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EDUCATION LIFE

Learning to Learn: You, Too, Can Rewire Your Brain

By JOHN SCHWARTZ AUG. 4, 2017

The studio for what is arguably the world's most successful online course is tucked into a corner of Barb and Phil Oakley's basement, a converted TV room that smells faintly of cat urine. (At the end of every video session, the Oakleys pin up the green fabric that serves as the backdrop so Fluffy doesn't ruin it.)

This is where they put together "Learning How to Learn," taken by more than 1.8 million students from 200 countries, the most ever on Coursera. The course provides practical advice on tackling daunting subjects and on beating procrastination, and the lessons engagingly blend neuroscience and common sense.

Dr. Oakley, an engineering professor at Oakland University in Rochester, Mich., created the class with Terrence Sejnowski, a neuroscientist at the Salk Institute for Biological Studies, and with the University of California, San Diego.

Prestigious universities have spent millions and employ hundreds of professionally trained videographers, editors and producers to create their massive open online courses, known as MOOCs. The Oakleys put together their studio with equipment that cost $5,000. They figured out what to buy by Googling "how to set up a green screen studio" and "how to set up studio lighting." Mr. Oakley runs the camera and teleprompter. She does most of the editing. The course is free ($49 for a certificate of completion — Coursera won't divulge how many finish).

"It's actually not rocket science," said Dr. Oakley — but she's careful where she says that these days. When she spoke at Harvard in 2015, she said, "the hackles went up"; she crossed her arms sternly by way of grim illustration.

This is home-brew, not Harvard. And it has worked. Spectacularly. The Oakleys never could have predicted their success. Many of the early sessions had to be trashed. "I looked like a deer in the headlights," Dr. Oakley said. She would flub her lines and moan, "I just can't do this." Her husband would say, "Come on. We're going to have lunch, and we're going to come right back to this." But he confessed to having had doubts, too. "We were in the basement, worrying, 'Is anybody even going to look at this?'"

Dr. Oakley is not the only person teaching students how to use tools drawn from neuroscience to enhance learning. But her popularity is a testament to her skill at presenting the material, and also to the course's message of hope. Many of her online students are 25 to 44 years old, likely to be facing career changes in an unforgiving economy and seeking better ways to climb new learning curves.

Dr. Oakley's lessons are rich in metaphor, which she knows helps get complex ideas across. The practice is rooted in the theory of neural reuse, which states that metaphors use the same neural circuits in the brain as the underlying concept does, so the metaphor brings difficult concepts "more rapidly on board," as she puts it.

She illustrates her concepts with goofy animations: There are surfing zombies, metabolic vampires and an "octopus of attention." Hammy editing tricks may have Dr. Oakley moving out of the frame to the right and popping up on the left, or cringing away from an animated, disembodied head that she has put on the screen to discuss a property of the brain.

Sitting in the Oakleys' comfortable living room, with its solid Mission furniture and mementos of their world travels, Dr. Oakley said she believes that just about anyone can train himself to learn. "Students may look at math, for example, and say, 'I can't figure this out — it must mean I'm really stupid!' They don't know how their brain works."

Her own feelings of inadequacy give her empathy for students who feel hopeless. “I know the hiccups and the troubles people have when they’re trying to learn something.” After all, she was her own lab rat. “I rewired my brain,” she said, “and it wasn’t easy.”

As a youngster, she was not a diligent student. “I flunked my way through elementary, middle school and high school math and science,” she said. She joined the Army out of high school to help pay for college and received extensive training in Russian at the Defense Language Institute. Once out, she realized she would have a better career path with a technical degree (specifically, electrical engineering), and set out to tackle math and science, training herself to grind through technical subjects with many of the techniques of practice and repetition that she had used to let Russian vocabulary and declension soak in.

Along the way, she met Philip Oakley — in, of all places, Antarctica. It was 1983, and she was working as a radio operator at the Amundsen-Scott South Pole Station. (She has also worked as a translator on a Russian trawler. She’s been around.) Mr. Oakley managed the garage at the station, keeping machinery working under some of the planet’s most punishing conditions.

She had noticed him largely because, unlike so many men at the lonely pole, he hadn’t made any moves on her. “You can be ugly as a toad out there and you are the most popular girl,” she said. She found him “comfortably confident.” After he left a party without even saying hello, she told a friend she’d like to get to know him better. The next day, he was waiting for her at breakfast with a big smile on his face. Three weeks later, on New Year’s Eve, he walked her over to the true South Pole and proposed at the stroke of midnight. A few weeks after that, they were “off the ice” in New Zealand and got married.

Dr. Oakley recounts her journey in both of her best-selling books: “A Mind for Numbers: How to Excel at Math and Science (Even if You Flunked Algebra)” and, out this past spring, “Mindshift: Break Through Obstacles to Learning and Discover Your Hidden Potential.” The new book is about learning new skills, with a focus on career switchers. And yes, she has a MOOC for that, too.

Dr. Oakley is already planning her next book, another guide to learning how to learn but aimed at 10- to 13-year-olds. She wants to tell them, “Even if you are not a superstar learner, here’s how to see the great aspects of what you do have.” She would like to see learning clubs in school to help young people develop the skills they need. “We have chess clubs, we have art clubs,” she said. “We don’t have learning clubs. I just think that teaching kids how to learn is one of the greatest things we can possibly do.”

Four Techniques to Help You Learn

FOCUS/DON’T The brain has two modes of thinking that Dr. Oakley simplifies as “focused,” in which learners concentrate on the material, and “diffuse,” a neural resting state in which consolidation occurs — that is, the new information can settle into the brain. (Cognitive scientists talk about task-positive networks and default-mode networks, respectively, in describing the two states.) In diffuse mode, connections between bits of information, and unexpected insights, can occur. That’s why it’s helpful to take a brief break after a burst of focused work.

TAKE A BREAK To accomplish those periods of focused and diffuse-mode thinking, Dr. Oakley recommends what is known as the Pomodoro Technique, developed by one Francesco Cirillo. Set a kitchen timer for a 25-minute stretch of focused work, followed by a brief reward, which includes a break for diffuse reflection. (“Pomodoro” is Italian for tomato — some timers look like tomatoes.) The reward — listening to a song, taking a walk, anything to enter a relaxed state — takes your mind off the task at hand. Precisely because you’re not thinking about the task, the brain can subconsciously consolidate the new knowledge. Dr. Oakley compares this process to “a librarian filing books away on shelves for later retrieval.”

As a bonus, the ritual of setting the timer can also help overcome procrastination. Dr. Oakley teaches that even thinking about doing things we dislike activates the pain centers of the brain. The Pomodoro Technique, she said, “helps the mind slip into focus and begin work without thinking about the work.”

“Virtually anyone can focus for 25 minutes, and the more you practice, the easier it gets.”

PRACTICE "Chunking" is the process of creating a neural pattern that can be reactivated when needed. It might be an equation or a phrase in French or a guitar chord. Research shows that having a mental library of well-practiced neural chunks is necessary for developing expertise.

Practice brings procedural fluency, says Dr. Oakley, who compares the process to backing up a car. "When you first are learning to back up, your working memory is overwhelmed with input." In time, "you don't even need to think more than 'Hey, back up,' " and the mind is free to think about other things.

Chunks build on chunks, and, she says, the neural network built upon that knowledge grows bigger. "You remember longer bits of music, for example, or more complex phrases in French." Mastering low-level math concepts allows tackling more complex mental acrobatics. "You can easily bring them to mind even while your active focus is grappling with newer, more difficult information."

KNOW THYSELF Dr. Oakley urges her students to understand that people learn in different ways. Those who have "racecar brains" snap up information; those with "hiker brains" take longer to assimilate information but, like a hiker, perceive more details along the way. Recognizing the advantages and disadvantages, she says, is the first step in learning how to approach unfamiliar material.

John Schwartz is a staff writer at The Times.

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