demands for independent learning increase—support that with instruction.

So, rather than a standalone study skills class, right when you start placing greater demands on students, teach them *how* to meet those demands.