

LEARN

like a Pro

Science-Based
Tools to Become Better
at Anything

DR. BARBARA OAKLEY
and **OLAV SCHEWE**



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NEW YORK

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To Our Readers

Do you spend too much time learning with disappointing results? Do you find it difficult to remember what you read? Do you put off studying because it's boring and you're easily distracted?

This book is for you.

We're Olav Schewe and Barb Oakley, and both of us have struggled in the past with our learning. But we have found techniques to help us master material—*any* material. Building on insights from neuroscience and cognitive psychology, we will give you a crash course to improve your ability to learn, whether you're studying math, language, coding, karate, cooking, or anything else. You'll see *why* the strategies work because you'll see what's happening in the brain when you use them. No, this isn't a little book of miracles. But you will find that reducing frustration and improving your study success may sometimes feel miraculous.

In Olav's case, he always wanted to get good grades, but he couldn't, no matter how hard he studied. He almost gave up on his dreams, thinking he wasn't smart enough. But then he discovered that the key to better grades wasn't his own innate abilities, or the number of hours he put in—instead, it was *how* he studied. After he took a step back in his teens and made some adjustments in his learning techniques, he began to excel.

In the end, Olav, the former “slow” student with average grades, became the top student in his high school class. He went on to get a master's with distinction in business administration from the University of Oxford. And his book on how to study effectively, *Super Student*, became an international best seller—translated into more than a dozen different languages.

As for Barb, she flunked math and science all the way through high school. She was convinced she didn't have “the math gene.” In her later twenties, however, she decided to start all over again with math, beginning with remedial high school algebra. Slowly, she improved in math and science. By applying powerful study methods learned during her language study at the United States Defense Language Institute, she succeeded. She's now a professor of engineering—she also teaches millions of students around the world in online courses such as “Learn like a Pro” and “Learning How to Learn,” which is one of the world's largest massive open online courses. This goes to show that even when you believe you're genetically incapable of succeeding at a subject, that doesn't need to be true at all.

You might think, “I am terrible with numbers,” or “I can't learn languages,” or “I can't speak in front of crowds,” when the reality is that you simply haven't learned how to do those things—*yet*. Instead, if you change your focus to finding techniques and methods for learning, you'll find that this little book puts marvelous insights at your fingertips. You'll find new solutions, often based on recent neuroscientific findings, that will allow you to move mental mountains and do what you never thought you could do.

Through their decades of writing, teaching, and research on learning, Olav and Barb have developed deep connections with experts from a vast array of disciplines. What you'll find in this little book are the very best of practical learning tools and insights synthesized from research in neuroscience, cognitive psychology, education, and many other fields. And it's all honed with feedback from hundreds of pro learners, many of

whom themselves have gone through the trenches of learning difficult concepts and skills. Pro learners gradually add tools and techniques to their mental toolbox, and discover how to think more critically about their learning. That allows these learners to make the best use of their brains, whether those brains seem “naturally” geared toward learning or not.

This book will help you join the pro learning club. Welcome aboard!

How to Focus Intently and Beat Procrastination

You're reading this book because, no matter what you're trying to learn, you want to make sure every minute of your studies counts. So let us start by giving you one of the simplest, most powerful mental tools in the world of study: the Pomodoro Technique.* This clever method will definitely help boost your concentration—we know this from research. Even if you already know the Pomodoro, you'll discover modern twists that can make the Pomodoro even more powerful. And there's much more in the chapters ahead that will be new to you!

The Pomodoro Technique

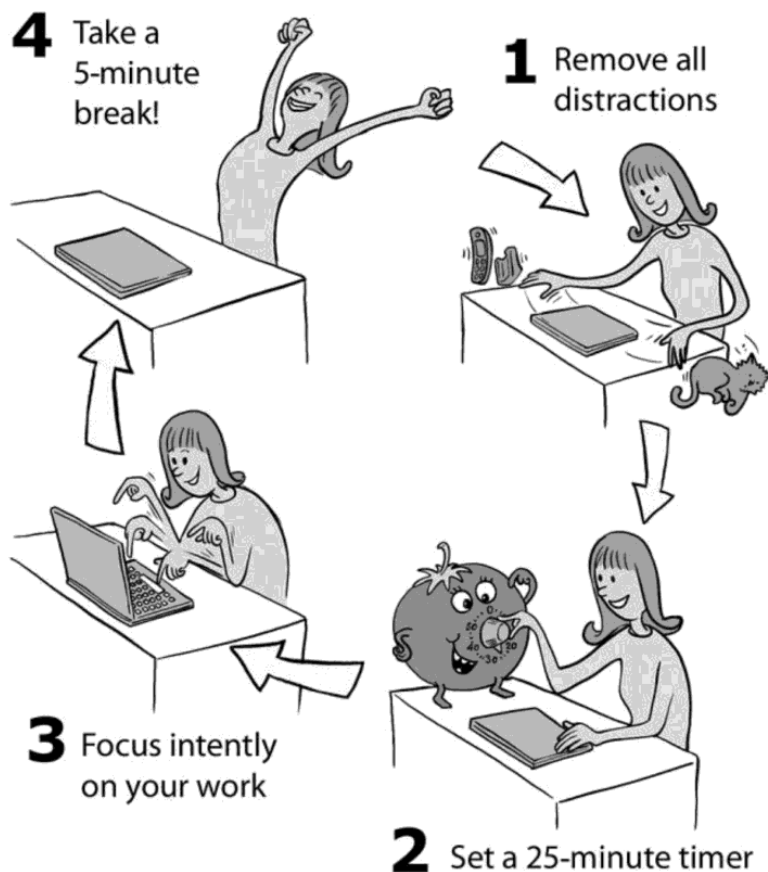
Use this approach to structure your study sessions:

1. **Sit down where you'll be studying or working and remove any possible distractors.** This means ensuring there are no pop-ups or extraneous open tabs on your computer, dings from your cell phone, or anything else that could draw you off-task.
2. **Set a timer for 25 minutes.** You can use a mechanical or silent digital timer. You can also use the timer or an app on your phone. If you use your phone, place it out of sight and beyond arm's reach so you won't be distracted while focusing.
3. **Dive in and study or work as intently as you can** for those 25 minutes. If your mind wanders (as it inevitably will), just bring your attention back to the task at hand. Most things can wait or be postponed for 25 minutes. If distracting thoughts come up that you feel like you should act on, write them down in a to-do list so you can tackle them after the Pomodoro session is over.
4. **Reward yourself** for about 5 minutes at the end of the Pomodoro session. Listen to your favorite song, close your eyes and relax, go for a walk, make a cup of tea, cuddle with your dog or cat—anything to let your mind comfortably flow free. It's also best to avoid checking your cell phone or email during this break time—more on why later.
5. **Repeat** as appropriate. If you want to study for 2 hours, you can do four Pomodoros with the break lasting roughly 5 minutes each time. If you have trouble getting yourself back to work when the break is done, set a timer for the break as

well.

POPULAR POMODORO APPS

- focus booster (PC)
 - PomoDone
 - Forest
 - Toggl
-



The Pomodoro Technique in four easy steps.

Sounds easy, doesn't it? It is easy. Sometimes your mind may struggle while doing a Pomodoro, but the reality is almost anyone can keep their focus for 25 minutes.

Why the Pomodoro Technique Works

You might wonder how something so simple can be so powerful. The reason is that the Pomodoro Technique captures important aspects of how your brain learns.

- Pomodoro-fueled bursts of focused attention give your brain practice in focusing without disruption, which is much needed in today's distraction-ridden mobile phone world.¹
- Short mental breaks where you get away from focusing are ideal to allow you to transfer what you've just learned into long-term memory, clearing your mind for new learning.² You can't feel this process taking place, which is why you might tend to skip it—but *don't skip it!*

- Anticipation of a reward keeps you motivated throughout the Pomodoro.
- It's much easier to commit and recommit yourself to short bursts of dedicated study than to seemingly endless sessions.
- Your studies begin a pattern of focusing on the *process*—putting in certain amounts of dedicated time—rather than the *goal* or *outcome*. In the long run, having a good process in place is much more important than any one individual session or goal.
- When you even just think about something you don't like or don't want to do, it activates the insular cortex, causing a “pain in the brain.” This pain diminishes after about 20 minutes of focus on the activity.³ Twenty-five minutes is therefore perfect to get you into study mode.

The Pomodoro Technique is highly adaptable. If you get into the flow and find yourself wanting to continue past 25 minutes, that's okay. The length of the reward period is also flexible and can be longer than 5 minutes if your Pomodoro has gone longer than the usual 25 minutes. Just don't forget that taking a mental break is important. One analysis of data from a time-recording app found that highly productive workers work for an average of 52 minutes with a 17-minute break.⁴ The key was that when these superstar workers focused, they *focused*, and when they took a break, they really took a break.

If you have nothing else to do once you've finished your Pomodoro, good. But if you have still more work to do, take a 5-minute break (set a “break” timer if you need to), then start the next Pomodoro. If you're doing a series of Pomodoros, try taking a longer, 10- to 15-minute break after every third or fourth Pomodoro you complete.

If you use the Pomodoro method to study new material, it's also wise to **spend at least some minutes of the Pomodoro looking away from what you're studying and trying to recall what you have just learned**. As you will see in chapter 3, *recall* (also called “*retrieval practice*”) is one of the most powerful ways to both remember and understand new information.

Avoid Your Mobile Phone During Learning Breaks

Research by professors Sanghoon Kang and Terri Kurtzberg from Rutgers Business School has revealed that **using a mobile phone for a break does not allow your brain to recharge as effectively as the other types of breaks**.⁵ They note: “As people are increasingly addicted to their cell phones, it is important to know the unintended costs associated with reaching for this device every spare minute. Although people may assume that it is not different from any other kind of interaction or break, this study shows that the phone might be more cognitively taxing than expected.”

Mobile phones are also particularly distracting if you happen to be in face-to-face training or classes. One study found that “Students who were not using their mobile phones wrote down 62% more information in their notes, were able to recall more detailed information from the lecture, and scored a full letter grade and a half higher on a multiple choice test than students who actively used their mobile phones.”⁶ Even just having your phone near you while you're studying can be distracting—your brain is still tracking it if it knows it's close at hand.⁷

If you feel anxious without a phone, researchers have found you'll still be better off with the phone out of reach.⁸ Leave your phone in a backpack, briefcase, or purse, or even back in the car. You'll be shocked at how much your focus improves.

Be Wary of Multitasking When Studying

Whenever you switch your focus to a new task, you activate information stored in your brain related to the new task.⁹ When you then switch to a different task, for example, when checking your email or a text message, you activate a different set of information. This leaves what's called an *attention residue*—some leftover attention from your previous task that means your attention isn't fully on the new task. Frequent task-switching increases susceptibility to distraction, causes more errors, slows work, makes writing worse, diminishes learning, and causes forgetting. In short, it's bad news. One study by researchers at the University of Michigan found that cognitive performance fell by 30 to 40 percent when participants switched between tasks instead of completing one task before moving to the next.*¹⁰ This is part of the magic of the Pomodoro Technique—it allows you to focus on *one* task without the interruptions that can cause you to multitask.

However, although researchers have focused on the dark side of multitasking, there is a brighter side—creativity. When you are focused on a task, you can become cognitively fixed on it. This reduces your ability to step back and take another approach or perspective. It seems that task-switching reduces cognitive fixation.¹¹ The question then arises, how often should you task-switch? There are no easy answers, because it depends so much on the task and how often you might get cognitively “stuck.”

Earmuffs can be one of the best tools around to help you maintain focus. We recommend the 31 dB Peltor earmuffs (although large, they are virtually screaming-baby-proof) over more slender noise-canceling earmuffs.

If, on any particular day, you find yourself going off-task so often that your work is suffering, we recommend that you use the Pomodoro Technique. This will keep you on task. But if you're making good progress in your study session despite a few occasional peeks at something different, especially when you feel a bit stuck in your problem-solving or writing, you're probably doing just fine.

Set Up a Distraction-Free Environment

Taking occasional peeks at a distraction is one thing, but to avoid being frequently drawn completely off-task, you want to **find a place to study where distractions are eliminated or minimized**. Learning specialists recommend avoiding study in rooms where your friends or colleagues socialize—for example, a college dorm room or student or employee cafeteria. There can be too many interruptions. A quiet library or an isolated location can be ideal. If you have to work in noisy environments, **earplugs, earmuffs, or noise-canceling headphones can be invaluable**. The nice thing about headphones is that they also send a “do not disturb” signal to others.

Some of the worst distractions are notifications from your computer and phone, especially because you can become compulsive about checking them. You can be pulled off-task even when you aren't cognitively stuck. One study showed that people on average checked for messages every 35 seconds when messenger apps were left open.¹² On a brighter note, however, business employees who had their access to nonessential websites blocked for a week reported both deeper focused immersion and higher productivity.¹³

POPULAR WEBSITE BLOCKERS

- Freedom
 - FocalFilter (Windows)
 - SelfControl (Mac)
 - StayFocusd (Chrome)
-

Do a sweep through the notifications settings on your devices and disable audible, visible, and vibrating alerts. “Do not disturb” mode may help. Use the Pomodoro Technique to keep you away from the internet or other distractions, or install a website blocker. Don’t pity yourself that you live in a modern social media era where it’s harder to get away from distractions. Even back in the mid-1800s, legend has it that novelist Victor Hugo, author of *Les Misérables* and *The Hunchback of Notre-Dame*, had his servant lock him naked in his study with a pen and paper to keep him from the distractions that beckoned. (You’d think his books would have been shorter as a result.) Distractions are always going to be around—it’s our job to figure out our own best ways to combat them.

Create a Ready-to-Resume Plan When an Unavoidable Interruption Comes Up

If you are interrupted by something or someone unavoidable, take a few seconds to mentally note where you are in your current task, and how you’ll return to that task. This can be as simple as noting that you were three-quarters of the way down the page you were reading, and that’s where you’ll return your gaze when you finish the interruption.

This ready-to-resume plan reduces attention residue that can disrupt the new task. How? It provides the closure the brain is looking for—even if the closure is only temporary. A sense of temporary completeness allows you to fully engage in the interrupting task, even while it allows you to return to the original task more easily later.¹⁴

Take Frequent Brief Breaks

We already mentioned that the mental break part of the Pomodoro Technique is critically important. Too prolonged a focus doesn’t give your brain time to offload the new material you’re learning into long-term memory.¹⁵ Your studying becomes less effective. In addition, specific areas of the brain can tire when you use them for a long time. Although researchers still don’t know why, it’s thought that just as muscles will tire from exercise, so can the brain tire from use, so-called “cognitive exhaustion.”¹⁶

Short (5- to 10-minute) breaks involving complete mental relaxation—no internet, no texting, no reading, nothing at all—are the best for enhancing what you’ve just learned, because the new information can settle without interference.¹⁷ This means you’re not being lazy if you want to take a short nap or just do nothing—instead, you’re being efficient.²⁰

HOW MANY HOURS SHOULD YOU STUDY PER DAY IN COLLEGE?

If you’re a college student, we recommend that you study between 2 and 8 hours per weekday (in addition to classes), depending on your ambition and the rigor of your study program. The gold

standard of study time is set by medical students with A grades. Above and beyond the hours they spend in classes, medical students generally study an average of 6 to 8 hours a day—studying more than 8 didn't improve grades. B and C medical students are more likely to study 3 to 5 hours a day.¹⁸ The average engineering student studies about 3 hours a day, while social science and business students average 2 hours daily.¹⁹ (Barb found herself studying engineering 6 to 8 hours a day, even though she generally took a slightly lighter than average course load. But this allowed her to earn A grades.)

Breaks that involve something physical, like going for a walk or jog, or even just getting up for a cup of tea, are always a good idea. Part of the reason that breaks where you move around may be so valuable may simply be that you aren't thinking so much. Another reason is that movement and exercise themselves are helpful for the learning process—more on that later.

Music and Binaural Beats

Music seems to slow down learning for most students, especially in math.²¹ You may feel better studying to music, and feel you can study longer. But that's because when you're listening to music, part of your attention is following the tune so you aren't working as hard as you could be. Music can also lead to multitasking as you switch between work and fiddling with your playlist. If you are getting good grades or evaluations for what you're learning, you're probably fine to listen to music. But if your feedback isn't what you'd like, or you're struggling to make headway with the material, we'd suggest backing away from music. There are hints, however, that those with attentional disorders may benefit from studying to music.²²

Incidentally, there is a music-related phenomenon called “binaural beats.” By wearing stereo headphones, the right and left ears can be supplied with two slightly different frequency tones—for example, 300 Hz and 320 Hz. Surprisingly, a person hears not only the original two tones, but also a third frequency—the difference between those two frequencies. In this case, the difference would be 20 Hz—called the “beat” frequency.

Researchers first became aware of binaural beats when they were investigating how the brain locates sounds.²³ Beginning in the 1970s, people began to explore possible changes in consciousness produced when the beats might shift, or entrain, brain activity toward the beat frequency. Most uses of binaural beats today are by regular people who download audio materials from various online sources to help them focus, remember, relax, or meditate. Since the beats can have a bland, monotonous sound, they are often embedded in music or pink noise.

You can explore studying to binaural beats, but be aware that the observed positive effects, at least in the baseline studies, are modest.²⁴ And despite their claims, online sources for binaural beats can be of questionable legitimacy. Finally, research suggests that the effect of binaural beats on focus might be canceled by the effects of the music they might be embedded in.

Meditation and Yoga

Meditation has been suggested as a method for building focus. Overall, there are two general types of meditation—focused types, such as mantra meditation, and open monitoring types, such as mindfulness. Mantra-type meditation may provide more direct practice in building focus, although effects generally become apparent after weeks or months. Open monitoring-type meditation may help cognition indirectly, by improving mood. A challenge is that many past studies on meditation didn't follow

image

not

available

- facilitates goal inference and contagion." *Journal of Experimental Social Psychology* 43, no. 5 (2007): 727–37.
- Doran, George T.** "There's a SMART way to write management's goals and objectives." *Management Review* 70, no. 11 (1981): 35–36.
- Duckworth, Angela L., et al.** "Self-control and academic achievement." *Annual Review of Psychology* 70, no. 1 (2019): 373–99.
- Duckworth, Angela Lee, et al.** "Self-regulation strategies improve self-discipline in adolescents: Benefits of mental contrasting and implementation intentions." *Educational Psychology* 31, no. 1 (2011): 17–26.
- Dunlosky, John, et al.** "Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology." *Psychological Science in the Public Interest* 14, no. 1 (2013): 4–58.
- Ericsson, K. Anders, and Robert Pool.** *Peak: Secrets from the New Science of Expertise*. Boston, MA: Eamon Dolan/Houghton Mifflin Harcourt, 2016.
- Fiebig, Florian, and Anders Lansner.** "Memory consolidation from seconds to weeks: A three-stage neural network model with autonomous reinstatement dynamics." *Frontiers in Computational Neuroscience* 8 (2014): Art. No. 64, 1–17.
- Fox, M. D., et al.** "The human brain is intrinsically organized into dynamic, anticorrelated functional networks." *PNAS* 102 (2005): 9673–78.
- Garcia-Argibay, Miguel, et al.** "Efficacy of binaural auditory beats in cognition, anxiety, and pain perception: A meta-analysis." *Psychological Research* 83, no. 2 (2019): 357–72.
- Garrison, Kathleen A., et al.** "Meditation leads to reduced default mode network activity beyond an active task." *Cognitive, Affective, & Behavioral Neuroscience* 15, no. 3 (2015): 712–20.
- Geng, J., et al.** *Cochrane Database of Systematic Reviews*, no. 12 (2010): Art. No. CD007769.
- Gervain, Judit, et al.** "Valproate reopens critical-period learning of absolute pitch." *Frontiers in Systems Neuroscience* 7, no. 102 (2013): Art. No. 102.
- Ghosh, VE, and Gilboa, A.** "What is a memory schema? A historical perspective on current neuroscience literature." *Neuropsychologia* 53, (2014): 104–114.
- Glade, M. J.** "Caffeine—Not just a stimulant." *Nutrition* 26, no. 10 (2010): 932–38.
- Gothe, Neha P., et al.** "Yoga effects on brain health: A systematic review of the current literature." *Brain Plasticity* 5, no. 1 (2019): 105–22.
- Handel, David.** "How to unlock the amazing power of your brain and become a top student." *Medium* (2019). <https://medium.com/better-humans/how-to-unlock-the-amazing-power-of-your-brain-and-become-a-top-student-369e5ba59484>.
- Harvard Medical School.** "Blue light has a dark side." *Harvard Health Letter* (2012, updated 2018). <https://www.health.harvard.edu/staying-healthy/blue-light-has-a-dark-side>.
- Haskell, C. F., et al.** "Behavioural effects of compounds co-consumed in dietary forms of caffeinated plants." *Nutrition Research Reviews* 26, no. 1 (2013): 49–70.
- Heisz, J. J., et al.** "The effects of physical exercise and cognitive training on memory and neurotrophic factors." *Journal of Cognitive Neuroscience* 29, no. 11 (2017): 1895–907.
- Himmer, L., et al.** "Rehearsal initiates systems memory consolidation, sleep makes it last." *Science Advances* 5, no. 4 (2019): eaav1695.
- Hofmann, Wilhelm, et al.** "Yes, but are they happy? Effects of trait self-control on affective well-being and life satisfaction." *Journal of Personality* 82, no. 4 (2014): 265–77.
- Hruby, George G., and Usha Goswami.** "Neuroscience and reading: A review for reading education researchers." *Reading Research Quarterly* 46, (2011): 156–72.
- Hughes, Nicola, and Jolanta Burke.** "Sleeping with the frenemy: How restricting 'bedroom use' of smartphones impacts happiness and wellbeing." *Computers in Human Behavior* 85, (2018): 236–44.
- Hulleman, Chris S., et al.** "Enhancing interest and performance with a utility value intervention." *Journal of Educational Psychology* 102, no. 4 (2010): 880–95.
- Jansen, Renée S., et al.** "An integrative review of the cognitive costs and benefits of note-taking." *Educational Research Review* 22 (2017): 223–33.
- Jenkins, E. M., et al.** "Do stair climbing exercise 'snacks' improve cardiorespiratory fitness?" *Applied Physiology, Nutrition, and Metabolism* 44, no. 6 (2019): 681–84.
- Josselyn, Sheena A., and Paul W. Frankland.** "Memory allocation: Mechanisms and function." *Annual Review of Neuroscience* 41, no. 1 (2018): 389–413.
- Jwa, Anita.** "DIY tDCS: A need for an empirical look." *Journal of Responsible Innovation* 5, no. 1 (2018): 103–8.
- Kang, S., and T. R. Kurtzberg.** "Reach for your cell phone at your own risk: The cognitive costs of media choice for breaks." *Journal of Behavioral Addictions* 8, no. 3 (2019): 395–403.
- Kapadia, Chaitali, and Shimul Melwani.** "More tasks, more ideas: The positive spillover effects of multitasking on subsequent creativity." *Journal of Applied Psychology* (2020): Advance publication online.
- Karpicke, J. D., and J. R. Blunt.** "Retrieval practice produces more learning than elaborative studying with concept mapping." *Science* 331, no. 6018 (2011): 772–75.
- Karpicke, Jeffrey D.** "Retrieval-based learning: Active retrieval promotes meaningful learning." *Current Directions in Psychological Science* 21, no. 3 (2012): 157–63.
- Kiewra, Kenneth A., et al.** "Note-taking functions and techniques." *Journal of Educational Psychology* 83, no. 2 (1991): 240–45.
- Kornell, Nate, and Robert A. Bjork.** "Learning concepts and categories: Is spacing the 'enemy of induction'?" *Psychological Science* 19, no. 6 (2008): 585–92.
- Kornell, Nate, Matthew J. Hays, and Robert A. Bjork.** "Unsuccessful retrieval attempts enhance subsequent learning." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 35, no. 4 (2009): 989–98.
- Kühn, Simone, et al.** "The importance of the default mode network in creativity— a structural MRI study." *Journal of Creative Behavior* 48, no. 2 (2014): 152–63.
- Kuznekoff, Jeffrey H., and Scott Titsworth.** "The impact of mobile phone usage on student learning." *Communication Education* 62, no. 3 (2013): 233–52.
- Lally, Philippa, et al.** "How are habits formed: Modelling habit formation in the real world." *European Journal of*

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