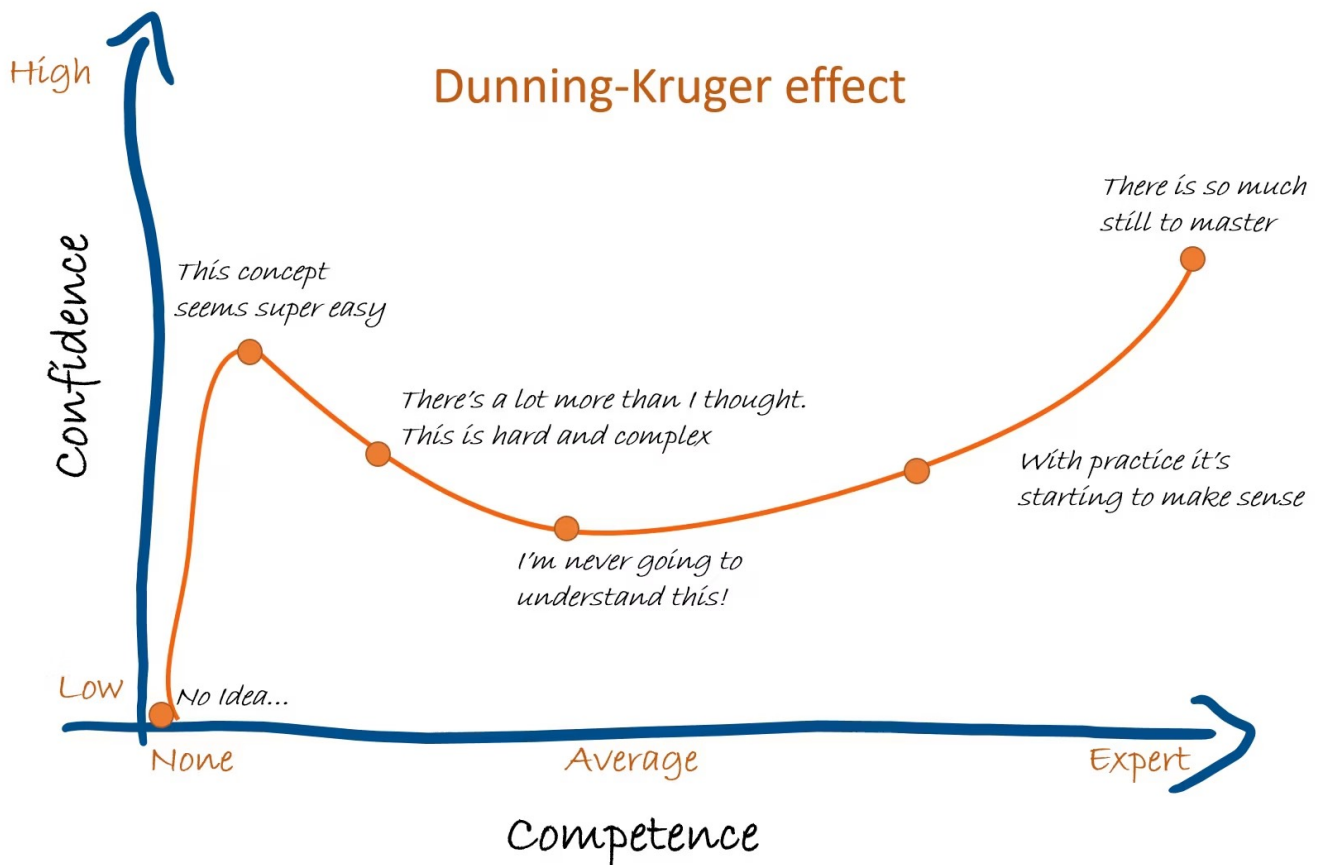
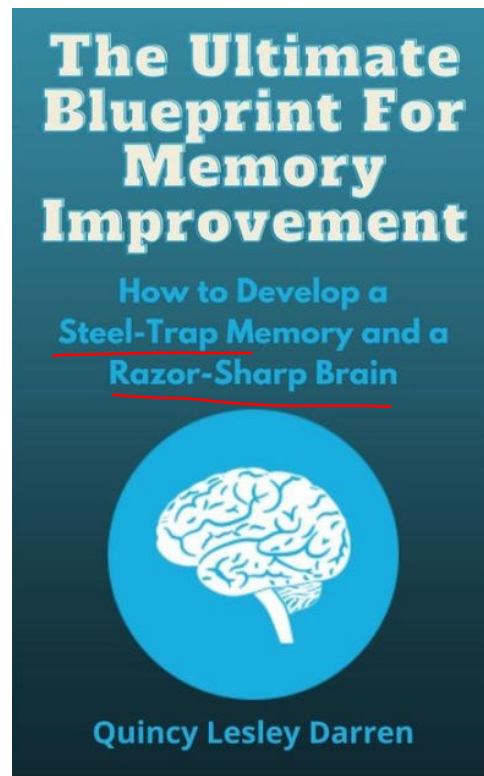
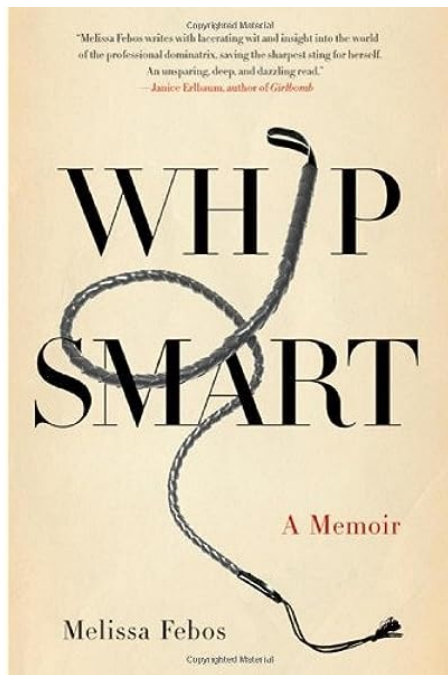
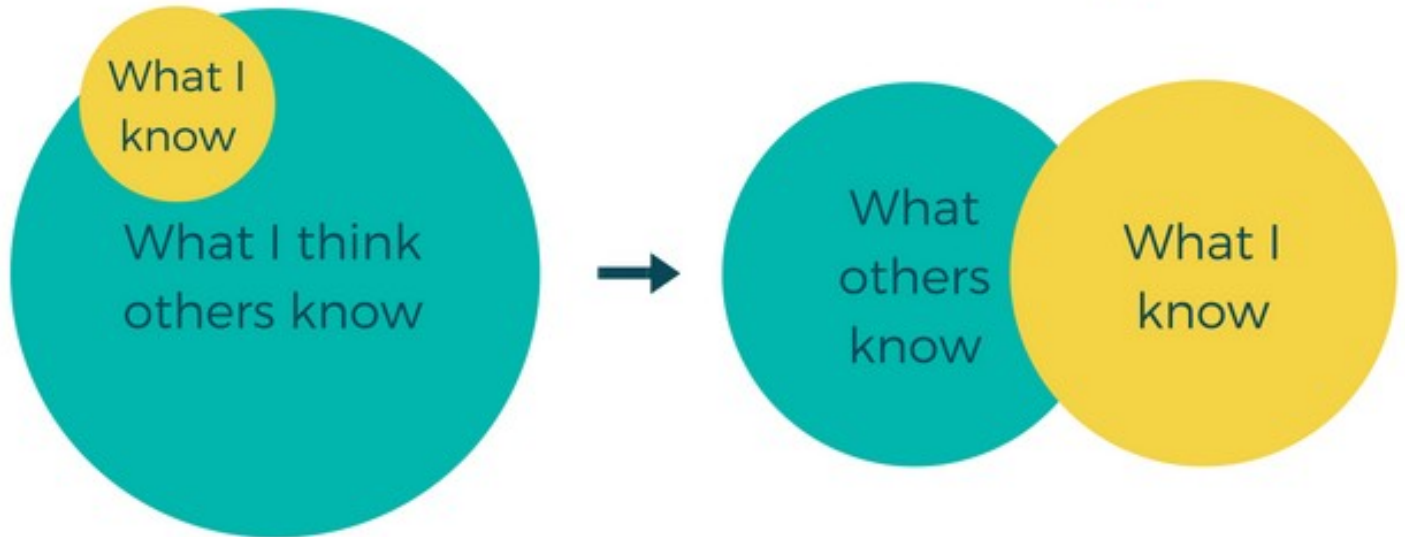




The Imposter Syndrome

Assumption

Reality



I don't deserve to be here.



I should trust the judgment of those who invited me



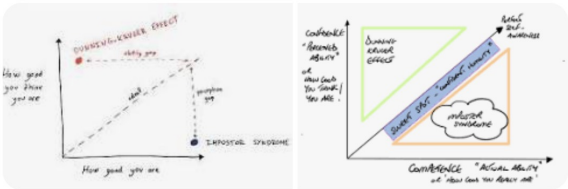
I'm here because I Earned It.



About 41,700 results (0.36 seconds)

As shown in the graph, the Dunning-Kruger effect happens when we are overconfident compared to our knowledge. Imposter syndrome, on the other hand, occurs when we are too humble about our knowledge and feel like we don't know enough.

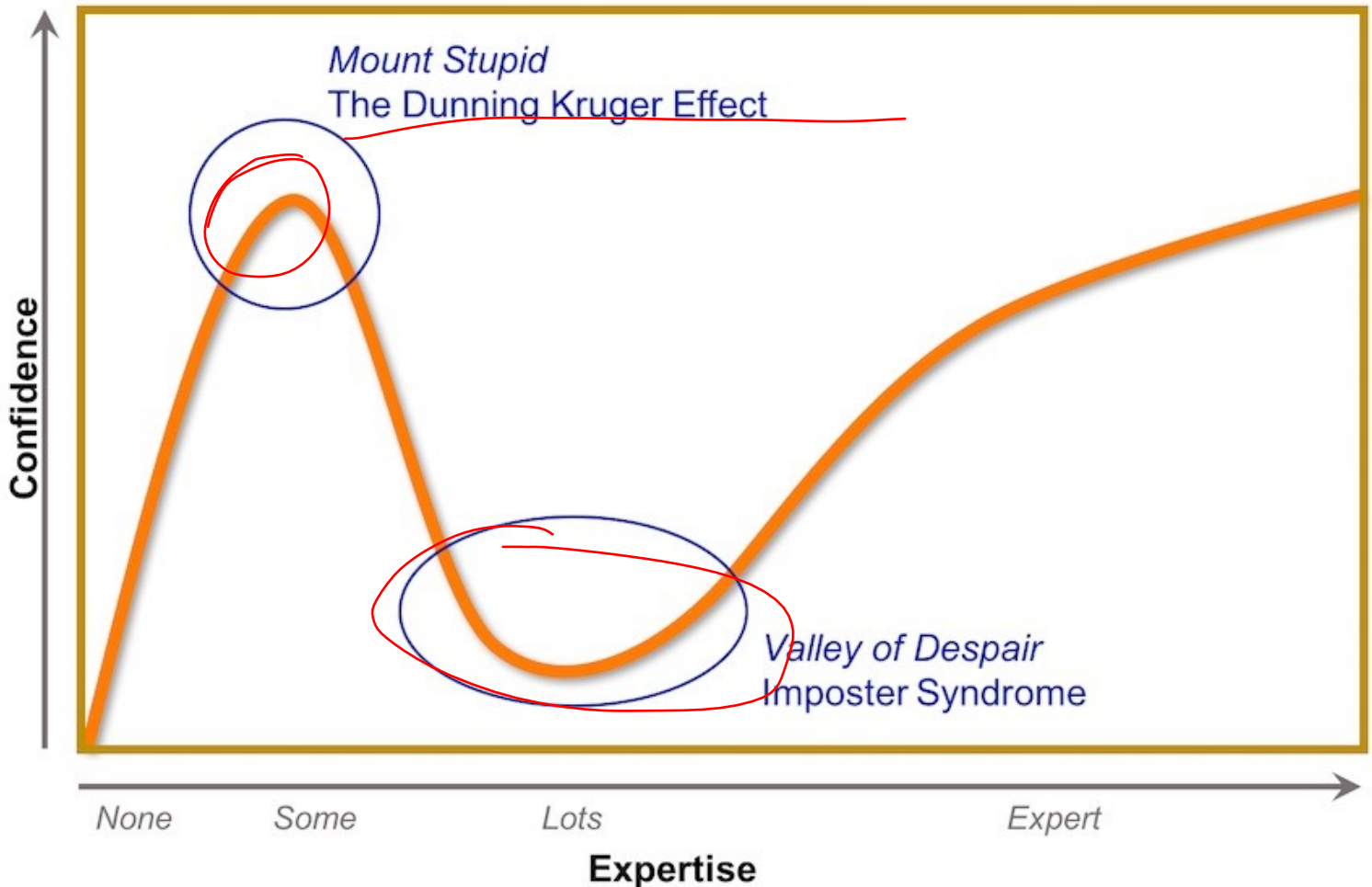
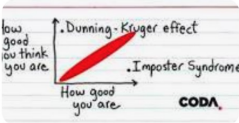
Medium
https://medium.com › dunning-kruger-and-imposter-syn...
Dunning-Kruger and Imposter syndrome: a reflection from my ...



People also ask :

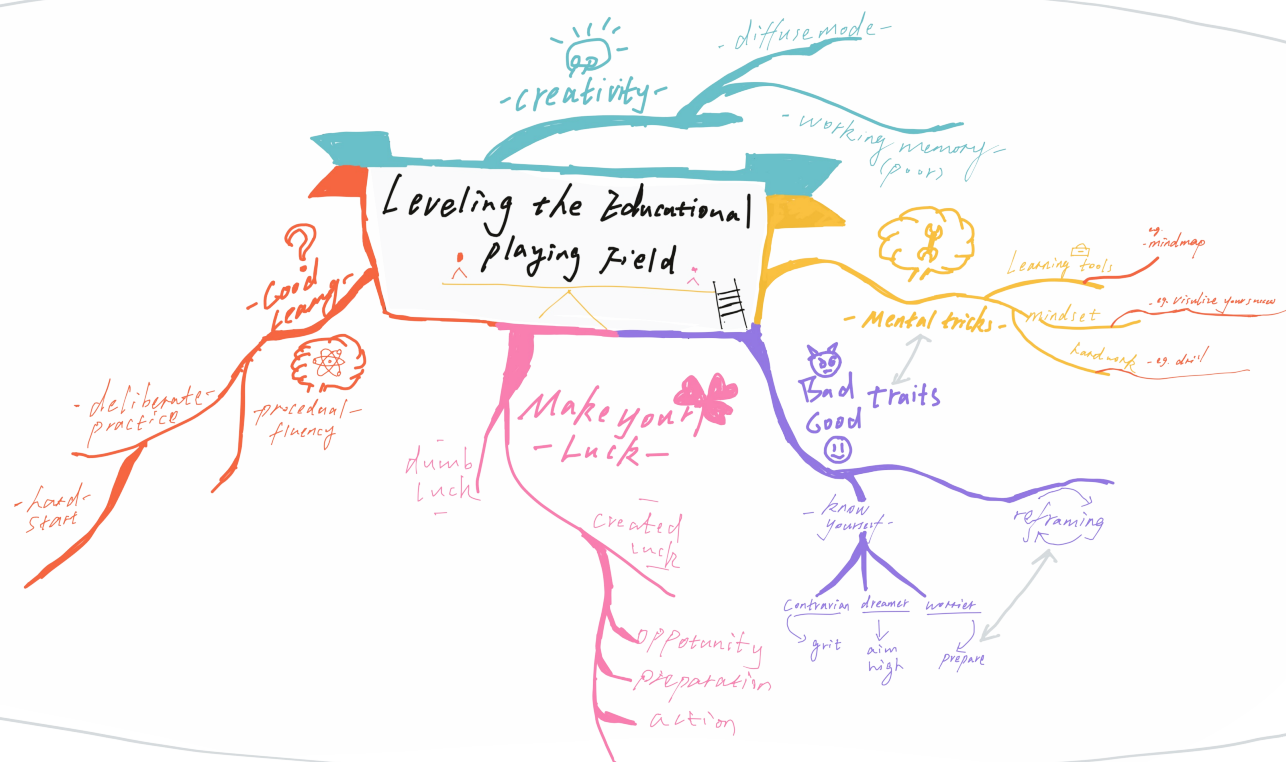
What is the difference between impostor syndrome and the Dunning-Kruger effect? ^

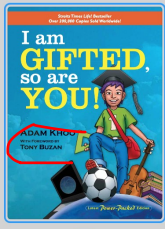
The Dunning-Kruger effect, where people tend to think they are better at a job than they are, and imposter syndrome, where people tend to think they are worse than they are at doing a particular job.



Imposter Syndrome

...and the Dunning-Kruger effect





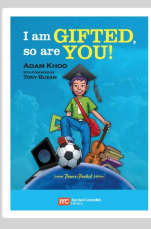
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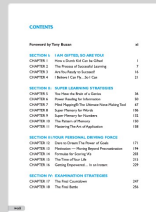
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x



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xii



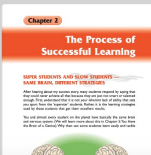
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2



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ABOUT THE AUTHOR

At the time when this book was first published in 1998, Adam Khoo was an undergraduate in the National University of Singapore (NUS) Business School. He ranked among the top 1% of students in NUS, earning himself a place in the prestigious Talent Development Programme (TDP), an extension of the Gifted programme. He was also placed on the Dean's List every consecutive year for his outstanding academic achievements.



Today, Adam Khoo is an entrepreneur, best-selling author, peak performance trainer and professional stocks & FX trader. He holds an honours degree in Business Administration and was awarded the NUS Business School Eminent Business Alumni Award in 2008 and the NUS Outstanding Young Alumni Award in 2011. He is also a Licensed Master Practitioner and Trainer in Neuro-Linguistic Programming™ (NLP™) by the Society of NLP, USA.

JUST ANOTHER UNDERACHIEVER

For me, my failure as a student began right from day one when I entered primary school. As a young kid, I hated reading. All I wanted to do was to play computer games and watch TV. As a result, I didn't pay much attention in class and the 'F's started showing up in my report cards. That made me hate teachers, studying and school even more! Well, things got worse and worse. By Primary Three, I was expelled from St Stevens Primary School for misbehaviour and relocated to Ngee Ann Primary School. There, I still continued to play and ignored my studies totally. As a result, when the Primary School Leaving Examination (PSLE) results were announced, I did so badly that I was rejected by all the six secondary schools that my parents listed as their choices. Instead, I was dispatched to Ping Yi Secondary School, a



FOR THINGS TO CHANGE, I MUST CHANGE FIRST

It was at the lowest ebb of my school career that my father learned of a motivational programme for teenagers designed to teach them how to study and take charge of their lives. Deciding that they had nothing to lose except their money, my parents enrolled me in the five-day camp.

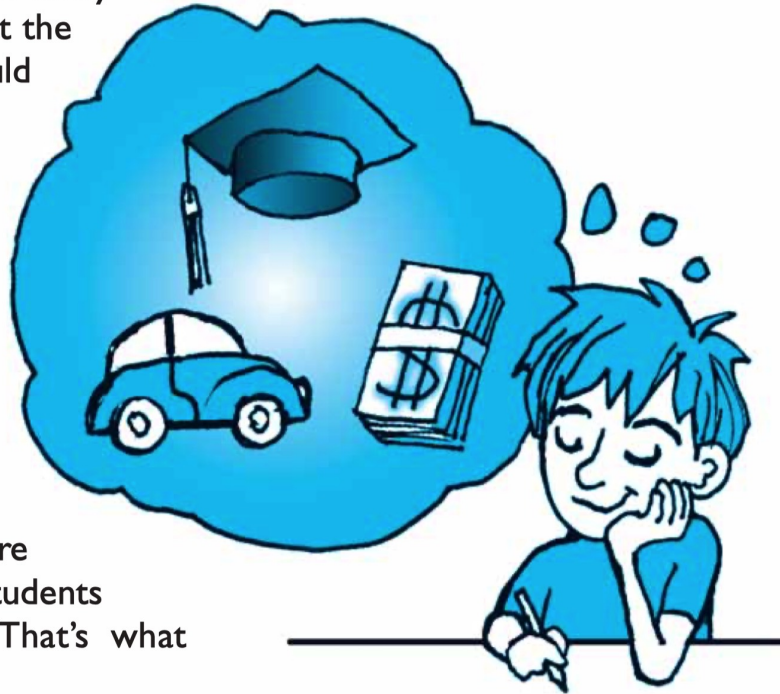
So, on a Sunday morning in 1987, I was dropped off at a local hotel and put under the charge of the Master Trainer, Mr. Ernest Wong. I was a mere 13-year-old among other students aged between 12 and 20. On that day, I was far from thrilled at having my precious school holidays burnt. But at the end of the five days, I was a completely changed teenager. What I learnt and experienced had transformed my whole attitude and outlook of my studies and my life.

During the programme, I was exposed to a powerful personal transformation technique known as Neuro-Linguistic Programming™ (NLP™), that taught me how to take charge of my mental state and eliminate my limiting beliefs and



GETTING INTO ACTION...WITH 'A' GOALS AHEAD!

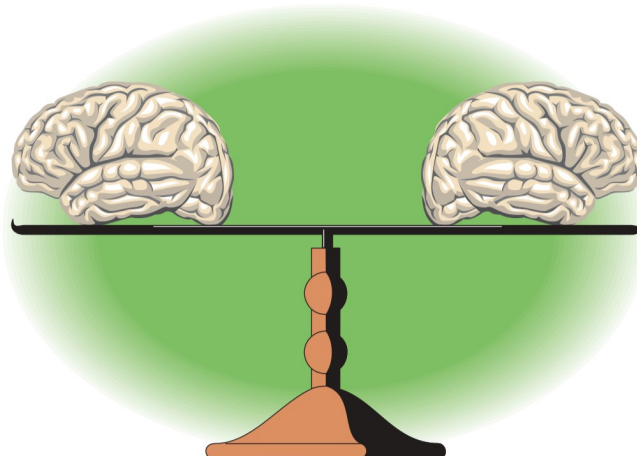
Once I left the camp, I was extremely charged up and excited about the future ahead. I felt like I could do anything. So the first thing I did was to set three really big goals. My first goal was to top my school in one year. My second goal was to do well enough to get a place in Victoria Junior College (the top junior college in Singapore). My final goal was to get into the National University of Singapore and become one of the top students there. Impossible dreams? That's what everyone thought.



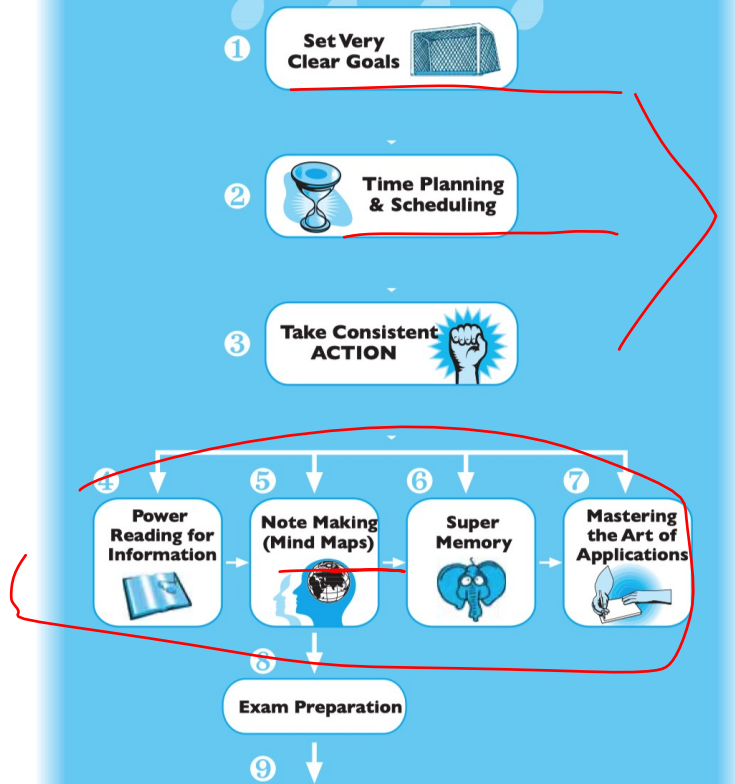
SUPER STUDENTS AND SLOW STUDENTS — SAME BRAIN, DIFFERENT STRATEGIES

After hearing about my success story, many students respond by saying that they could never achieve all that because they are just not smart or talented enough. First, understand that it is not your inherent lack of ability that sets you apart from the 'superstar' students. Rather, it is the learning strategies used by these students that get them excellent results.

You and almost every student on the planet have basically the same brain and nervous system. (We will learn more about this in Chapter 5: You Have the Brain of a Genius). Why then can some students learn easily and tackle

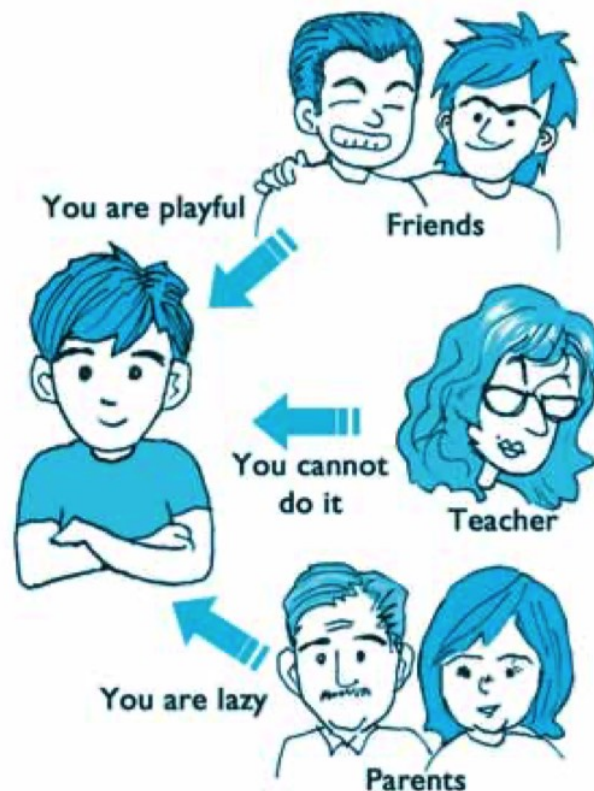


The 9-Step Study Process



down
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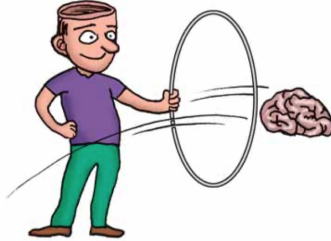
Without meaning to do so, sometimes the people who love us may unknowingly give us beliefs that destroy our lives. Dr Georgi Lozanov, the founder of accelerated learning said that we were all born geniuses, but in the process of growing up, we have been de-geniused by negative suggestions from people. Like our parents, friends or teachers telling us that we are 'lazy', 'good for nothing', 'stupid', 'bad in maths', etc... After we hear it for a while, we slowly begin to believe it, and we live our lives according to these damaging beliefs, thinking they are real and never questioning them again.



You Have the Brain of a Genius

A LOUSY BRAIN OR AN UNTRAINED ONE?

You often hear people complain that they are not as smart as other people. They say they have a slower brain, a less creative brain or one that just cannot absorb anything. 'If I were smarter, I would do a lot better in school' is one of the most common excuses I hear. Many people ask me if I believe that some students are just more intelligent than others. My answer is always a definite yes. More intelligent students learn faster and produce better results. I always continue by saying that 'your intelligence is your responsibility'. What I mean is that if you are not intelligent, it is your fault. 'But how can I help it if I am not intelligent?' is always the reply.



Well, I believe that a person's intelligence can be trained and anyone can become more intelligent. If you decide today that you want to increase your brain power, your intelligence, your memory and your ability to think, you can! While I acknowledge that there are some people who are born gifted, most gifted people or geniuses were self-trained! I am a good example. I basically trained my brain to be gifted.

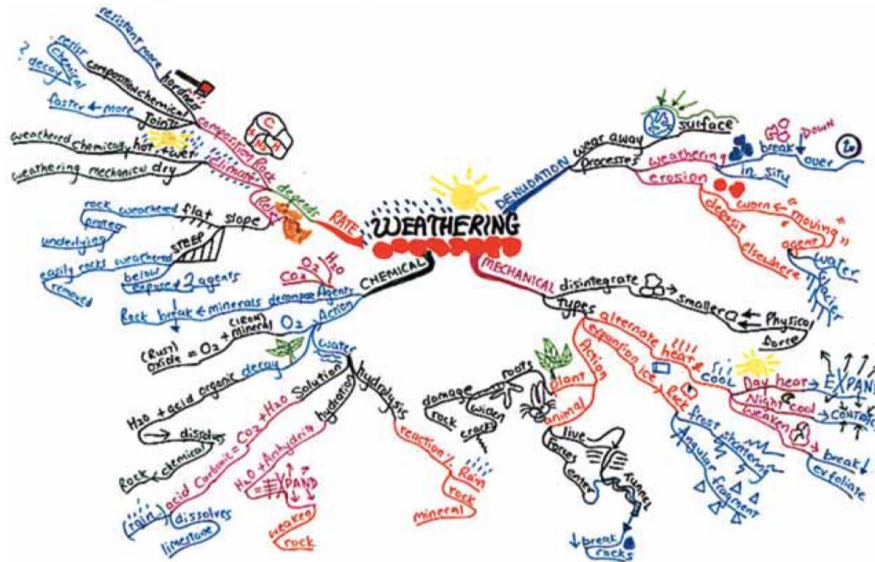
TWO BRAINS, ONE SYSTEM

Unfortunately, all students (both left and right brain dominant) are put through the same conveyor belt of the education system where 90% of subjects are taught and tested using left-brain dominant techniques. So what happens? Obviously, right-brain students will be the ones who fail and get kicked into all the lousy classes and schools. How unfair! Pretty soon, right-brain students begin to be labelled as 'slow', 'attention deficit prone', 'stupid' and 'problem students'. And you know what? I was one of them! After a while, these students begin to believe that they are stupid and lousy and that belief seals their fate!



THE ADVANTAGES OF MIND MAPPING®

Shown below is an example of a Mind Map® on Weathering, a chapter in geography. Let's make a comparison and see what are the advantages of making our notes in this way.



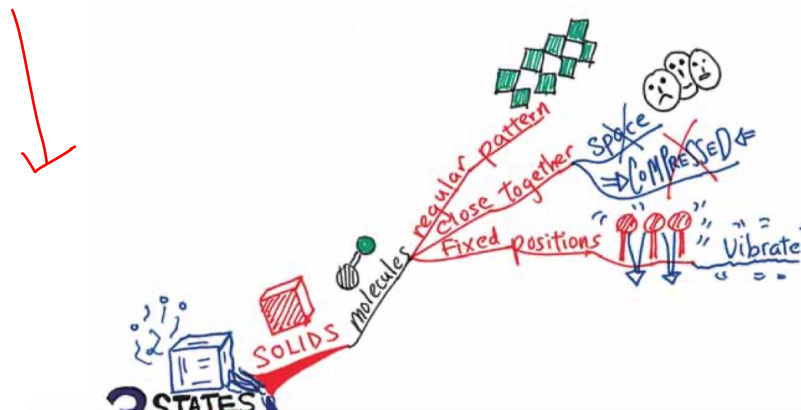
STEP 4: Add the Main Points and the Supporting Details.

As you read through the keywords you have circled in the text, begin by adding the main points and the supporting details to the first sub-heading on 'SOLIDS'. Again, fully develop 'SOLIDS' before adding points and details to 'LIQUIDS' and 'GASES'.

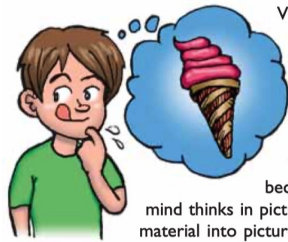
The first paragraph shows

'The molecules in a solid are arranged in a regular pattern and are packed close together. There is little space between them so solids cannot be compressed. They are held in fixed positions by strong inter-molecular forces. As a result, they can only vibrate about these fixed positions'

This can be converted into the Mind Map® as follows:



1. Visualisation



Visualisation is one of the two most powerful principles in memory. Our mind thinks in pictures. We therefore tend to remember pictures more easily than words. The more detailed and vivid the picture in our minds, the stronger our memory of it will be.

The reason why most students forget easily is because we try to remember words, while our mind thinks in pictures. The secret is to therefore convert study material into pictures that our brain can absorb very fast. In the exam, we will recall the pictures and translate them into words which we give as our answer!

2. Association



The second most powerful principle of memory is association or creating links between things we need to remember. Association forms the links between ideas we talked about earlier. This in turn creates an ordered index in our minds for quick recall. Linking pictures (visualisation and association) in our minds is the basic principle behind super memory.

3. Making Things Outstanding

If I were to ask you what you had for lunch on your last birthday, would you remember? I doubt it. What if for your last birthday, you were forced to eat fried cockroaches by your friends? Would you remember now? Of course you would. In fact, I bet you will remember what you ate when you are 80 years old. You see, the brain tends to remember things that are very outstanding. And one of the best ways to make things outstanding is to use humour and absurdity.



4. Imagination

We tend to remember things that we create out of our own imagination. This is especially so when we imagine experiences using as many of our senses as possible. In other words, instead of just imagining what a banana looks like, we should imagine the smell, the texture and the taste of it.

We should also use our imagination to create strong emotions within us. This is because we also tend to remember experiences that arouse strong emotions such as fear, laughter, anger, love, pain and hate.

5. Colour

Colour is also a powerful trigger of memory. This is why we should use multiple colours in note-taking. This can improve our memory by up to 50%.



6. Rhythm

Rhythm increases our ability to remember because it activates our right brain, a hemisphere usually dormant during study. For example, have you ever wondered how effortless learning the words of a song are compared to memorising the same number of words in a history textbook? Ask yourself how you can still remember the alphabet song, despite learning it in kindergarten. We can use rhythm in our learning by playing music in the background or creating rhyming phrases for facts we need to remember.

7. Holism

Finally, holism also helps you to remember. Holism (from the word 'whole') is learning things by seeing how it fits into the whole picture. Learning facts by seeing how it relates to the whole concept helps you remember better than learning facts in isolation.

Some Examples

Consider the following new words and their meaning which you may have to learn:

1. Poignant — A sharp pain

How to do it!

First break down the abstract word into its syllables, if necessary. In this case, we get 'poig' and 'nant'. 'Poig' sounds like 'point' and 'nant' sounds like 'nun'. So imagine that a sharp point pierced a nun and caused an intense pain. So, whenever you think of 'poignant' it reminds you of 'sharp pain'.



2. Exhort — To advise

How to do it!

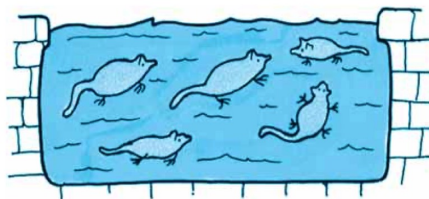
Again, break down the word into 'ex' and 'hort'. 'Ex' sounds like 'axe' and 'hort' sounds like 'hot'. Imagine that every time your father gives you advice, he holds a sharp axe with a blade threateningly, so you will heed him. When you are asked the meaning of 'exhort', you will remember its meaning i.e. to advise strongly.



3. Pumice — Volcanic Stone

How to do it!

'Pumice' sounds like 'pool' and 'mice'. To link the substitute word to the meaning, you could imagine the crater of a volcano filled with water (pool) and mice swimming in the pool.



4. Prodigy — Genius

How to do it!

You can imagine a (pro)fessional who went (dig)ging for a special mineral which, when he ate, turned him into a genius!

5. Salient — Most prominent

How to do it!

'Salient' sound like 'sail' and 'ant'. Imagine an ant who excels in sailing and becomes the most prominent ant around. So when you think of 'salient', you will immediately think of 'prominent' (prominant).



6. Forebear — Ancestor

How to do it!

Imagine that your ancestor was a circus trainer. His most famous act was training four bears (sounds like 'forebears') to play mixed doubles in tennis. Again, 'forebears' will remind you of 'ancestor'.

7. Amoeba — A one-celled organism

How to do it!

'Amoeba' sounds like 'amy' and 'baa' (the sound made by a sheep). You could imagine that a girl, Amy, suddenly starts to bleat ('baa') like a sheep because she is unable to speak like a normal person. Because of the strange behaviour, Amy has to be locked up in a prison with one-cell! (a one-celled organism).



Go through all the material once, seeing the images in your mind. Then write down the meaning of all the new words you have learnt.

↑ lucky

in the zone

2 me

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7 月的社群学习主题是「提升教学和自学能力」，我们主要读了 3 本书：

Chapter 10

Turning a Midlife Crisis into a Midlife Opportunity



ARNIM RODECK HAD known he was going to become an electrical engineer ever since he was a kid sitting in his bedroom tinkering with electronics. He never anticipated that he would grow dissatisfied with the job he loved—a job that he seemed born to do.¹ And he certainly never foretold the turn his career would take.

Finding Paths Past the Insurmountable

Arnim was born and grew up in Bogotá, Colombia. His sweet-natured, supportive mother—a nurse—was born in Africa to German and Belgian parents, while his strict, results-oriented father was an Austrian from Vienna who owned an elevator business. The couple had fallen in love in Colombia and ended up staying there, so Arnim grew up comfortably bilingual, speaking Spanish and German. He jokes that he likes to use the German area of his mind for more logical thinking and the Spanish area for the more emotional and passionate parts of his life.

The school Arnim attended as a youngster was partially sponsored by the German government, so some subjects were taught in German, some in Spanish, and a few in English. Since Arnim's first English teachers were Germans, his English has a German accent.



Arnim Rodeck's learning journey took him far from his native Colombia before he found his career calling.

But it wasn't all roses for Arnim. He is dyslexic, and memorization has always been difficult for him. This meant that schoolwork was a struggle. And he had other challenges—with music, for example. He's terrible at singing—so terrible that, in kindergarten, when it was time for all the children to sing, his teacher had him go play with Legos.²

Arnim also had no rhythm, so he couldn't dance. He was unable to read musical notes or detect which piece of music he was hearing, and he couldn't even figure out which instruments were doing what.

But audio signal processing—the digital and analog aspects of the electronics behind some forms of music—was a different experience from hearing music for Arnim. He *loved* it. Fortunately, his high school music teacher recognized Arnim's hidden strengths and allowed him to pass his exams by building a turntable and an electric guitar. In this way, Arnim continued to learn about music in his own way and still get great marks. He

went on to design and build music synthesizers, mixers, recorders, and even a theremin—that weird electronic instrument that’s played without touch.

Ultimately, Arnim developed a strong, lifelong interest in a subject that most people would have said he had no “talent” for. He also learned an oft-overlooked lesson: Great teachers can bring out the best in someone, even when others might think of that person as a failure. Arnim learned something even more important—that sometimes the best way to succeed in a seemingly impossible task is to slip through a side door.

Thanks largely to Arnim’s dyslexia, he was a dismal failure in his high school English classes—which necessitated a lot of reading. He had a terrible memory for vocabulary words and lacked any sense of logic for grammar or spelling, no matter how hard he tried.

Arnim ended up going to Germany to earn his bachelor’s degree in electrical engineering. To his surprise, once he arrived in Heilbronn, he found himself facing his old nemesis—the English language. Some of the required technical courses were taught only in English. Tests were in English, too. So he struggled valiantly—passing exams only with the help of tutors and the occasional kind, blind eye of his professors. He was warned to avoid pursuing any jobs requiring English.

However, much like Singaporean entrepreneur Adam Khoo, Arnim had learned to turn apparent disadvantages into advantages. After his move from equatorial Colombia to temperate Germany, he realized that he loved studying in different countries, where he had the chance to meet diverse people and soak in new cultures. For graduate school, he ended up in the UK, language “disability” and all. *exotic*

To Arnim’s surprise, he discovered that despite his problems with *reading* English, he was quite good at picking up the spoken language. He had no language-related problems in his master’s studies at all.

Though my English was very poor when I got to England, I never have been shy, so I simply asked questions and spoke, regardless of how bad I was. The fact that I was a foreigner was often a great excuse to ask for directions, things to do, special places, and so on—questions that a natural English speaker from the area often wouldn’t ask.

For example, while looking for an appropriate university for my master’s, I was in an almost empty train going from Manchester to Liverpool. I sat beside a young woman and started chatting with her. I wondered aloud about the various master’s programs and finally asked for a recommendation of where to stay in Liverpool. She ended up inviting me to her parents’ home and became a wonderful friend and supporter.

↳
Having an accent makes people curious and often gives you a chance to tell them a bit about you. It breaks barriers. But the biggest advantage of speaking more than one language is simply understanding that there is more than one culture. There are several ways of seeing and acting in the world. Learning to speak another language gives you a more open mind.

I think the language-study turnaround for me was moving from the structure of a formal class to simply speaking and interacting with people. As a matter of fact, even today I keep diligently learning new words that I pick out of books and the news—I practice them every morning through a flashcard system called Anki. Ironically, learning new vocabulary was what I hated most and was terrible at in school. I am still slow, but now I simply do it and even enjoy it.

In a funny way, my bad English even allowed me to communicate better. People made an extra effort to understand what I was saying. They were interested and helped me learn by being unwilling to accept language as a barrier.

Distraction: It's Not Necessarily a Bad Thing

It turns out that listening with a bit of a distractor—like a foreign accent—gets your brain to do mental tricks to boost your thinking. So Arnim's insight that people might have paid closer attention to him because of his accent was spot-on. When people have slightly more difficulty in processing what they are hearing or seeing, they can be forced to think more abstractly. This, in turn, may allow them to think more creatively about what they are hearing.³

A bit of background noise, much like having an accent, seems to create slightly more difficulty with processing—it distracts just enough so that you move, at least momentarily, into a different mode of perception, allowing you to think more broadly and creatively. This may be why some of us go to a coffee shop, with its background murmuring—perhaps subconsciously seeking an obliging ambience for our studies.

Focus Is Good, but Not All Learning Involves Focusing

When we're studying we often drink caffeine, which enhances focus by attenuating "daydreamy" alpha waves. This effect is strongest for about an hour after drinking a cup of coffee or tea, although the energizing can persist for some eight hours, which is why an evening cup of coffee is sometimes better left untasted.⁴

g v u n

When you're doing something that's cognitively difficult, coffee isn't the only booster. You often subconsciously use other tricks to increase your focus. For example, if you're trying to remember something, you tend to avert your gaze—which avoids overloading your working memory with extraneous information from your environment.⁵ Even just closing your eyes can help you ignore distractors so you can more easily bring something to mind.⁶ Accordingly, memory experts who compete in memory competitions will do everything they can to reduce noise and extraneous visual stimuli, often wearing special blinders and earmuffs so they can stay focused.

It's often easier to just memorize something than to truly understand it. This sometimes trips up those medical school students lucky enough to have exceptional memories. (Yes, although memory tricks work well, memorizing does come much more easily for some people. Researchers still aren't quite sure why, though there's evidence that having the right genes helps.⁷)

In medical school, when there's a big anatomy test, ordinary med school students spend weeks preparing. They practice over and over to memorize thousands of terms and related functions. Ace memorizers, on the other hand, can procrastinate until just a few days before the test, spend a few hours glancing over the material, and still do well.

However, when these same memorizing aces are faced with a different type of medical school exam—for example, a test related to how the heart functions—they find that a few hours of last-minute cramming just doesn't cut it. Medical school advisers themselves can be startled to find these seemingly star students flunking certain sections of the curriculum. It seems that quickly memorizing anatomical terms related to the heart doesn't allow you to understand and answer questions about the heart's complex function.

This is a reminder that simple focused concentration often *isn't enough* when we're trying to understand a complicated issue.

More Complex Learning Demands Diffuse Connections

It takes time to understand complicated systems, whether we are studying the human heart, laying out a new lawn irrigation system, or analyzing the multifaceted causes of World War II. To untangle such complex subjects,

we often need to alternate a tight focus on the issue at hand with steps back to look at the bigger picture. Our need for occasional distraction during any given learning session may arise from those competing tight-focus versus big-picture needs.

As you saw in Chapter 7, people have two very different ways of perceiving the world—that is, two different neural approaches to thinking. The focused mode makes use of our focused attention, while the diffuse mode involves neural resting states.⁸ Focused thinking, if you'll remember, is the kind of thinking you do when you are intently concentrating on a math problem. You might fall into diffuse thinking, on the other hand, when you are standing in the shower not thinking of anything in particular.

Now, let's take these ideas a bit further.

The focused mode is primarily centered in the prefrontal cortex—the front part of your brain. The diffuse mode, on the other hand, involves a network that connects more widespread areas of the brain.⁹ The widespread nature of diffuse thinking is why it is often related to the unexpected connections that lie at the heart of creativity.¹⁰ Activities involving the diffuse mode, like walking, riding a bus, relaxing, or falling asleep, are more likely to lead you to creative ideas that arise from seeming nowhere.¹¹

A Little Background Noise

If we're in a very quiet environment, that quietness can hype up focused-attention circuits while simultaneously deactivating the diffuse mode. This is why quiet environments are ideal when we're doing something that demands concentrated attention, like our tax returns or a difficult problem on a test.

But sometimes we're looking at bigger-picture sorts of issues—like cardiac function or computer network connectivity or meteorological patterns. In that case, a little sporadic noise, like a snippet of conversation or the clatter of dishes in the background, can help. This is because that bit of noise temporarily allows the longer-range diffuse network to pop up. (Technically, the noise “disrupts the deactivation of the default mode network.”¹²) In other words, the gentle hubbub of, say, a coffee shop can still allow you to focus, but the background noise also allows you to step

back more easily on occasion to look at the bigger picture of what you are trying to understand.

But there can come a point when there's too much noise, which can keep you from concentrating at all. Older people can be a little more sensitive to noise, because they're not quite as good at suppressing the default mode.¹³ That's probably why older patrons at restaurants tend to take more issue with neighboring conversations that are all trying to outcompete the evening's musical entertainment.

→ **Key Mindshift** **Background Noise**

A little intermittent background noise can allow us to more easily alternate between focused and diffuse modes. This is especially useful with learning that encompasses new concepts, approaches, or perspectives.

What About Music?

So, you might ask—what about music? Does it help or hurt when you are trying to study? The answer is—it depends. If the music is fast and loud, it definitely disrupts reading comprehension, in part because you use some of the same areas of the brain to process music as you do to process language.¹⁴ Music with lyrics is more distracting than music without lyrics.¹⁵ On the other hand, researchers have found that if you're listening to a favorite style of music, it could enhance your studies, while if it's something you're not so fond of, it could detract.¹⁶

In the final analysis, all this just means that when it comes to music, you should use common sense and discover what works best for you.

Another Slip Through the Side Door

Arnim's Colombian upbringing taught him a mind-set rather different from that of people in many wealthier nations. The country of Colombia is not

just developing—it is *rapidly* developing, and its diverse peoples have a confident, enterprising spirit. If homework is due and there is a power outage, teachers still expect assignments to be turned in on time, no excuses. If there's horrific traffic that means a simple trip across downtown Bogotá could take three hours, it doesn't matter—the work still needs to be done on time. The intrepid cultural expectation that he could find a way around obstacles was part of Arnim's very soul.

In Germany, Arnim often heard, *So etwas haben wir noch nie gemacht* —“We have never done that.” People who said this really meant that *Arnim* couldn't do it. But as soon as Arnim would hear that, the Colombian part of his mind would start wondering, “Well then, how can *I* do it?” He used this thinking to avoid having to retake all the courses he had already taken at a previously unrecognized university in Colombia. When he asked the dean about how he could obtain formal credit for his previous coursework, the dean first replied, “Can't be done”—but then added, “Well, unless you get an okay from every single one of your professors.”

Arnim asked around and discovered who the “easy” professors were. He got their signatures, gaining a momentum of yeses, so that, eventually, even the toughest professor couldn't turn him down. In the end, the dean congratulated Arnim and gave him credit for his previous work.

Upon graduation with his master's, Arnim found himself in a quandary. Although he'd always wanted to move to Canada, he hadn't had much luck in pitching himself for jobs there. As graduation crept closer, he sent out hundreds of applications to companies in Germany, also with little success. It was depressing. He went to engineering-telecommunications job fairs and saw massive lines at all of them. He couldn't resist asking the human resources people he spoke with whether they knew of any less popular, less crowded job fairs.

Well, off he went to the “wrong”—but far less crowded—job fair, one that specialized in economics. There, he was able to speak to representatives from many of the same companies and countries as were at the engineering-telecommunications fair. Most gave him a hard time for turning up at an event meant for a different industry. The rep from Hewlett-Packard, however, loved his moxie, saying, “We're looking for people who think differently!”

Arnim was first hired as a support engineer for HP in Darmstadt, Germany. As part of his training, he was sent to an HP lab in Bristol, in the United Kingdom, where the new products were being developed. Here at last, Arnim felt he began to get his *real* education—often, through mentors.

Arnim's first mentor didn't talk a lot—he was instead an outstanding listener who led by example to get the best from people. When he did speak, he was onto something. Arnim learned from his next mentor not to worry about money, positions, or even reputation, but to focus on doing the best he could, without cutting corners.

Much like high school dropout Zach Caceres in Chapter 5, Arnim has found mentors to be extraordinarily important in his career and personal development. He's had "professional mentors" who were paid by HP as part of a future leaders program. But it was his self-appointed mentors who have made the bigger difference.

When Arnim spots a potential mentor, he works to get their interest. He realizes, for example, that a lone e-mail isn't enough. He's come to realize that different approaches appeal to different people—there's no single "mentor-grabbing" trick. He also recognizes that it's a big turnoff to ask someone point-blank to be your mentor, especially when they hardly know you. Again, like Zach Caceres, Arnim looks to see how he can make the relationship a win-win, so the mentor will also gain through his or her "investment" in their relationship. Arnim also makes a point of seeking two different types of mentors—one who keeps him feeling confident and pumped up, and another who doesn't shy away from criticism and who broaches no excuses.

→ Key Mindshift

Mentors

Mentors can be invaluable in your career and personal development. People don't need to even know that you consider them to be mentors for them to be of value in your life. Look for ways to make yourself somehow useful to the mentor, just as they are for you, to make such relationships flourish.

Arnim's trip to the world-class laboratories in Bristol also provided him with an opportunity to show his mettle. The project Arnim was assigned to

had special challenges. Oddly enough, some of those challenges came, not directly from the technical problems, but instead, from the lab's culture. In old-fashioned British stiff-upper-lip style, one simply didn't ask for help. But perhaps due to Arnim's being a foreigner in addition to being an inexperienced newbie, he *had* to ask around to find out what was going on. Executives began to notice Arnim's willingness to reach out, form connections, ask questions—and get problems solved.

HP had just bought a small start-up in Canada, and its management was looking for a support person in Europe who was open-minded, flexible, and willing to build HP's presence. Arnim fit the bill perfectly. But once Arnim began visiting Canada, he became engrossed in resolving problems that came up at that location—his trips became more and more extended. After a year, it started to seem silly to keep his apartment in Germany. His dream of moving to Canada had come true.

It was Arnim's love for new cultures that next led him to one of his biggest breakthroughs—selling a major customer on a new product that had never previously gotten any traction with the company. Arnim convinced his managers to let him go into the field in Silicon Valley and “live with” the customers. His move was very unusual, because the company had a well-established sales and support force. However, within six months, Arnim began to understand how customers were using both HP's and other companies' products. His reports back to the factory formed a new dialogue—a way of listening to what was truly needed—that enabled HP to become more successful. And that's how he came to find himself living in the hotbed of high tech, in Palo Alto.

Time to Change Careers

It might have been Arnim's father, Heinz, who planted the seed for career change. He would always say that when you become good at what you do, it's time to change. “Don't wait for what comes after that.” He meant, *don't wait until you're tired of it.*

It wasn't burnout, exactly, that Arnim experienced. For one thing, he was treated well at Hewlett-Packard (part of which was eventually spun off to form Agilent Technologies). He was valued, he had great colleagues, and

he felt intellectually challenged. It was just that he was tiring of the politics and bureaucracies that are inevitable in big organizations. He was also tired of the daily maddening commute through traffic jams, the vistas of buckled concrete, and the world-class, yet sometimes surprisingly narrow-minded, people around him whose interests centered solely on technology or business.

And so, after more than a decade doing his near-dream job, Arnim began thinking about a career transformation. He had no idea what his next job would be; he just wanted to become good at more than one thing, and he wanted the new job to be different from what he had been doing. Of course, change entails risk, but the risk of *not* changing could be bigger.

Underlying his need for change was the fact that Arnim wanted to be his own boss—and to be a creator. He also wanted to find something that he could get better at, even as he grew older. One of his strongest assets was his analytical way of thinking, arising from his engineering training and experience—he knew whatever career he chose should take advantage of that.

Gradually, he began thinking about options. He kept a piece of paper with him and jotted down any idea that came to mind—especially the crazier ones. At the end of each week, he took the pieces of paper and sorted through them. After six months, one idea was shining through.

Woodworking.

Arnim hadn't done any real woodworking before. But he was drawn to the beauty of the woods in Canada and inspired by how native carvers breathed unique life into each piece. He loved the feel of wood—how he somehow communicated with a piece, and it with him, signaling how the woodwork should unfold. It was the opposite of what Arnim had experienced in tech, driven as it was by emotionless consistency, accuracy, and efficiency. “With wood,” Arnim says, “it comes down to feelings, perceptions, patience. In essence, art. I wanted to explore that side in me. I wanted to make a new career and, with that, a new way of seeing the world.”

Once he'd figured out what he wanted to do, Arnim began visualizing himself ten years into the future, working in his wood workshop with his customers. Next, still imagining himself in the future, he would ask himself, “How did I get here?”

Two things became clear. First, he *loved* what he saw. He wanted to go there.

Second, he would have to quit his job—undo his “golden handcuffs” and jump into unfamiliar waters. Of course, this would not guarantee success.

The advantage of Arnim’s “envision the future” method was that he didn’t have to plan all the steps. Instead he simply geared his mind toward building a new career that incidentally made use of his previous engineering training.

When Arnim finally quit his high-flying job, many of his colleagues thought he was making a big mistake. But at the same time, they envied him. Since then, some of his old coworkers have visited and even enjoyed helping him in his workshop. (A fair number of those old colleagues have since lost their jobs in mergers and high-tech shuffles.)

The shift was hard—much, much harder than Arnim had thought it would be. Since he had no real previous woodworking expertise, he needed to learn the best techniques and to experiment with woods, glues, and finishes. He also needed to learn where to get the best materials, and how to keep himself up-to-date with key professional developments.

Arnim had never even run a business before. He had to figure out what he should sell and to whom. He had to determine costs, location, and logistics, and understand all the intricacies of money flow. He began to realize that he’d been spoiled by his past experience at a big company, where there were specialized departments to take care of all of his and the company’s needs.

A good bit of Arnim’s challenge came down to prioritizing where to put his energy. There were many more problems and challenges than he had time for. He had to figure out how to do it all himself—advertising, selling, procuring, shipping, testing, building, answering requests, designing, fixing problems, experimenting, and meeting new clients. And then there were building codes and other regulations.

In a way, not knowing at the beginning how hard it was going to be helped Arnim to keep sailing through sometimes turbulent waters.

As Arnim has come to realize, in his old “envisioning the future” mode, he was not able to plan the details of a profession he didn’t yet know, or the details of running his own business. But those original dreams began programming his “vectors”—his subconscious thoughts—to keep pointing

him in the new direction. This subconscious vectoring hasn't stopped, of course. Even now, Arnim keeps envisioning how he needs to keep changing, learning, and growing—augmenting his current skills. He says, “If I have a free moment, you will see me in the workshop dreaming up the next thing. Wherever I go, whatever I do, I am dreaming of the next things I want to do.”

He has worked hard to build an environment that forces him to keep changing—to not be content to fall back into old ways. Now, more than ten years later, Arnim is more passionate than ever about his new career—even though much of it did not turn out as he had initially envisioned.

Arnim had loved the people he'd worked with in industry—highly intelligent people who kept him on his toes. To keep the spirit of these people with him, Arnim began to take notes on people he admired, respected, or even disliked—people who were good at what they did. He observed what types of questions they tended to ask and what made them so good.

Nowadays, phrases from Arnim's old “guiding light” mentors at HP still drift through his head, keeping him on track as he does various woodworking projects. Some of these phrases are:

- Yes, it's got a lot of great features. But how well does it do on the basics?
- *Be* the customer, *use it* as the customer, try to *achieve* what the customer needs to achieve with it.
- Ensure there is a win-win-win for everyone—the supplier, the customer, and us.
- Know and focus on your talents and successes. But also know your deficits and have ways to get help for these.



A key aspect of what Arnim did was to begin to visualize himself ten years in the future. He could see himself in his wood workshop with his customers, imagining what his life looked like. He loved what he saw.

- Think about the future. Each step you take, as small as it might be, adds up and becomes powerful down the road. Think of compounding interest.
- There is no such thing as a problem with a customer—it's just an opportunity to establish a deeper relationship.
- You don't take a sales course—or anything else—and think you know this stuff. Keep doing it for a decade and *only then* you will start getting it.
- Find out how to get the best out of people and help them thrive. It will make you thrive, too. Not the other way around.

Even today, Arnim sometimes imagines meetings with his old HP colleagues to keep their inspirational approaches alive within him. “I recall their questions and attitudes and review my latest idea or challenge with ‘them.’ Of course I cannot replace working with those people, but I have taken some of the best of them with me into my new environment.”

★ Now You Try!

Intro

Creating Words of Wisdom



Arnim made a list of the most useful pieces of advice his coworkers had given him. In a similar vein, who have you admired, respected, or even disliked? Who are the people in your life who are exceptional at what they do? What kinds of questions do they ask and points do they make?

Under the title “Words of Wisdom,” make a list of sayings from your own favorite (and “un-favorite,” but highly competent) coworkers. Your choice of words of wisdom should be shaped by your desires and goals—which will mean that you yourself have creatively contributed to your list. You can refer to this list as a guide in your plans for the future.

Retraining

One of the things Arnim did *not* want to do as he changed careers was to formally retrain. He instead wanted to nurture his free-thinking creativity,

which was part of what had drawn him to woodworking. So instead of enrolling in a lengthy formal course, he took short courses and worked and studied independently—reading books and visiting woodworking-related fairs and shows where he asked lots of questions. He also tested ideas with potential customers to get their feedback, and worked on various renovation projects in his own home to get a better sense of his abilities.

Then a special opportunity arose. While visiting with friends and family back in Colombia, he heard about, and then went to, a religious retreat at a woodworking monastery in the town of El Rosal, near Bogotá. Arnim isn't religious himself, but he has respect for people who devote their lives to something greater than themselves.



Among the monks' leadership was a silver-haired German "Meister" woodworker—a much-beloved man who seemed to come straight from a medieval woodworking guild. He epitomized the magic that was manifest in the team. Under the Meister's direction, a team of twelve local carpenters made wooden items for churches, prisons, and people who commissioned their work. Arnim asked the Meister if there was any way he could just sweep the floor or otherwise clean up after his woodworking team—anything so that he could just watch for a period.

The monk, a gentle, soft-spoken man, gave Arnim a brief, noncommittal answer.

When Arnim was back in Canada, he wrote to the Meister—sending him a letter (the old-fashioned kind, with a stamp). No response.

Next Arnim turned to the telephone. The Meister, perhaps sensing he could trust Arnim, and possibly also impressed with Arnim's tenacity, simply replied from his end: "You are always welcome."

These were the magic words Arnim had been waiting for.

"How long should I stay?" Arnim asked.

"That is up to you" was the answer.

What Arnim had asked for had no precedent—like all the times before when he had asked for the impossible. No one had ever been given carte blanche to study briefly at the monastery—the expectation had been years of apprenticeship.

Arnim coordinated a fourteen-day stay. He lived in the monastery, ate with the monks, and spent his days doing carpentry. He was living his dream—it was one of the greatest experiences of his life. He made every moment count, asking questions and trying to learn from everyone, but also trying to be modest, appreciative, and helpful in every conceivable way. He studied in the monks' library and took notes, which he shared with the monks. While he was there, he began building his first projects, always seeking criticism and feedback.

Arnim's enthusiasm was contagious. The monks and carpenters were inspired by their protégé's obvious respect for them and the work of the monastery. They also appreciated his ability to learn quickly. Even today, Arnim regularly returns to the monastery to show the team how their training and ideas continue to inspire him. They sit, laugh, exchange ideas, and inspire one another. When Arnim is back in Canada, each time he reviews his old notes, he sees even more in them.

"Perhaps what was most important to me," Arnim recalls, "was how the Meister encouraged my learning. To observe and then try it out myself. To observe again and try again—to keep trying until it was *beyond* what I thought could be done. And to do it so often that it became innate." The Meister was trying to ensure that Arnim developed an attitude of continual improvement—to make sure Arnim didn't become complacent at a plateau. Arnim still hears the Meister's voice in his head every day as he works in his workshop.

In keeping with the Meister's guidance, Arnim makes certain that when he gets new commissions, he is continually pushing himself in new directions. With every project, he tries to ensure he has the chance to learn not just one new approach, but many. Arnim has crafted doors and furniture for the Vancouver Winter Olympics, as well as for many high-end houses, along with coffee tables, wall carvings, gift boxes, music stands, mantels, cabinets, street signs, and even, if it catches his fancy, commissions for items as simple as cutting boards.¹⁷ And his customers have become his friends.



Energy Injections

Arnim's old environment in high-tech engineering was very energetic, with lots of insightful conversation, ideas, and coworkers motivating him. How, he wondered, could he maintain the energy that arises from working in a team when he went solo?

Considering this helped Arnim realize—counterintuitively—that time was *not* his most important resource. In fact, it was energy—both physical and mental. How could he develop and maintain it? Arnim started to do a lot of walking, hiking, and bicycling. He began to notice that interesting ideas and solutions to problems came when he walked in nature. Even his post-walk showers paid off: “The shower is my creativity office!”

Arnim hadn't realized how much he'd miss the performance evaluations he'd gotten at HP. He wasn't thrilled by negative feedback, but he had always used the evaluations to improve. Nowadays, Arnim instead conducts what he calls “postmortems.” He does one after every project, asking himself—and his customers, friends, and colleagues—lots of questions so he can understand how to improve the next project.

Arnim, who takes great pride in meticulous craftsmanship, also makes an effort to experiment and to embrace his mistakes. He knows that creativity requires an openness to mistakes. As he puts it, “When things go wrong or not as anticipated, it's fun to take a positive approach and still find a way to make things turn out even better than expected.”

Turning Negatives into Positives

Many people are turned off by a negative experience with a teacher—for example, if they had a bad math teacher they might use that as an explanation for their failure from then on. Arnim is different. He makes an effort to view even the most disheartening teachers as mentors. For example, as Arnim was reaching adolescence, he took math from a widely disliked teacher who practically exuded nastiness. Once, the teacher called Arnim to the front of the class and told him to draw a big circle. Arnim did that. “No!” his teacher exclaimed, “Much bigger!” Arnim complied. His

teacher turned to the class and announced, “That is Arnim’s mark on the math exam!”

Arnim was devastated, but decided that this was not to be his destiny. Arnim’s father had been offering to work with him on math, and this public humiliation by his math teacher finally pushed him to accept his father’s offer. Decades later, as a successful math student who went on to obtain a master’s degree in electrical engineering, Arnim has a surprising perspective: He believes his math teacher did him a favor by pushing him to accept that he really did need help with his math.

★ Now You Try!

The Power of the Positive

Even the most disheartening people can make positive contributions to your life. Under the title “Turning Negatives to Positives,” jot down ideas about how you can turn negative encounters into positive learning experiences. To add extra oomph to this exercise, reach out to an upbeat friend and exchange some of your upbeat ideas. (Don’t let yourself fall into waxing about the negative!)

Risks and Change

Arnim took substantial risks to build a new career. In the end, however, the initial discomfort he endured was preferable to spending hours each day commuting, all the while wondering whether he might suddenly find himself made redundant or obsolete.

“The most interesting lives,” Arnim observes, “are lived by people who take risks and make mistakes—and who are willing to learn from those mistakes.” He explains that to him, “the gift of having a mind brings an accompanying duty to experiment with it, to mold it, to play with it.”

As an electrical engineer, Arnim can’t resist comparing his brain to an operating system. An upgrade in the operating system usually offers better features, though there are almost always temporary glitches and problems. Arnim feels he needs risk to give him the forceful push he needs to open his

mind to change. And indeed, in shifting into his new career, Arnim had to change his mind, his attitudes, and his values.

But Arnim found one way of changing that was more powerful than virtually anything he'd ever tried. That's what we're going to explore in the next chapter.

★ **Now You Try!**

Creating Your Dream

Arnim envisioned himself as he wanted to be in ten years. If you tried a similar exercise, how would you envision yourself? What would you need to do to allow that dream to unfold? Jot your ideas down under the title "Creating My Dream."

Chapter 11

The Value of MOOCs and Online Learning

ADULT LEARNING IS changing dramatically. Perhaps the best way to see those changes is by taking a look at a special group of people—“super-MOOCers”—who have taken a dozen, or even dozens, of MOOCs. We’ll start with our old friend Arnim Rodeck, who, as it happens, is not only a master carpenter but also a master-MOOCer, with more than forty MOOCs under his belt. Since we know something about Arnim’s past, it’s easier to understand how super-MOOCing has brought him into the present. We’ll go on to see how other super-MOOCers are making use of their learning.

I love learning things and I read a lot. But it’s hard to find good reading material that provides an introduction to the subject while simultaneously being targeted and covering important areas of that field. Luckily for me, that’s what a lot of MOOCs do!

—Kashyap Tumkur,
software engineer at Verily Life Sciences

All of this is a lead-up in our journey to a *very* special place. (Hint: It has a low ceiling.)

Armin Discovers MOOCs

A decade before I met Arnim, when he was still working in high tech, his employer had been very generous with training programs and opportunities. However, as Arnim began preparing to shift to working for himself, he realized that he faced a problem. How could he keep up with learning without the kind of in-house training his employer had supplied? (Arnim's problem wasn't uncommon—it has become a major issue with the emergence of the “gig economy,” where people are choosing to work more as independent contractors than full-time employees.)

More than that, at his high-tech company, Arnim had gotten in the habit of absorbing new insights by hanging around highly informative people. But there'd be no one but the cat most of the time in his woodworking studio. Also Arnim's high-tech environment had been all about change. He worried that switching to a craft as old and seemingly static as woodworking could become an intellectual dead end.

To keep this from happening, Arnim began selecting woodworking commissions that continually forced him to learn new woodworking approaches and techniques. He also initiated a routine in which he studied something new every morning for at least an hour, using library books, podcasts, and blogs.

Several years before, Arnim had learned from a Buddhist monk about the importance of setting his mind and spirit on the right path first thing each morning. The monk pointed out to Arnim how news of current events —“if it bleeds, it leads”—can instill fear and concern about issues that are irrelevant and can even be harmful to the attitudes that launched his day. (This is reminiscent of what Claudia found in relation to her depression, as discussed in Chapter 2.)

As a result of the monk's advice, Arnim stays away from news and e-mail on mornings when he's working. He tends to arise early, but he lies in bed with his eyes closed reviewing his learning and vocabulary from the day before. Next, he visualizes the *what* and *how* of the projects he is going to work on during the coming day.

Over the years, Arnim has tried to keep his mind fresh and open for hard-to-master new topics and ideas. But he noticed that the tougher the material, the more challenging it was to pick up on his own. Textbooks in subjects like philosophy or modern art sometimes seemed impenetrable. At the same time, podcasts and blogs didn't help much, because they didn't

explore subjects with the kind of depth and breadth he was looking for. There were online videos, but they were often practical in nature, covering topics like how to use a table saw or camera.

What Arnim longed for were outstanding instructors with real expertise—professors who could crystallize the essence of the material and convey it in an easy-to-understand way. Arnim also wished he could actively engage with his fellow students and work with the material as he had back in college.

In 2012, Arnim chanced upon a TED talk titled “What We’re Learning from Online Education,” by Daphne Koller, the cofounder of a newly formed company called Coursera, which worked with universities to make some of their courses available online as MOOCs. Daphne talked about how Coursera’s MOOCs were opening new horizons for learners around the world. Their MOOCs were made up of much more than just videos—they also had discussions, quizzes, and peer-graded assignments that supported learners as they grappled with the material. It sounded like the college experience Arnim was looking for.

Only part of this MOOC approach to online learning was new—many universities had done online courses for years. What *was* new was that these classes, by Coursera and others, were widely available and cheap—many were even free. There was a sort of story line to MOOCs—they had a beginning, a middle, and an end. You could go through with a cohort of fellow students, some of whom would become your buddies. There was usually some sort of gamification—students could at least see how they progressed in the class. And there was a winning payoff in the end—a certificate from a top university like Stanford, Yale, or Princeton. These classes were also unique in how *big* they were—with tens of thousands and even hundreds of thousands of students. This was part of their allure—the sheer scale of the classes made not only for dramatic cost reductions but also gave students an opportunity to interact internationally.

Arnim was captivated by Daphne’s talk, and he signed up for the first MOOC he found—Scott Page’s “Model Thinking.” Scott’s course wasn’t heavy on special effects or expensive production values. What it *was* heavy on was insight into how to use mathematical models to organize information, make forecasts, and make better decisions.

Arnim dove into MOOCs. He also spent time with the supplemental material from each MOOC—books and textbooks. He found that with MOOCs, even dense mathematical formulas and complicated philosophical ideas became more understandable. It was as if he had the professor beside him, walking him through the harder parts, doubly reinforcing what he was learning. MOOCs reminded Arnim of his old days at the university—except that he didn't have to put his life on complete or partial hold in order to attend classes.

Arnim saw that there was no limit to subjects he could explore. To his surprise, he discovered that some MOOCs are so good that even experts in the field were taking them—*as students alongside Arnim*. This provided an extraordinary opportunity for Arnim to learn from experts beyond his professors. His hour or two of MOOCing in the morning became one of the most exhilarating parts of his day.

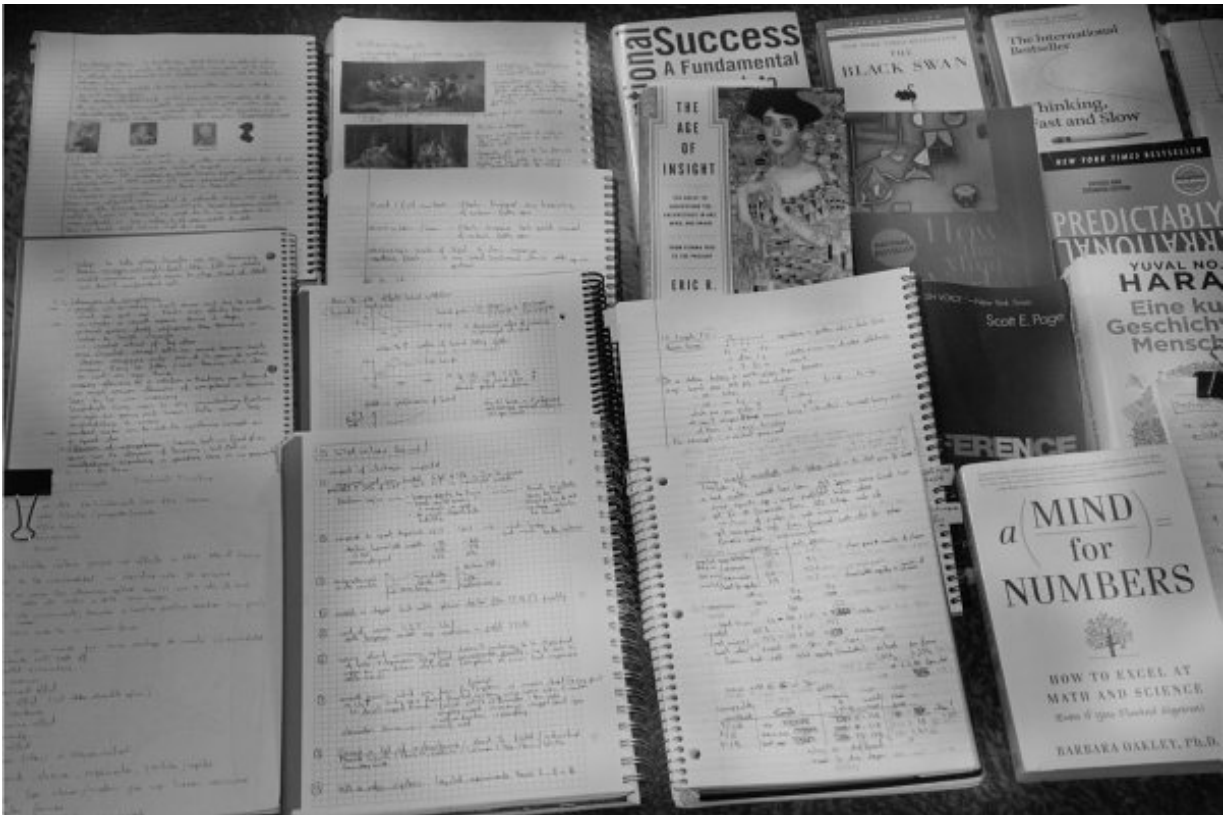
In the last four years, the forty-plus MOOCs Arnim has taken have created a deep shift in Arnim's approach to learning. He says:

Last year, I was with my wife in Lisbon in the famous museum of modern art. I had a hard time in it. I didn't like most of what I saw and didn't understand why it was called art. But the fact that so many people enjoyed what they saw made me wonder. So off I went and took a whole series of art-related MOOCs and read related books. I am far from an expert, but I have completely changed how I see art and how I appreciate it. And now my work is also changing.

Arnim likes to take MOOCs on related topics from different universities. This way, he gets a broad picture of thinking across fields, from different universities—an opportunity that's been impossible in the past for most cash-strapped college students. He realizes that he is learning *now*, in his maturity, in a way he wasn't able to before—seeing connections that he didn't have the life experience to recognize when he was a young man first in college.

Arnim's personal friendships have expanded with MOOCs. He and his wife have regular get-togethers with fellow MOOCers—local friends he has introduced to the world of MOOCs—so they can discuss what they've just learned and see the material through the sometimes differing perspectives of others. As he notes, "These MOOCs have changed my life and continue to do so. I am [virtually] traveling around the world visiting the best universities. All for low cost, but of course, lots of time and energy. Yes,

learning is hard. That is because by ‘learning,’ I mean truly changing and being able to see and think in ways I didn’t before.”



Here are some of Arnim’s MOOC notes and related reading materials. MOOCs have provided a way for Arnim to continue advanced, university-level learning even as he has an active family life and is intensely involved in the day-to-day of running his business.

Super-MOOCers like Arnim and others form a new breed that gives us insight into how MOOCs can change entire approaches to both credentialing and learning.

→ Key Insight

The Value of Opportunities to Learn

Consider learning opportunities as an important factor when making career and job decisions. How supportive is the new environment of new learning?

Super-MOOCing

Taking a dozen or more MOOCs—sometimes three or four dozen—gives a special perspective on what’s available now in the world of online learning. Even the fact that super-MOOCers exist is an indication that people are finding a special sense of challenge and fulfillment with MOOCs—something akin to the allure of chess, the thrill of a poker competition, or the social feeling of quilting bees. This means it’s worth it for us to take a little time to meet a bigger group of these wide-ranging, self-propelled learners.

Among this intense, ^{tech-savvy} ~~online-savvy~~ group, conventional college degrees still seem to matter: many super-MOOCers already have them. MOOCs are often being used to flesh out a new expertise—to second-skill—in a more flexible, low-cost way. Super-MOOCers are aware that many employers want self-motivated learners who keep themselves up-to-date and who are also willing to broaden their skillset.

But perhaps it’s best to learn about motivation directly from super-MOOCers themselves.¹ Here we go:

“No-Pay MBA”

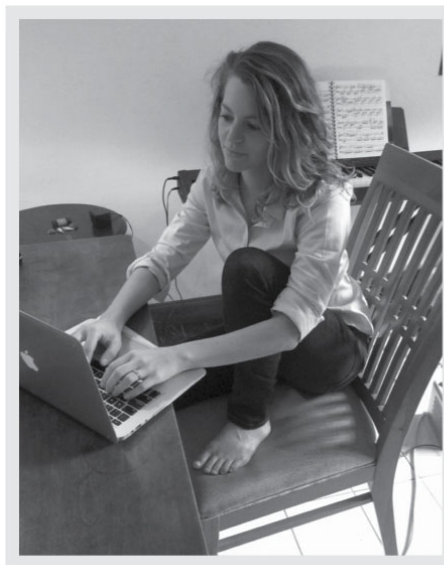
Laurie Pickard is stationed in Kigali, Rwanda, working for the U.S. Agency for International Development, a federal agency that manages the majority of the U.S. foreign aid budget. She holds an undergraduate degree in politics from Oberlin College, has taught public school in Philadelphia, and earned a master’s degree in geography from Temple University. Laurie got her start in the field of international development as a Peace Corps volunteer in Nicaragua.

Laurie has taken around thirty MOOCs (she stopped counting after twenty) as part of her project to complete the educational equivalent of an MBA. She calls this project her “No-Pay MBA” and she has been blogging about it at www.nopaymba.com since late 2013. Laurie admits that her education was not completely free—her biggest expense has been in maintaining high-speed Internet while stationed in Central Africa. But compared with the price of an MBA degree program, MOOCs have helped Laurie save a small fortune.

Laurie’s work involves forming partnerships with private-sector companies to improve the lives of people in developing countries. What she

especially appreciates from her MOOC learning is how she is able to directly apply it to her work in international development. She says:

My particular focus is on entrepreneurship and public-private partnerships. I've been able to develop new skills, keep my knowledge fresh, and have even been promoted since starting my MOOC education. I am able to use what I learn in real time, which is a huge benefit over full-time degree programs. Knowing that I can speak the language of business, I feel much more confident when discussing partnership opportunities with high-level executives from private companies. After covering the basics, I've developed an on-demand style in which I take MOOCs as needed to build new skills and knowledge. I'm currently taking a course on two-sided marketplace businesses (think Uber and Airbnb) in Africa. I have felt my worldview shift, I have developed a new vocabulary, and I have met fellow learners from around the world.



Laurie Pickard “super-MOOCing” in Rwanda as she heads toward the equivalent of an MBA degree.

A Do-It-Yourself Data Science Master's Program

Twenty-three-year-old David Venturi's first internship for a dual-degree program in chemical engineering and economics left him less than enthralled with chemical engineering. A chance encounter with a friend who had interviewed with a MOOC provider led him to MOOCs. He ended up trying Udacity's CS101—an introduction to programming and computer science. (Udacity is a MOOC provider that focuses more on vocational courses for professionals, rather than general university courses, although it has recently partnered with Georgia Tech to do a master's in computer science.)

A lightbulb clicked on: programming was the subject and career David had been searching for! But how could he transition into the field? The most straightforward way David could see was to earn another bachelor's degree—this time in computer science, since he didn't have the prerequisites for a master's.

David applied and was accepted by the University of Toronto, one of the best programs in Canada. He was elated. Off he went to his new university,

planning to complete their computer science program even as he was finalizing his dual degree at nearby Queen's University. He began attending classes, but soon came to a disconcerting realization—these courses were nowhere near as good as the courses he had been taking online. Another reality set in. Tuition was around ten thousand Canadian dollars a year. It would take him *three* years to graduate with a second bachelor's degree—all while earning little income but accruing a lot of debt. By the end of the second week, he dropped out of the Toronto program. He explains that the traditional university route for computer science “just didn't feel right”:

I remember sitting in the lecture hall and thinking the learning process seemed so slow and inefficient compared to my Udacity experience. I've always hated long lectures . . . I usually have to relearn all the content back at home. With MOOCs' less-passive listening and more-active doing approach and the “pause video” button, I could learn faster, more efficiently, and for a fraction of the cost.

Even as he is nearly finished with his dual-degree program, David is now in the midst of his own data science master's program using online resources. He's about 50 percent through his curriculum, which is a compilation of about thirty individual MOOCs.²

In addition to providing more efficient learning for many students, MOOCs offer huge cost savings over traditional college programs. David estimates a total cost of just over one thousand Canadian dollars for the program he came up with. In comparison, he says, “Paying \$30,000-plus to go back to school seemed irresponsible.”

The Good and the Bad of Do-It-Yourself Degree Programs

Here are David's own reflections on how his do-it-yourself program has worked out for him.

GOOD

- **Because of MOOCs, I finally found a career path I'm excited about!**
- I'm **saving tens of thousands of dollars**, not including the opportunity cost of getting into the workplace faster.
- **No forced extra electives.** I'm learning what I want to learn, faster, more efficiently—and at a lower cost. I handpick my courses—an important consideration, because I already took plenty from my original undergraduate degree.

- I can **fast-track my studies** without trudging along with a strict four-month semester time line.
- I'm **learning where and when I want**. It's awesome to have the freedom to make my own schedule and choose where my "classroom" will be. All I need is a laptop and headphones. I also feel less pressure than I did when studying for my chemical engineering degree, though I'm working the same amount of hours per week as I did back then. This is probably due to a combination of the increased content absorption efficiency and no hard deadlines.
- I **connect with people all over the world** through Twitter, Slack, LinkedIn (where Udacity has a Nanodegree alumni group), and my website. Next week, I'm having a Skype chat with a fellow MOOC graduate from India. That's pretty cool.
- I'm **helping and inspiring others**—which inspires me. A number of people (friends and strangers) have reached out and told me they were inspired by my path and asked me to guide them regarding their online learning goals. It is very fulfilling, both to hear they were inspired and to enable others to move forward.
- I'm **raising awareness**. Many people still aren't aware that incredible resources like Udacity, Coursera, and edX exist. I feel very lucky that the timing has worked out for me in regard to discovering MOOCs. I want people to be aware so they don't need a stroke of luck to seize a potentially life-changing source of education.

NOT SO GOOD

- **Work-life balance decisions are trickier.** A self-paced program requires self-discipline. Turning down social stuff to stay on schedule is way more difficult without professor-imposed, grade-threatening deadlines. When taking a MOOC, you are presented with more decisions to make regarding time allocation for family, friends, physical activity, entertainment, school, networking, and sleep.
- **I lack the level of classmate interaction of a traditional university.** The lack of face-to-face interaction is mitigated by the ability to connect with people all over the world. But it'd be more awesome if we could also hang out with nearby MOOC-mates. Services like Meetup and Udacity Connect are trying to fix this, but they aren't that well developed yet.
- **Flexible deadlines make for doubt and guilt.** It's never about whether I am learning the content, it's: *Am I going fast enough? Did I work enough today? Holy crap, going to the gym and making meals take four hours out of my day!* I never felt unsatisfied with my progress in the university, where everyone had the same deadlines. When you're making your own schedule and creating a unique mix of courses, you're also creating your own benchmarks for what you want to achieve.

With MOOCs, Browsing Is Welcome and Failure Is an Option

Pat Bowden is a retiree in Queensland, Australia, who started taking MOOCs because she saw it as a way to pursue interests she had been unable to follow earlier in her life. After failing her very first MOOC, on astronomy (it had been forty years since high school physics), she's gone on to successfully complete seventy-one—and to fail another twelve.

Former bank officer Pat says, “MOOCs have opened up a new world for me. I envisaged a retirement doing handcrafts and pottering around the garden. Instead, despite a rocky start to my MOOC studies, I have learned a lot in the last few years and now have the confidence to start a writing career.”

It’s worth noting what it really means to “fail” a MOOC. It’s a different kind of failure from a traditional classroom. For one thing, the stakes are lower—MOOC grades are not going to go on a college transcript. For another, there are opportunities to try again—if you don’t pass a MOOC, it’s usually offered again within another few months.

Laurie Pickard, the “No-Pay MBA” foreign aid worker in Rwanda, observes that it’s impossible to truly fail a MOOC in the traditional sense, since MOOCs generally mean learning at your own pace and exploring the limits of your current capabilities. Another nice feature of MOOCs is that it’s easy to back away from a MOOC and take another MOOC or two to get the background knowledge you may need to be successful in the first MOOC.

Education technology entrepreneur and super-MOOCer Yoni Dayan (we’ll learn more about him further on) notes that many learners are only interested in parts of a MOOC, or in quickly browsing through the material and watching specific videos. They may not complete a MOOC, but they’ve used the MOOC to help them succeed in their own learning goals. In this sense, MOOCs are a lot like textbooks. **Students are made to purchase \$250 textbooks, of which they may use less than half the material.** Yet no one says that textbooks aren’t worthwhile because of their low “completion” rates.

Self-Improvement That Also Enhances Business-Related Skills

Cristian Artoni, an operations manager and analyst on the staff of the chief operating officer for a major Italian transportation company, has taken nearly fifty MOOCs. An avid learner, he also reads at least a dozen books a year, always related to the themes of the MOOCs he is following.

On his LinkedIn profile, the list of MOOCs Cristian has taken reveals an extraordinarily broad range of interests—including ancient philosophy, management, spreadsheets, public speaking, negotiation, and, of course,

“Learning How to Learn.” This may seem a wild hodge-podge, but Cristian uses a precise logic to approach his MOOC-taking. In essence, he takes theoretical and practical concepts from the courses, which not only improve him as a person, but also allow him to function more effectively at his work.

A cornerstone of Cristian’s studies has been learning *how to learn effectively*. With this skill, he feels he’s been better able to access a range of other skills. Since Cristian plays the role of mentor, coach, and trainer within his company, he’s found that knowing how people learn has been particularly worthwhile. Also useful have been MOOCs in leadership, communication, and negotiation, which have enhanced Cristian’s ability to find new ideas, communicate them, and then persuade people to act on them.

Cristian also values critical thinking. He notes: “Philosophy is the foundation of this skill, while logic is its tool.” Related to this are problem solving and time management, which are key requirements for Cristian’s everyday work.

Cristian became a senior mentor for the MOOC “Learning How to Learn” and then took charge of the Italian version of the course. Under Cristian’s leadership, gathering fifty volunteers together and translating the equivalent of an encyclopedia happened virtually overnight. His organizational training from MOOCs, as well as his own natural acumen, have allowed us to improve the management of a course so large that it dwarfs any previous approach to teaching.

I have recently begun to experiment with online learning. It’s both interesting and relaxing. I choose when I want to take courses. I can also replay videos until I understand the key ideas—I can’t do that with my teachers in a regular class. Online is the best way I’ve found to learn new skills.

—Sanou Do Edmond,
third-year statistics student from Burkina Faso

Fine-Tuning and Expanding Technical Skills

As a program evaluator and database administrator in the human services nonprofit sector, Jason Cherry has found that MOOCs enhance his job

performance. Most of Jason's colleagues are social workers, which has meant that it has been tough for him to fine-tune his technical skills with fellow high-tech types at work. At first, Jason took MOOCs to improve his analytics skills and learn web development and more programming. Once he started, he couldn't stop—to date, he has completed roughly thirty-five MOOCs. Jason says, "One thing I really like about MOOCs is the flexibility—still having deadlines, but also allowing me to go as rapidly as I'd like. It's easy enough for me to blast through a week's content in one class in an afternoon." Right now, Jason is supporting his work's development department with his MOOC-obtained insights in predictive modeling, which is well beyond anything they had before.

Reinventing Yourself

Brian Brookshire was the smart kid who blew the test curves in Des Moines, Iowa, while growing up. But although he had plenty of friends and girlfriends, and was even in a fraternity, social relationships never quite clicked for him. He says, "I just didn't have a good algorithm for social interactions. People would ask me why I was so quiet and I would reply, 'Because I don't know what to say.'"

He graduated from Stanford with a bachelor of arts in Japanese, and a few months later, he found himself in Korea studying in an intense, yearlong Korean language program. One evening, he was killing time online when he ran across a quiz that asked, "Can you tell when she's ready to be kissed?" Intrigued, he clicked on it. At the end an ad popped up for a video course on dating. On a lark, expecting nothing of real value, Brian enrolled. But a whirlwind tour of ideas in evolutionary psychology and general self-help, and adaptations of techniques from sales and marketing, soon convinced him of an idea that he found revolutionary—social skills were indeed learnable.

Brian says:

I quickly discovered that there was an entire category of dating advice for men seminars being promoted on the web, and a host of web forums where the material was being discussed. I tried it. I tried it all. Surprisingly, a lot of the material was not even really about dating per se. There was a lot of emphasis on perspective-taking and being able to understand where others are coming from. Realizing that other folks are walking through

life experiencing the same worries, concerns, and hopes as you. As one speaker put it, “The more personal an issue seems, the more universal it is.”

It worked. Over a six-month period I met and went on dates with approximately sixty different women—one of whom I eventually married. The effects spilled over into all other facets of my life. I began to feel at ease in social interactions in a way that I had never felt before. Meeting new people became a genuinely exciting experience.

This self-reinvention through online learning was a number of years ago—but it taught Brian a lot about how learning could make extraordinary changes in his life—much broader than he’d ever thought possible from the usual academic approaches. He has set a powerlifting national record, has appeared in fashion magazines, speaks Japanese at the highest levels of proficiency, and is fluent as well in Korean. Not bad for an ordinary “meat and potatoes” guy from Des Moines.

These previous self-reinventions have led to Brian’s most recent learning adventure. Wanting to understand more about the microbiome, he took a MOOC. Before he knew it, Brian was fifteen biology courses deep and enjoying himself more than he had in years. A question he always likes to ask himself is, “How can I take what I’m doing to the next level?” He thought of setting out to complete a PhD in biology. But going back to undergraduate school for three years to complete the requirements to apply to a doctoral program was unappealing. So, inspired by an online computer science program he’d seen, Brian put together an undergraduate biology program insofar as possible with the equivalent MOOCs—he’s blogged his efforts.³ Whether or not Brian gets his doctorate remains to be seen. But his learning path, along with his preexisting business and language skills, is meanwhile positioning him to be knowledgeable about a nascent market in Asia that melds both biology and business.

Working Through Disabilities

Super-MOOCer “Hans Lefebvre” became a quadriplegic after an unfortunate fall at age eleven.⁴ He types on the keyboard with a stick in his mouth or by using voice recognition. Hans has earned a master’s in astrophysics, and he would like to earn a second master’s in computer science. But he doesn’t have the previous coursework to allow him to enter the program without starting all over with a second bachelor’s degree.

As it turns out, however, the university has another path for getting in their master's program—passing their equivalence examinations. To that end, Hans has taken more than fifty computer science MOOCs, in which he has been a top student—he has even become a mentor in Princeton's algorithms MOOC. Hans still has a few more courses to take before he feels he is ready, but the availability of advanced online coursework through MOOCs has made a way for this gifted learner to have dreams for the future. Hans's long-term goal is to get a job in university research. This is not an impossible dream—he lives in one of the most accessible cities in Europe for those with physical disabilities.

Hans says, “I love learning, so I'm having lots of fun. The more I learn, the more I realize how much I'm lacking skills, but that just motivates me to keep learning.”

Social Mindshifting: Using MOOCs to Develop New Social Networks

French-Israeli entrepreneur Yoni Dayan, a thirty-four-year-old graduate in international affairs from the Sorbonne, has always been fascinated by start-ups. When he was only eighteen, he cofounded a company that reviewed video games—since then, he has been drawn to the idea of creating businesses that help others.

A benefit, but simultaneously a challenge, for Yoni has been the “natural” social circles that surround him. As a college student more than a decade before, he formed professional connections in the international affairs community. But for an entrepreneur like Yoni, those types of connections weren't enough. He needed entrepreneurially oriented social networks to allow him to build his business-making acumen.

MOOCs formed the perfect networking opportunity. Yoni has taken several dozen, many in business and entrepreneurship, and others in related areas such as programming, creativity, and design. Yoni says, “By struggling together in submitting the team assignments on time, by collaborating through hangouts, and by sharing our stories, my virtual acquaintances have become friends and associates.” In the past few years, the succession of small wins and continual support from the like-minded individuals Yoni has met in online courses have given him the confidence to fully embrace his inner entrepreneur. Among many other projects, he is now

in the process of leveraging the insight and networks he has developed from super-MOOCing to create a new start-up on valuing the informal ways we acquire knowledge and skills.

Being a Generalist

Super-MOOCer Paul Hundal, a fifty-nine-year-old lawyer from Vancouver, recently finished his hundredth MOOC through edX. In an age when having specific programming or business skills is valuable, it's easy to forget that society also needs generalists. And, as Paul points out, being a lawyer is about being a generalist. Rather than having specialized knowledge on one topic like a scientist, a lawyer has to analyze every case as a new fact pattern with different and sometimes hidden issues. The more generalized knowledge he has, the better Paul can analyze a situation.

For the past two decades Paul has been on the board of directors of one of Canada's oldest environmental groups, the Society Promoting Environmental Conservation, where he has led campaigns for water- and air-quality protection, the protection of old-growth forests, wildlife habitat conservation, and waste reduction. These campaigns required Paul to develop generalized knowledge from many disciplines so he could be effective at advocating for conservation.

Paul's approach has always been to get the facts and science right. He recalls, "Twenty-five years ago, when I needed to quickly learn something in a specialized field, I used to call the local university and speak to an academic expert. At that time professors were surprisingly open to talk to someone on a cold call, especially when they knew why I was asking. Over the years, however, that became much more difficult. People just are not as accessible through cold calls anymore."

Lots of information is now available on the Internet, but learning to sort the good from the bad is key—twenty sources can cite the same false statement, which came from the same original bad source. Paul's been forced to become more of a do-it-yourselfer in finding the knowledge he needs to do his job properly. He says, "When I first heard of edX, free online courses taught by the best professors in the world, I immediately was convinced of the value of it. I could study almost any topic, benefiting from the best scholarship in the world, quickly and easily from home. After one

hundred MOOCs it has been a wonderful experience in broadening my knowledge in the most efficient way so I can share that knowledge with others. It makes me a better lawyer and a better environmentalist advocating for conservation and a better world.”

→ Key Mindshift

With New Forms of Learning, You're the Driver

Remember that the new forms of learning allow *you* to take charge. MOOCs are an important new resource for achieving your learning goals, whether they demand technical skills, soft skills, or even skills about learning itself!

Changing Your Brain: Online Learning Makes It Easier

Jonathan Kroll is an entrepreneur who loves learning languages. And that's a bit of an understatement. Back in college at UC Santa Barbara, he majored in French and Spanish and minored in Portuguese (but only because he wasn't allowed to triple major). He had also studied Latin, Italian, and Catalan.

Jonathan's aptitude for languages was not matched by an aptitude for math. In fact, Jonathan was terrible at math. However, this wasn't a big deal to him, because he was planning for a career in foreign service.

Shortly before graduation, though, Jonathan found himself drawn to the potential of the then newly exploding Internet. There were entrepreneurial opportunities galore, and Jonathan threw himself headlong into the competition with others who were forming new companies and services like Facebook, YouTube, and Gmail.

By day, Jonathan would go to class to learn and bone up on the sort of languages he'd always done so well in, and at night, he'd come home to research, learn, and experiment with programming languages. He was surprised to find that he had transferable skills—the grammar, syntax, and semantics of the languages he had been studying for so many years had primed his brain to easily digest and understand the rules governing computer languages. (Yet again, we see that “irrelevant” expertise from the past can provide a surprising advantage in a new career.)

Eventually, in hopes of giving himself a better understanding of the entrepreneurial world he was embracing, Jonathan set his sights on business school. He began preparing for the GMAT (Graduate Management Admission Test). The GMAT is math-intensive, so Jonathan knew it would be tough on him. There are no calculators allowed—Jonathan would have to do every single calculation by hand during the test. He would have less than two minutes per question, so every second mattered. However, Jonathan, at twenty-nine, could barely perform simple multiplication or division without the aid of a calculator—much less factor a polynomial or calculate the number of permutations of n distinct objects in a circular arrangement.

He took the test and got the results. It was pretty much akin to having been run over by a semitruck. He wasn't just bad at math—apparently, a first grader could have done better.

He picked himself up, dusted himself off, and started over with his studies. Understanding now how bereft he was of math fundamentals, he decided to start his reviewing process with elementary school math. He worked with tutors and test-prep experts, and studied for hours on his own. Little by little, he mastered each concept.

Over two years, he sat for the four-hour GMAT exam on *six* different occasions. On top of that, he sat for the GRE (Graduate Record Examination) four times. In the end, his scores blew away those of the vast majority of Americans. What was really important was how, through those two years of study, Jonathan gained a completely different outlook on his ability for math. He really *could* do it after all.

Jonathan knew there had to be a better way for people to study for the quantitative sections (the parts with all the math-related questions) of exams like the GMAT and the GRE. He and his former tutors realized they had an opportunity at hand, in the form of an already-existing company named Target Test Prep. It was a company with not fully realized potential. Its assets were its comprehensive curriculum and thousands of proprietary practice questions. But its software was outdated, its branding was lackluster, and its market penetration was poor. Jonathan saw the possibilities and decided to delay his plans for business school to instead join Target Test Prep as chief technology officer. Within weeks, a plan had been crafted to rebuild its GMAT software from scratch—and a month later,

a ten-person development team had been assembled and was ready to get to work.

MOOCs were just becoming more widely known, and out of curiosity Jonathan had already taken a few. He was surprised to find that this new knowledge was immediately useful.

For one thing, panic is a big factor on high-stakes tests. Jonathan had been there himself—the pressure turns your mind blank, you feel almost frozen, tunnel vision sets in, the clock runs, and the stress makes applying even your most comfortable concept nearly impossible. The MIT MOOC “Design and Development of Educational Technology” taught Jonathan about “active learning” and how noncognitive skills can be as important as content knowledge when preparing for a high-pressure, high-stress environment such as the GMAT. This allowed Jonathan to develop insights and ideas for features that he brought to the table during planning discussions.

In a related vein, it turns out that the GMAT contains so many concepts that it can be overwhelming for students to know how to organize their studies. From the MOOC “Learning How to Learn,” Jonathan had learned about the concept of chunking. (If you’ll remember from Chapter 3, chunking involves building small chunks of knowledge using day-by-day practice and repetition. It’s the foundation of expertise in any subject.)

Knowledge of chunking led Jonathan to push to have Target Test Prep’s content organized online so that each unit was small enough to “chunk.” His team then designed a system for students to practice questions related to each specific chunk. For example, they took the concept of “exponents and roots” and made it its own pedagogical unit—an “über-chunk.” This large chunk was then further subdivided into fifty or so smaller chunks, each with its own corresponding body of practice questions. All of this was built into the very deepest structure of the software. Such an approach may seem common sense, but it is not something done to the same degree by other test-prep companies, where, for example, everything related to exponents might be swept into a big “arithmetic” category.

Jonathan’s experience as a “bad” math student was surprisingly valuable. For one thing, he knew exactly where students would struggle. As Singapore’s Adam Khoo would say, Jonathan turned a problem—his inability to do math—into an opportunity.

Since its relaunch, Target Test Prep has been featured in top magazines and has formed partnerships with leading universities and organizations.⁵ They have helped thousands of students earn impressive scores on the GMAT, GRE, and MCAT—and perhaps as important, the company has allowed people to improve the critical-thinking and analytical skills that are in strong demand today. It's not just teaching to the test—it's teaching vitally important skills.



Jonathan Kroll's MOOC certificate collection. MOOCs have allowed Jonathan to bring new ideas from neuroscientific research directly into the creation of a new, useful, and popular product.

As for Jonathan? Although his math studies were done before MOOCs came along, he now understands the power of learning in making pivotal life changes. He has become a super-MOOCer, completing eighteen MOOCs to date. He is always learning something new, either for professional improvement or out of simple curiosity.

→ Key Mindshift

Online Learning Provides a Great Path for Renewal!

It can be shocking to realize how high school skills have atrophied or were barely there in the first place. Online learning provides a great way to refresh old learning, bone up on the skills you need for a critical test, or simply gain foundational skills.

Super-MOOCer Ronny De Winter's Tips for Getting the Most Out of MOOCs

Ronny De Winter is a freelance software engineer from Belgium who has completed fifty MOOCs. Here are his tips for top performance:

- Define what you would like to learn in the next two to three years.⁶
- Find the MOOCs and other learning means that best fit your needs—Class-Central.com is very useful here.
- Before enrolling in any MOOC, carefully investigate the course outline, prerequisites, syllabus, and suggested weekly workload.
- Schedule time each week. To play it safe, it's a good idea to arrange to have twice the recommended time available for your learning.
- Some people like to listen to videos at anywhere between 1.2 to 2.0 times normal speed. More advanced MOOCers sometimes employ "fast-MOOCing." In this approach, you skim through the syllabus and slides before watching videos. Then you watch the videos at up to 2x speed.
- See how things go during the first week. If you're not getting a lot out of a MOOC, stop taking it.
- Don't enroll in too many courses at the same time. It's better to study a few subjects deeply than many courses superficially. Most courses are repeated, so you can usually take a course later if it doesn't fit into your schedule.
- Use the discussion forum to enhance your learning and to get questions answered—but be aware that this can be time-consuming.
- Any time you enroll in a brand-new course, you may find it a bit buggy, so if this bothers you, wait until a later offering. But first-time courses can still be fun, so don't discount them altogether.

Can We Learn Too Much?

Sometimes MOOCs are valuable because they cause us to step back and look at what we really want to learn, and why. Ana Belén Sánchez Prieto, professor of medieval manuscript studies and archives management in Madrid, gives interesting insight about this. Ana was originally a total skeptic about the value of online learning. But when her university started a pilot program for an online master's degree, she volunteered to teach a class, mainly because she figured that teaching via the web would allow her to spend more time with her husband, who worked abroad. After all—if she taught online, she could teach from anywhere.

Since Ana was going to create an online class, she wanted to try one. She took the MOOC “Archaeology’s Little Dirty Secrets,” by Sue Alcock, a classical archaeologist at Brown University. Ana loved it—it gave her a lot of ideas for her own online class. But oddly enough, it also showed Ana that, just because she knew her subject, it didn’t mean that she knew the most effective way to teach it. With that in mind, Ana enrolled in another MOOC, “Foundations of Teaching for Learning.” She thought that was a good class, too.

Next, Ana realized that there was a whole cluster of education-related MOOCs, a “specialization,” from Coursera. *Hey, a specialization would look good on my résumé*, she realized—though she was a full professor with tenure who loved her job and had no intention of moving.

Ana ended up taking every MOOC she could find about education. However, the MOOC “Teaching Character and Creating Positive Classrooms,” by Dave Levin of the Relay Graduate School of Education, formed a special turning point. By the time Ana got to the second half of the course, her husband was asking, “Ana, what’s happened to you?” Ana says, “I do not know if the MOOC helped me to become a better teacher, but it definitely helped me to become a better human being.” She feels that the MOOC gave her a deeper understanding of others and a willingness to forgive their weaknesses.

Then Ana began to discover MOOCs on subjects she had always wondered about, but had never had the chance to learn, such as computers. Dr. Charles Severance’s classes on the Internet and Python were fantastic eye-openers for her. (Side note: Most of the MOOC-making and MOOC-watching world loves “Dr. Chuck.”)

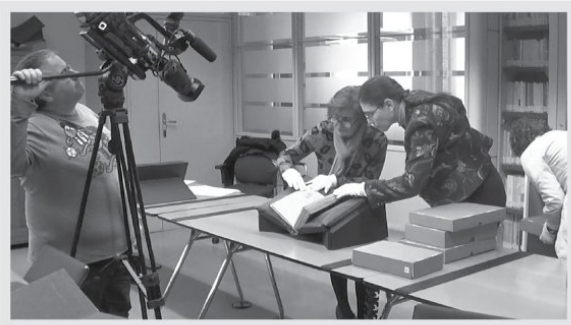
Then Ana began taking classes on HTML and other tools for web development.

Then she began working her way through math with Khan Academy.

Ana was so excited by her ability to learn—and get credentials for that learning—that she got carried away, taking MOOCs on practically everything. “It caused real stress, because I also have my own classes. My social life began vanishing. Finally, I had to face it—I was addicted to MOOCs. And what is worse, I often wasn’t really learning, because I was focused more on finishing and getting the certificate.” By that time, she’d

gotten around fifty MOOC certificates and ninety-one Khan Academy badges.

Ana stopped cold turkey. She had finally realized that many things can be interesting to learn about, but she had to choose.



Professor Ana Belén Sánchez Prieto, on the right, as she prepares to present for her MOOC on medieval manuscripts.

A few months after her cold turkey withdrawal from MOOCs, Ana went back to MOOCing. But this time, she took a more balanced approach. She's started "sitting in on" a MOOC on game design so she can apply gaming techniques to improve her classes. She's planning to repeat the gaming class again before formally enrolling, so she really learns the material. Ana's

objective now is simply to learn—but not to be overwhelmed.

By the time you read this, Ana's MOOC "Deciphering Secrets: The Illuminated Manuscripts of Medieval Europe" will have launched.

→ **Key Mindshift** **Balance**

Life holds many—sometimes too many—learning opportunities. If you are just getting started in the world of MOOCs, note that they can be addictive. If a subject interests you, you can audit a course to browse the material when and where you want, without the pressure of assignments and deadlines. Certificates can be great for motivating yourself. But use common sense to balance learning and certificates with professional obligations and family life.

Why MOOCs and Other Online Learning Courses Matter

Perhaps you're wondering why I've been putting so much emphasis on MOOCs and online coursework in this chapter, as opposed to plain old television or videos. The catch is that television and videos often contain

passive, “watch only” sorts of materials (with a few important exceptions we’ll get to soon). This means that television and video can form a great start for learning, but it’s often still not enough. Many people need a bit of a boost to truly get their brains wrapped around the material. Well-designed MOOCs provide that boost—they help bring the material to life through active learning—the kind of learning that leads to more profound physical changes in the brain. Active learning, remember, is what Jonathan Kroll found to be so valuable when designing an outstanding test-prep system for the GMAT. Such fundamental neural shifts have an impact, not only on mental flexibility, but on your long-term health and longevity.

Here’s what I mean. In passive learning, you might watch a TV show and discover there’s a musical instrument called an oboe. In active learning, *you become able to play the oboe yourself*. Active learning is exceptionally powerful—it’s the kind of learning that allows you to make logical arguments, formulate good questions, problem-solve, expertly kick a soccer ball, speak a foreign language, play that musical instrument, or simply be more creative with what you’re learning.⁷ (Ever wonder why we have the “Now You Try!” sections in this book?)

MOOCs, especially well-designed MOOCs, provide plenty of structured opportunities for active learning through their tests, homework assignments, projects, and discussion forums. Even if all you do is take a few quizzes while breezing through a MOOC’s videos, you’ll see that those quizzes allow you to understand the material in a fresh way. And of course, quizzes reinforce your new knowledge and allow you to check to see whether you really understood the material. (Naturally, deep quizzes involving fundamental concepts are much better than shallow quizzes with superficial, “memorize this” type answers.⁸ But deep quizzes can be much more difficult to create.) All this said, sometimes it’s just not necessary to go overboard with active learning—especially when all you need is a bit of an overview of an area. Again, this is why MOOCs can be so handy—you can pop in and just get what you want or need.

The great thing for learners is that MOOCs compete with one another. All you have to do is go to an outfit like Class-Central.com, which analyzes and compares MOOCs. You can pull up their ratings to find the best MOOC on negotiation, public speaking, organic chemistry, or what have you. It can

also be fun to read the reviews, which sometimes seem like they're straight out of Rotten Tomatoes.

There are challenges, however. At present, many students have trouble motivating themselves to complete the active parts of MOOCs. This is why coding programs like Dev Bootcamp, which has a large face-to-face component, can be so worthwhile despite their high cost. Another problem is that MOOCs provide an education that, in general, won't supply credits toward a college degree. (New technology that applies airport-style facial recognition technologies to proctor MOOCs may spark big changes here.) And yet another issue is that many current MOOCs are too conventional in their structure and passive in their pedagogy. Professors drone on through long lectures that have been sliced into parts to make the videos seem shorter, while the only "active" parts of the course are cursory quizzes with superficial projects. None of this is enough for you to truly wrap your mind around a topic and embrace learning by doing and practicing.

Super-MOOCer Jonathan Kroll has observed that we are moving toward an à la carte skills credentialing model where education becomes more of a salad bar than a sit-down, table-service restaurant. There are smart online education companies that are beginning to make sense of the multiplicity of ways of learning. If you go to the online company Degreed, for example, you'll see ways to input your own learning from hundreds of different platforms like Khan Academy, Coursera, and Udacity, as well as from books, TED talks, articles, and university coursework and degrees. Degreed's motto is "A million ways to learn—one place to discover, track, and measure all of it."

In any case, now that you have an introduction to MOOCs and how they fit more generally with the world of online learning, we'll next discover what it's like to do online learning from the other side of the camera. We're finally going to that low-ceiling place I told you about.

Chapter 12

MOOC-Making

A View from the Trenches

I'M A PRETTY straightforward, old-fashioned midwestern engineer—the kind of person who's happy to be asked out to lunch with friends at McDonald's. So it was kind of a shocker for me when I was invited to speak at Harvard about “Learning How to Learn,” the MOOC I created with Salk Institute neuro-ninja Terry Sejnowski. I was even more surprised to arrive in Cambridge and see the room packed with Harvard and MIT folks, all eager to learn the “secret sauce” behind the making of our MOOC.

Eventually, I understood—at least in part—the reason for their curiosity. “Learning How to Learn” was a labor of love made for less than \$5,000. Yet it had on the order of the same number of students as *all* of Harvard's dozens of MOOCs put together, made for millions of dollars with hundreds of people.¹

Strangely enough (though I didn't share this with the audience), one of the motivators behind my making of this MOOC was the worst professor I ever had in college—call him Professor Clueless. One day, while he was at the blackboard, puzzling over some relatively simple equation he'd screwed up, the students started talking about a TV show. He whirled around to face the class, puffed his chest out, and announced: “I never watch television.”

I was in my thirties then and rarely watched television myself. But because this awful professor had sneered at it, the only thing I could think of was, *I'd better start watching some TV!*

So I did. I didn't watch a lot—just a couple of hours a week. But over the past two decades, that little bit of TV-watching has given me a real appreciation for the power of video and visual imagery for conveying information. As an author, I might write a book like *A Mind for Numbers* about how to learn math or anything else. But by watching television, and talking to people who watched television and other videos online, I began to realize something important. The people who most needed the information in any book about learning would never read those kinds—or any kind—of books. *Instead, those people watch video.*

And there was nothing wrong with that. Remember how I mentioned in the last chapter that television and video don't *always* involve passive learning? Video can not only provide the groundwork for active learning (mimic me and you too can unclog your toilet!), it can serve as a motivator by fantastic guides to explore everything from ancient Greek mythology to string theory. When a video is done well, it's enjoyable—even when it's teaching difficult subjects like calculus. Integrated with the kinds of active learning support materials that MOOCs can supply, video can have a great impact on learning. Good MOOCs may not necessarily make learning *easy*, but they can help motivate you through the material, and help make it *stick*.

In the last chapter, I'd also mentioned that we were going someplace special. Well, we have finally arrived. It's the family room in our basement—the low-ceilinged video studio, where much of the MOOC “Learning How to Learn” was born. There's a photo of it on the next page. I think you'll find it worthwhile, discovering what happened in that basement. It will provide clues about what to look for when you're seeking quality online or in-person learning. My hope is also that you'll gain a better sense of the future of learning.



The upper image shows the raw footage of me in the basement. The black at the top of the photo shows a bit of the hood of the teleprompter. Those black hooded “umbrellas” on the left and the right are two studio lights. (And yes, on the far edges, you can see the fireplace and the blinds.) The lower image is the final composite image of me walking between two metaphors for focused and diffuse thinking. When I was being videotaped, I was acting like the weatherperson in front of that green backdrop, so I had to imagine how it would ultimately look when I composited the footage of me with that of the PowerPoint animations I “walked” among. (Yes, a lot of the moving background imagery in “Learning How to Learn” was simple PowerPoint caught with a screen capture program.)

→ Online Learning: How the Sausages Are Made

Getting Traction

Once Terry Sejnowski and I decided to do the MOOC “Learning How to Learn,” we realized it wouldn’t be easy. Unlike most MOOC-makers, we didn’t have a big grant or some sort of solid institutional backing. But we did have one thing going for us: Terry was a professor at UC San Diego, ~~which was plugged in to the online provider~~ Coursera.

After I scoped out options for getting our course made, it was clear that the only real choice was to buy a camera, put together a little home studio, and do the bulk of the videotaping there. So that’s what I did.

Of course, there was a problem with this approach. I had zero previous video-making or video-editing experience. I could just barely press the right button on a camera—that is, if somebody pointed it out to me. I remember,

see how the sausage gets made

(redirected from *seeing how the sausage gets made*)

see how the sausage gets made

To understand or have knowledge about the process by which something is created or conducted away from public view. Typically refers to something that the average person would find unpleasant or unsavory, in the same way that making sausages might be off-putting to some.

I know you don't like to see how the sausage gets made in politics, but these closed-door deals are the way anything gets done!

Nearly everyone in the country has a smartphone, totally oblivious to the dire effects their production has on the planet and on the lives of workers who assemble them. But, as ever, people don't want to see how the sausage gets made.

See also: [ai](#) · ·

NEVER LET THEM SEE



HOW THE SAUSAGE IS MADE

memegenerator.net

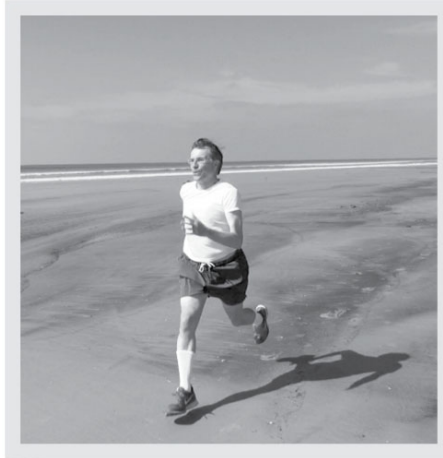
just three years ago, upon seeing a picture of someone's office video studio, thinking to myself, *Wow—no way I'd have the expertise to pull together something like that!*

To create the basement studio, I Googled “how to create a green screen studio” and “how to set up studio lighting.” I watched YouTube videos on video editing and then tried things out for myself. In fact, being able to watch and then try things out myself is what formed the active part of online learning that made it all come together for me. (If you'd like, take a little journey through the endnote here for a listing of hard-earned insights.² A good MOOC on MOOC-making could have saved me so much trouble!)

In the “green screen” approach, you videotape yourself in front of a green backdrop—even a simple green cloth will do. Computer wizardry during the later editing process can then replace that green backdrop with whatever you'd like—for example, the “pinball” metaphors in the illustration that started this chapter. I chose a green screen approach because it would provide a lot of flexibility to allow my image to be moved around on the screen and to add cool effects—only later did I discover that green screen is considered a more advanced video technique.

You might think that learning videography was easier for me, as an engineer, than it might be for you. But the reality is, making professional-looking and -sounding educational videos—even with a “sophisticated” green screen—is not that tough for *anyone* nowadays. I won't lie to you—as with any new venture, there were moments of frustration. But whenever I'd really get stuck, I'd just ask some local high school kid for help.

Terry shot footage of his part of the MOOC in San Diego and sent it my way. I edited in his insights, which help provide the neuroscientific backbone of the course. One of the many great things about Terry is that he's not only a legendary neuroscientist, but he shows how to use neuroscientific research in practical ways to improve our lives.



Terrence Sejnowski, co-instructor of “Learning How to Learn,” practices what he preaches in the course about the importance of exercise. When I visited him in California, I asked where he exercises. Next thing I know, Terry’s scrambling like a mountain goat down a 400-foot cliff and running for miles on the beach.

My heroic hubby, Philip Oakley, was the man behind the camera, also running the teleprompter and handling audio. In addition, he did some of the initial rough editing. Oh, and then there was the psychological support he provided. I’d flub a take for the fourth time and rip off my microphone, melodramatically announcing, “I just can’t do this!” He’d listen, then calmly tell me to get my act together and get back to work. Our son-in-law did some of the cool metaphorical imagery — surfing zombies, metabolic vampires, an octopus of attention. Our two daughters kindly “volunteered” for bit parts like backing a car up into a ditch or looking dorky in a set of oversized headphones. This kept production costs down.



My hubby Phil, safely behind the teleprompter as I have a diva moment.

The use of family, um, “actresses” would also lead to later surprises. Our older daughter, for example, a medical school student at the time, was taken aback when her professor — a distinguished specialist — suddenly stopped the class, pointing directly at her: “Wait — you’re in the MOOC!”

As I worked on the MOOC, pre-registrations began to add up — ten thousand, thirty thousand, eighty thousand. MOOCs don’t usually see anything like this kind of

interest so early on. This was scary, especially because we weren't doing anything unusual to promote the course. I didn't have time to promote the course.

Partway through production, I made the mistake of reaching out to a professor with a popular MOOC.

"Any tips you might be willing to share?" I asked.

"Why don't you talk to my producer?" he answered.

"Okay," I said, thinking, *Holy crap, this guy's got a producer!* I didn't have a penny for staff.

So I talked to the producer. She said, "Get ready to go with no sleep for six months, because trying to get the twenty people on the production team all synced together is crazy-making."

I thought, *Twenty people! Production team!*

I started to panic. I was working away, scripting, shooting, editing—fourteen, sixteen hours a day.

At that time, even inside academia, few people had even heard the word "MOOC," so I couldn't easily explain what I was doing. My super-competent editor at Tarcher/Penguin, Joanna Ng, called to urge that I do the typical author thing and write op-eds to promote my soon-to-be-published book, *A Mind for Numbers*—the book that "Learning How to Learn" is based on. I told Joanna, "I'm, um, a little preoccupied—I'm in my basement making a MOOC."

There was this long pause. Joanna was hyperpolite, like people get when they're not sure someone's quite all there. "What's a 'MOOC'?" she finally asked.

The Benefits of a Fresh Perspective

For me, the biggest drawback and—simultaneously—the biggest advantage of putting together the bulk of the MOOC myself was learning to edit video. As it turns out, video editing is one of the most time-consuming, most expensive, and—as I learned—most critical aspects of production, because editing goes right to the heart of what sparks our attention. And attention is essential in learning.

It's worth noting that in television- and moviemaking, production and editing revolves around creating compelling sounds, visuals, and stories, in

order to get people to *pay attention to what's on-screen*. In academia, on the other hand, the focus is on *creating the prescribed number of hours of educational content*—important for accreditation purposes. Sadly, the academic tradition of “just doing time” has extended to the production and editing of a surprising number of today’s MOOCs. Though there may be high production values, those alone don’t make a MOOC watchable or worth learning from. To understand what does, let’s visit MOOC-making together—I’ll be your guide to an insider’s perspective on MOOC-making.

→ Key Mindshift

The Value of Fresh Perspectives

There can sometimes be great value in striking off on your own and not following traditional approaches. Even though it may be intimidating, look for opportunities to bring your own unique insights and fresh ways of doing things into your work or your hobby.

Dhawal Shah’s Story: An Eye for Opportunity and a Willingness to Learn

Learning on the fly when the right opportunity might arise is part of the key to success. For example, take Dhawal Shah, the founder of Class-Central.com, a website where people can find the highest-rated MOOCs on any topic they might choose—much like Amazon provides a rating system for books. Dhawal says:

Class Central was something I built for myself over a lonely Thanksgiving weekend in Dallas where I was working as a software engineer. All my friends had gone to visit their families, so I had nothing to do. But I was really excited about free online courses—MOOCs—from Stanford that were being announced. So I built a simple one-page site to keep track of these courses. I shared the link to Class-Central.com on social media. Within a few weeks of launching, Class-Central.com was being used every month by tens of thousands of people around the world.

As more and more universities started offering courses online for free, Class-Central.com grew in popularity. I wanted to work full-time on developing the website, so I applied to a prestigious Silicon Valley EdTech incubator called Imagine K12. To my surprise, I was accepted and they invested \$94,000 in Class Central.

The transition was very abrupt. One day Class-Central.com was just a fun thing that I built for myself—the next day it was a start-up with high

Silicon Valley expectations. But the only thing I had experience with was writing code. I had no idea how to run a business. I had to quickly learn a number of new skills, including blogging, marketing, managing finances, and project planning, as well as personal development skills like leadership and time management. For some I just winged it or learned on the job; for others I got help from resources like online forums, blog posts, online courses, and MOOCs.

To my surprise, I found out that I was pretty good at some of those new skills. It turns out that with those skills, I was able to reach and be useful to millions of people around the world who are trying to figure out which online course to take. At every stage of the business I have to learn new skills to bring Class-Central.com to the next level. My ability to learn new skills has become my most important skill.



Dhawal Shah, founder/CEO of Class Central, which describes MOOCs so that people can make better choices about what MOOCs might be right for them.

Instructors Are Key

In university classrooms, professors are generally in charge. Sure, certain topics need to be covered, but the instructor decides on both the mechanics and the specifics of delivery—whether to read from notes, perform cartwheels, drone through a PowerPoint, or give exams whenever the moon is full. *No one* second-guesses the professor, especially if that professor is more senior and at an elite university—the very type of professor who is most often asked to make a MOOC.

This traditional “professors make all key decisions” approach has also been taken with MOOCs—everyone in the MOOC production chain defers to the professors’ judgment. This can create real problems, basically because most professors are clueless about MOOCs.

There *are* spectacular MOOC instructors who are deeply vested in creating a fantastic learning experience in their online courses. Take, for example, the Ohio State University’s Jim Fowler, who makes calculus not only fun but understandable in his almost magically artistic MOOC “Calculus One,” and the University of Pennsylvania’s Al Filreis, who teaches “ModPo,” about supposedly difficult-to-understand modern poetry. These professors have figured out how to take advantage of the medium—Filreis in particular takes a strong interest in connecting with students through live webcasts and active participation on the forums.

But not all professors are that way. For example, after an embarrassing “you can’t make this stuff up” implosion in front of 41,000 students, the first MOOC on MOOC-making was halted after a chaotic first week, when students had been given vague instructions for various impossible-to-complete activities.³ Many other MOOCs aren’t bad—they’re just bland. The professors simply stand in front of the camera and jaw on and on, rarely bringing in effective visuals or taking advantage of the power of the video medium.

The best online instructors are, of course, experts in their subject area. But they are also receptive to learning at least a little about some of the new technologies that support online learning—screen capture, animation, music, sound effects, video editing, cameras, and more. Part of the challenge in doing a MOOC is simply that they are so new that few instructors have any in-depth experience. As I write this, there are no good books, much less a good MOOC, on MOOC-making. And, of course, most professors have zero training in how to teach, whether in class or online. This means that even diligent, hardworking professors who truly desire to do an excellent job on a MOOC can have difficulty actually doing it.

The take-home message here is that, for a truly outstanding learning experience, you want to look for instructors who have an almost religious zeal for effectively conveying their information in this new online terrain. Again, that’s where online reviews are so worthwhile.

Another valuable tool to decide what MOOC to take is this: Research has shown that if you watch a professor on a video for about thirty seconds, you can get a very good sense of how effective that professor actually is as a teacher.⁴ Amazingly, even as little as six seconds can allow you to form an effective snap judgment, in part based on emotional micro-expressions too fleeting to truly register. (I sometimes play a quiet guessing game while watching people order coffee about how good they would be as instructors.) One caveat here, though, is that sometimes dryly analytical professors can start out like dreadful bores. But when they begin unleashing their understated but deliciously wicked sense of humor, watch out.

There are people called “instructional designers” who can help professors come up with an engaging MOOC structure. The online “classroom” is different from an in-person class because the tempo is

different—good video lessons, for example, are six to ten minutes long. The most helpful instructional designers explain this to instructors and show them how to adjust to this tempo. Poor instructional designers, on the other hand, tend to be more wedded to theory than practice and have little feel for how impractical some theories are. For example, some instructional designers insist that any instructional video should start with bullet points that tell students the key points they will be learning in the video. This approach might have been good in the old days of two-hour classroom lectures, but for a five-minute video, the title alone usually serves as the only bullet point needed. In fact, a list of bullet points at the beginning of a five- or ten-minute video provides a clue that the content will be “pedagogically sound”—and totally snooze-worthy.

Where a professor’s internal zeal for creating a superb learning experience really becomes clear is in the quiz questions. It can be tedious and hard to create questions, so some professors farm the work out to teaching assistants. When they do that—though there are some terrific teaching assistants—you’re getting the understudy instead of the star. Not cool. And typically not as good a learning experience.

I was told that the best way to do a MOOC was to just “act natural” and speak spontaneously. That just didn’t seem right to me—particularly since at the start of the videotaping, my tendency was to freeze and stutter in fear in front of the camera. So instead, I scripted everything and used a teleprompter—no “ums” or “ahs” for me.⁵ In the end, students really appreciated the seemingly casual, easy-to-follow performances on the videos. One important point I personally can attest to is that when you’re first being videotaped, it can be totally intimidating. No matter how much you try to chase away the feelings, there’s always this nervous sense of hundreds of thousands of imagined future viewers. A number of my own first videos (I’m embarrassed to tell you how many) ended up in the computer trash bin.

There’s one more reason why the instructors are key: good ones can break through convention and present the material in a fresh, profoundly useful way. Here’s what I mean, based on my own experiences with MOOC-making.

A conventional MOOC titled “Learning How to Learn” would have been done by professors from a school of education, not by an engineer and a neuroscientist working on their own. The course would have, in all probability, been geared only for teachers, because teachers of teachers reflexively think that teachers are the ones with a real interest in learning. (For those who think that *any* course on effective learning for general learners would be obvious to make and an instant hit, ask yourself why, out of the thousands of MOOCs available when *Learning How to Learn* came out, no one had ever thought to do a course like it before.)

A conventionally done *Learning How to Learn* course would have been structured with something like two weeks on the history of education, two weeks on theories of learning, two more weeks on how babies learn, with the final weeks touching on how emotions shape our learning and perhaps a bit about deliberate practice and the like. There might even have been a brief lecture or two describing a discipline called “neuroscience.” Nothing too deep there, because after all, neuroscience is hard to understand.

Learning How to Learn works because it went back to first principles to present what we know of learning in a fresh, immediately useful way. Neuroscience isn’t patched on as an afterthought—instead, it serves as the foundation for the course’s key ideas. Where the science gets deep, we use metaphor—we trust in the strength of our learners’ abilities to grasp even the toughest ideas when those ideas were presented using the very methods we recommended for learning. We provide direct links to the original research, so learners could check any of our claims for themselves.

How much of what we learn in college could be revitalized by examining the materials in a similarly fresh way? MOOCs offer original, nonconformist professors opportunities for a fresh start, even while providing the platform to reach learners worldwide.

A Sense of Humor

Here’s a dirty little secret about learning that you’ve probably always known, but that nobody really talks about: Even just *thinking* about learning something you aren’t partial to, like studying math, activates the insular cortex—a pain center of the brain.⁶ Humor can counterbalance this pain—it activates the brain’s opioid reward systems.⁷ (Yes, humor is like drugging

yourself—but in a healthy way.) Humor has an incongruity that makes unexpected neural connections—different types of humor can activate very different parts of the brain.⁸ Perhaps, then, humor is the neural equivalent of letting the parts of your brain that are actively involved in learning relax for a moment as other parts of your brain take over to handle the joke. Whether or not this is true, a number of studies have shown that humor is helpful in learning.⁹

Unfortunately, for a lot of people—perhaps especially professors—being funny isn’t easy. Coming up with a single humorous bit, especially if it includes animation, can take time and care. Terry and I once got a letter from a fifth grader commending us because she’d never understood that teachers could be so witty. All I could think was, *Of course we were witty. We spent days scripting that “witty,” damn it!*

Until recently, when learning was chained to physical classrooms, it was easy to get lazy about being both educational and entertaining: *It’s not our job to be funny!* Professors could downplay the importance of humor by claiming there was “too much to cover” to take time for a joke. (Of course, just covering material in class in no way guarantees that students are actually able to learn it.)¹⁰ Or a bit of wit could be dismissed as being a seductive detail that detracts from teaching.¹¹ But the online world is highly competitive. MOOC-makers who take the time and care to seamlessly integrate humor into what’s being taught can not only make learning even tough subjects more enjoyable, but also will make courses that students flock toward.

The bottom line is, when you’re looking for a course that will have real value for you, keep an eye out for reviews calling a professor or course “funny” or “witty.” It suggests a level of care and creativity, and an understanding of student needs, that may not be in other courses . . . and let’s be honest: If there are two courses of equal quality, which would you go for, bland or funny?

➔ **Key Mindshift**

The Instructor Makes the Difference

Your first impression about whether an instructor is effective is usually spot-on. Look for an instructor who shows unexpected flashes of humor—it's a clue that you'll probably enjoy the time you're putting into learning.

Editing: Every Second Counts

A friend who used to produce TV commercials for a big New York ad agency expressed surprise when she saw some of the footage I'd edited together for my MOOC. At first, I thought it was because she thought I'd done a terrible job. To my astonishment, she complimented me—she said, “People who haven't produced stuff for a living generally go way long. I don't know how you got there, and I mean this in the best possible way—you did this like a TV commercial: making every second count.”

How Great Salespeople Are like Great Teachers

Salespeople are also teachers, and time is of the essence. If a prospective client can't quickly grasp what it is you are selling and how it will help them, you don't make the sale and you don't eat. This is especially challenging when you are selling complex technical products and services. We spent hours coming up with metaphors to more quickly and concisely explain our offerings. Imagine if teachers had that kind of moment-to-moment pressure about their students' understanding.

—Brian Brookshire, former director of sales at MortgageLoan Directory and Information, LLC, and also a super-MOOCer

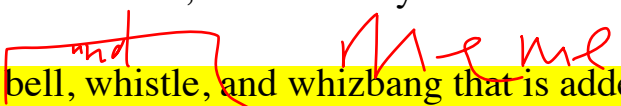
As for how I made every second count, not only did I script succinctly, but I also took care that nothing sat still on-screen for too long. Even my own talking head was too boring for me to look at for long—which is why I'm first on one side of the screen, then maybe ten seconds later, I'm on the other. Or . . . I'll be standing back far enough that you can see my full standing body, and then I'll suddenly shift to a waist shot, which provides the illusion of looming motion. From an evolutionary perspective, looming motion usually involved critters or objects that could kill you, so we human types tend to snap to attention when something looms, even when it's just on video.¹²

One thing that came as a great surprise was how it would sometimes take me ten hours to edit five minutes of video. (Of course, if I'd been a video-editing professional, I would have been faster.) Although editing was

time-consuming, I discovered it is incredibly creative. I began watching television with a different eye—it's fascinating to observe the clever methods used to maintain your interest and to keep a static scene from getting boring.

The best video editors, it seems, have an intuitive feel for the underlying neurocircuitry that keeps people's attention on the video. They do just enough to enhance the message being conveyed, stopping short of distracting from it. Because motion attracts our attention—especially unexpected and looming motion—it is super important in learning online, just as it is in learning in general. This is why some award-winning teachers leap onto desks—and why some of the worst professors inflict death by PowerPoint, with a slew of lifeless images.¹³ Unfortunately, despite its importance, video editing is like the ugly stepsister of the MOOC production process—frequently treated as an afterthought.

What good editors do is help design the imagery, sound, and pace of a production. They are co-problem-solvers and understand tricks the professor can use to convey information in the most engaging ways, yet within budget. A good editor is mindful of both the arc of the story or production and of the bits and pieces. The same scene can be dramatically different and dramatically more—or less—engaging depending on how it is shot and cut, and what the audio is. It's exhausting to just watch a tight shot of someone talking, unless perhaps they are as expressive and hilarious as Chris Rock. Few of us are, which is why smart instructors team up with their editors.


Every little bell, whistle, and whizbang that is added to a video to make it more interesting means time and money. If you're a video editor for a MOOC, you typically aren't paid for making an *extraordinary* ten-minute video that might take twenty hours of editing. You're paid for making *a* ten-minute video that might take, at most, a couple hours of editing. And the reality is, many MOOCs just feature the professor seated in front of a bookcase talking, interspersed with a few pictures and some handwriting. Even if you're a fantastic video editor, there's just not that much you can do to add sizzle to a shot of a professor in front of a bookcase.

Closely related to video editing are insights from the world of video gaming. I believe that the best MOOCs of the future will bring much more

in from the world of online gaming—not just in the sense of “make it more game-like,” but rather, using techniques that video game makers have found grab people’s attention and draw them deeply into what’s on-screen. Music, sound, motion, humor, game-like design, and human-computer interfaces—all of these play enormously important roles in the learning process that can easily be overlooked because of the trapped-in-a-classroom approaches to learning that we’re used to.

The best MOOCs are a meld of academia, Silicon Valley, and Hollywood.

As the price of good video-making equipment keeps falling, it comes within reach for younger and younger students. Some of today’s tech-savvy high school kids will go on to become professors who will make fantastic MOOCs—far beyond what we can currently envision. The best MOOCs then, as now, will be a meld of academia, Silicon Valley, and Hollywood.

Crawl Inside a Metaphor

We love metaphors, because they give us a shorthanded way to say something is akin to something else: “Life is a roller coaster” or “Time is a thief.” I made liberal use of metaphors in “Learning How to Learn”—even walking around inside them, as with the “pinball in the brain” illustration earlier in this chapter. Unfortunately, many professors are skittish of using metaphor—they perceive it as potentially dumbing down the materials. They’re unaware that “neural reuse” theory posits that metaphors use the same neural circuits as the underlying, more difficult concept.¹⁴ The reality is that metaphor doesn’t dumb things down for students. Instead, it brings them more rapidly on board with difficult new ideas.

Another reason that metaphor doesn’t receive pride of place in teaching is that many MOOC providers and universities rely on learning analytics—statistical data about how people interact with online courses—to drive improvements in their course making. These analytics can point to obvious MOOC-making missteps such as lousy quiz questions, confusingly

presented material, and overlong videos that people don't finish viewing. But analytics don't tell you things like "if you'd used a metaphor at the beginning of your theoretical explanation, people would have understood the concept in half the time and had more fun with it, too."

My prediction is that future MOOCs will make much more use of metaphorical visual effects, because MOOCs that use these techniques will tend to be more successful. For you, whatever you're learning, see whether you can make a metaphor to help yourself understand the most difficult topic—you'll be surprised at how much it can bring the key idea to life.

In a related vein, picturing yourself as the same size as whatever you're learning about has a rich history of fueling scientific creativity. Einstein shrank himself five million times to imagine himself traveling so fast that he caught up with a light beam with a wavelength. Cytogeneticist and Nobel Prize-winner Barbara McClintock shrank herself forty million times to enter the realm of the nanometer-sized genes she was studying, where they became like family to her.¹⁵

In a video, we can actually show the professor riding a light beam. The professor can swim around an alveolar sac, pointing out exactly what happens in your lungs when you are breathing. Instructors can slip onto a proton inside a semiconductor. Sure, you can just show a representation of a light beam, alveolar sac, or proton. But visualizing a person guiding you through the internal intricacies of *anything* can make it more personal and engaging. The "ability to visualize the unseen has always been the key to creative genius," says Einstein biographer Walter Isaacson.¹⁶ Using the power of online video, we can teach ordinary people these exceptional visualizing tools of the imagination.

Formal and Informal Learning Connections

My own sense from interacting with hundreds of thousands of students around the world is that perhaps only 5 to 10 percent of learners are highly self-motivated. These are also the ones who tend to gut it out and do every quiz, project, and other assignment required for formal completion of a MOOC. They also learn on their own quite nicely, thank you very much.

However, perhaps another 60 percent of students learn well *when they're able to also connect with other people to bring the material to life*. Online

discussion forums that are built into most online courses make social connections easy. Social media—such as LinkedIn, Facebook, Twitter, and Snapchat—are also used by many MOOCers. Still other MOOCers, as well as libraries, make their own in-person MOOC clubs, kind of like book clubs. Spouses take MOOCs together, and parents enjoy taking MOOCs with their kids. Universities, too, are starting to explore the idea of giving new students a common MOOC experience prior to their orientation. MOOC providers have experimented with meetups and learner hubs, but only an open-source community called Free Code Camp seems to be having any success. (As I write this, Free Code Camp has around a thousand freestanding study groups.)¹⁷ There are also blended learning experiments, where the best learners from a big MOOC with tens of thousands of students are funneled onto an intense, on-campus boot camp–like experience.¹⁸

On a side note, professors are used to telling students to read textbooks. But even though MOOCs can be as helpful as books for a class, professors just aren't yet used to telling students to go off and watch a MOOC—even though it can mean that the professors have to come to the physical class only half the time for in-person work. (This is the so-called flipped format.) However, I believe that once professors realize that they can teach just as well in half the time by sharing the teaching load with top-notch online materials—well, I think it'll be hard to go back.

In any case, the bottom line is that forming connections with other students is a great way to enhance your learning. Some people like making these kinds of connections, some don't. But even if you're a very independent or solitary type, you might be surprised to find how much you enjoy taking a MOOC with friends or family.

→ **Key Mindshift**

Forming Connections

Learning with others can enhance your entire experience—that's why discussion forums and social media can be so worthwhile. Family and friends are often overlooked as learning buddies, but especially when it comes to MOOCs, they can be the most fun!

Where Will MOOCs Take Us?

Over the past century, IQs as a whole have improved dramatically. This rapid IQ ramp-up is dubbed the Flynn effect, after James Flynn, the New Zealand social scientist who discovered it. It's real, not a statistical fluke—most people back in the early 1900s didn't have anything like the learning opportunities we have today to increase our cognitive skills.¹⁹

Flynn conveys this change with the example of improvements in basketball skill. In the 1950s, when television became a household staple, kids were able to watch top basketball players in action. They saw what the pros were doing, and they brought it to their neighborhood games. As kids started playing against other kids who were just a little better, they got better themselves. And better. And better. There was an ongoing cycle of improvement as kids competed and improved not only themselves but one another. This, in turn, brought higher skill levels to professional basketball.²⁰

MOOCs and their ilk are, in some sense, the equivalent of the televised championship basketball games kids began watching. MOOCs can present outstanding teaching by extraordinary teachers, so anybody, student or teacher, around the world, can up their own game. But there's much, *much* more. MOOCs can include little video-editing tricks that grab our attention and unexpected punch lines that leave us laughing—and open to the next tough idea. They can also include metaphors that increase our understanding, as well as splendidly articulated testing systems that reinforce what we need to bone up on and force us to stretch when we reach a plateau.

Essentially, MOOCs are like dating. When you're first going out with someone you're into, you tend to show only your best side. MOOCs, likewise, allow this “best side” selectivity—if the instructor flubs a take, that video can be thrown out and replaced with a better take. Regular classes, on the other hand, are more like a marriage—you see all sides of the instructor. Lousy mood that day? Sorry. Classes are live, and there's no way to take back a poorly taught lesson.

Traditional classes are lacking in comparison to MOOCs in another way. They can be fantastic, but they just don't develop a following that goes

beyond the immediate classroom or lecture hall. MOOCs are different. Much in the way of great books—perhaps even more so—MOOCs can develop a life of their own. The learning that goes on within a MOOC can get caught in an online updraft, spreading to others—locally and around the globe.

The MOOC world is in its infancy. We are at the starting point of a whole new continuous and creative cycle of improvement in teaching and learning, not only for adult learners and university students, but also for secondary and even elementary school levels worldwide. Though, at this writing, “Learning How to Learn” is the world’s most popular MOOC, whatever magic we’ve worked in it will eventually be eclipsed by even better MOOCs—stickier, funnier, and overall “learnier.” This will be a great boon for the mindshifts that many people are making to fit into this new era of lifelong learning.

What to Look For in Good Online Learning— and Any Kind of Learning

The easiest way to decide whether an online learning experience is right for you is to check out an online ranking site. Class-Central.com, for example, has a smart way of comparing MOOCs across different platforms by checking out people’s reviews. As you try to evaluate the best MOOCs for your purposes, look for the following underlying techniques, approaches, strategies, and tricks, all of which can make a difference in how well you learn, and how much you enjoy the learning process:

- **Metaphor and analogy—wrapped, wherever possible, into visuals and motion.** As “neural reuse theory” shows, use of metaphor and analogy allows you to more rapidly understand difficult concepts.
- **Well-done visuals that relate directly to the material—not generic clip art.** If the instructor can’t take the time to develop helpful illustrations, it tells you a lot about how invested that instructor and their institution are in the course. But just slapping a complex image from the professor’s book on the screen also doesn’t cut it. People learn differently from videos than they do from books. Complex images need to appear part by part—you’ll learn better in the same amount of time if you’re not hit visually with everything at once.
- **Lots of motion and rapid cutting.** If intelligently done—and not just style for style’s sake—good editing keeps your attentional circuits in gear while *adding* to your comprehension. People are increasingly used to the rapid cutting seen on YouTube videos, where even a simple exhale is sometimes snipped out to create a sense of breathless speed.

- **Humor.** Content that integrates humor and makes you laugh can help activate addictive dopamine circuits of pleasure. It also provides the mental equivalent of a ledge to temporarily rest on and regain your breath when you're climbing an intellectual mountain.
- **Friendly, upbeat instructors.** Look for approachable, encouraging, fun professors who can simplify the material and make the hard stuff look easy. It may seem obvious that all professors should be this way, but they aren't—the reality is, professors *become* professors because they've continually demonstrated how well they can handle hard stuff—or at least stuff that they can complexify and make *look* hard. And okay, truth be told, some professors are pompous blowhards.
- **A minimum of “ums” and “ahs.”** Unfortunately, MOOC instructors are typically told to speak “spontaneously” rather than read from a script. Occasional MOOC professors—such as MIT's Eric Lander, in his fabled “Introduction to Biology” course—can pull this off, although even Lander refers to his notes. Many professors stiffen in front of the camera, and their speech suffers accordingly; others simply aren't as polished as they might think they are. You might wonder why all videos in a MOOC can't be “spontaneous,” like TED talks. But a typical twenty-minute TED talk demands some seventy hours of practice.²¹ No professor has that kind of preparation time for the hours of footage of a MOOC.
- **Welcoming online environment with mentors and TAs playing an important role.** Mentors and TAs are a bit like park rangers—roaming around online forums making sure the experience is rewarding for everyone, and if necessary, putting out fires. These cheerful assistants also serve as aides-de-camp and lieutenants for the instructors—they often have highly creative ideas about how to improve the course. (This is where having a leader like Princess Allotey, who was willing to solicit and use the best ideas of her team members, is valuable.)
- **Discussion forums and other ways to actively interact with other learners.** Many students benefit from the boost of connections with others. Surprisingly, some of the most introverted learners enjoy discussion forums—it's a way to interact with others even if you're too shy to do much of it in real life.
- **Gamification—bringing in point-scoring, competitive, fun elements to improve learning.** Well-made MOOCs are increasingly taking cues from the gaming world. Games can be addictive—they often are built to give you a series of carefully designed small wins that entice you to go deeper and deeper into the material. (*Wait . . . lunch was two hours ago?*) Zippy music and sound effects at the right moments can enhance feelings of immersion.
- **A well-designed, easy-to-follow course structure.** A glance at the syllabus and the layout of the course on the webpage gives a sense of whether the course is for you. If reading descriptions of the course materials makes you curious to learn more, it's a good sign.
- **Quizzes.** One of the best methods for making sure you really know the material is to test yourself every chance you get. Online quizzes make this process easier. Plus, well-made tests strengthen your retention of the most important aspects of the material. Be careful if reviews of a course mention problems with the quizzes.
- **A final project.** It's uncanny how we can remember that we did a project or report for a class, years after we've forgotten virtually everything else. Not only that—a good final project can leave you with real love for the material. (I once met a man

who moved to Pennsylvania because he'd fallen in love with the state after doing a report on it in grade school.)

★ Now You Try!

Find a MOOC!

Go online and find a MOOC on a topic you're interested in. The easiest way to do this is to go to Class-Central.com to run a search. Class-Central allows you to build your own list of courses and follow universities or topics, and to receive e-mail notifications of upcoming courses and most popular courses.

When you are searching MOOCs of interest, you'll need to be a little careful. The subject matter in MOOCs is so broad that you may not even think to look for a MOOC on your favorite minor novelist or television drama—though such a MOOC may very well exist.

It's helpful to know who some of the major MOOC and online learning "players" are. This listing is of U.S.-based and university-affiliated providers unless otherwise noted. The word "MOOC" is used loosely to mean any low cost or free online course.

- **Coursera:** The largest MOOC provider. Has courses on many different subjects and in many different languages. Also offers an MBA and data science master's degree, and offers "specializations"—clusters of MOOCs.
- **edX:** Has a large number of courses on many different subjects and in many different languages. Offers "MicroMasters"—clusters of MOOCs.
- **FutureLearn:** Has a large number of courses on many different subjects and languages, particularly, but not exclusively, from British universities. Offers "Programs"—clusters of MOOCs.
- **Khan Academy:** Offers tutorial videos on a large number of subjects, from history to statistics. The site is multilingual and uses gamification.
- **Kadenze:** Special focus on art and creative technology
- **Open2Study:** Australia-based, many subjects
- **OpenLearning:** Australia-based, many subjects
- **Canvas Network:** Designed to give professors an opportunity to give their online classes a wider audience. Has a large number of courses on many different subjects.
- **Open Education by Blackboard:** Similar to Canvas Network.
- **World Science U:** A platform designed to use great visuals to communicate ideas in science.
- **Instructables:** Provides user-created and -uploaded do-it-yourself projects which are rated by other users.

Here is a listing of professional- and specialist-oriented platforms (some are subscription-based):

- **MasterClass:** Top masters teaching their subject—Kevin Spacey teaches acting, Serena Williams teaches tennis, Christina Aguilera teaches singing, Annie Leibovitz teaches photography, etc.
- **Udacity:** Tech-related courses for professionals, offers “Nanodegree programs,” and a master’s degree in computer science through Georgia Tech.
- **Lynda.com/LinkedIn Learning:** Thousands of courses in software, creative, and business skills.
- **Codecademy:** Free coding classes in popular computer languages.
- **Shaw Academy:** Ireland-based. Courses on many professionally related subjects are conducted live at convenient times—students can interact with the instructors as well as with fellow students.
- **Pluralsight:** Online developer, IT, and creative training—large library of courses. (Royalties created the first millionaire teacher from online teaching.)
- **Udemy:** Courses by self-claimed experts on a wide variety of topics, including technical topics and job-related skills. Popular with corporate trainers.
- **Stone River Academy:** Web, app, and game development
- **Skillshare:** Courses by self-claimed experts in creative arts, design, entrepreneurship, lifestyle, and technology.
- **Eliademy:** Finland-based, simple platform for anyone, for example, K–12 teachers, to create, share, and teach online courses.
- **Treehouse:** Courses on web design, coding, business, and related subjects.
- **General Assembly:** Courses on design, marketing, technology, and data.
- **Tuts+:** How to tutorials

There are also MOOC and online learning platforms that specialize in certain languages and cultural spheres (there is some overlap between areas and languages). These are some examples:

- **Arabic-speaking world:** Rwaq, Edraak
- **Austria:** iMooX
- **Brazil:** Veduca
- **China (simplified Chinese):** XuetangX, CNMOOC, Zhihuishu
- **Europe:** EMMA (European Multiple MOOC Aggregator), Frederica.EU
- **France:** The France Université Numérique, OpenClassRooms, Coopacademy
- **Germany:** openHPI, Lectorio, Moocit, MooIn, OpenCourseWorld
- **Greece:** Opencourses.gr
- **India:** SWAYAM; NPTEL
- **Italy:** EduOpen, Oilproject
- **Japan:** JMOOC
- **Russia:** Stepik, Intuit, Lektorium, Universarium, Openedu.ru, Lingualeo .com
- **Spanish- and Portuguese-speaking world:** Miriada X, Openkardex, Platzi
- **Sri Lanka:** Edulanka
- **Taiwan (traditional Chinese):** eWant
- **Ukraine:** Prometheus

Also worth noting:

- **Duolingo:** free language learning app for many languages.

- **Crashcourse:** A series of witty educational videos that have expanded from the initial humanities and science (YouTube).
- **VSauce:** Incredibly funny and quirky educational videos (YouTube).

Jot your MOOC ideas down under the title “Possibilities for Expanding My Learning.”

Chapter 13

Mindshift and More

“LOUISE” HAD A problem: Her horse, “Specs,” was trying to kill her.¹

He had just kicked her in the head, knocking her flat. It took five minutes before she came around—fortunately, after she’d hit the dirt and stopped moving, Specs had lost interest and wandered off.

Louise had spotted a flyer for Specs on a gas station bulletin board when she and her husband had driven from their coastal Washington State home to eastern Washington to visit relatives. Specs’s owner, a rancher, had described him as an adorably curious little guy who loved investigating anything new, even if it meant stepping hoof by hoof into a new water trough or managing to get himself entangled inside a brand-new tent. There was just something about the description that captured Louise’s heart. She felt certain Specs would become her perfect horse—the quiet hobby she needed for retirement after her many years of work as a part-time secretary and mostly stay-at-home mom. On their way back to western Washington, Louise and her husband arranged to meet Specs.

Strangely enough, Specs pretty much ignored her. When she’d led him out of the corral, he’d charged into the lead, dragging her along as he snatched clumps of grass from the edges of the path. Louise already had him in her heart, though—they bought him on the spot. Sure, Specs was a little crude. But with a little training, Louise was sure Specs would be Mr. Ed in no time.

It wasn’t turning out that way. One afternoon, Specs had reared overhead to strike—Louise could see all the way to his back teeth as he leaned in to bite. Yet another time, Specs kicked Louise all the way out of the barn.

She'd hit a plank and spent the next few weeks limping. Her list of injuries went on and on—thumb cut to the bone, bruises, stomped toes.

Louise tried to ride Specs, but he would buck her off as soon as she mounted—or he would wait until she was more relaxed and then flop on his side and try to roll over on her. If she led Specs on a halter, he would wait until they came to a steep hillside and then head butt her down the slope. Or he would just take off and gallop through the neighbors' yards.

Louise had loved animals all her life—she'd always been fascinated by how they think and learn. But this situation was becoming increasingly out of control. In fact, Louise was beginning to suspect that Specs was something of an equine psychopath.

But there was a problem. If Louise told anybody about what was really going on, Specs could end up dog food.

She felt trapped. And Specs was getting worse.

Discovering Hidden Potential

Modern humans are thought to have headed into Europe and Asia some sixty thousand years ago, where they found modern horses waiting for them.² Dinner! Humans hunted, killed, and ate equines with abandon for tens of thousands of years. Finally, about six thousand years ago, people began realizing there was hidden potential in horses.³ They could be milked. They could carry and drag stuff. They could even—wow!—be ridden. The domestication of the horse had a profound effect on the course of civilization. Earlier in *Mindshift*, we saw echoes of the power of horses in the extraordinary spread of the Comanches.

Consider what this means: It took humans more than fifty thousand years to discover the extraordinary hidden potential of the horses *hidden in plain sight right in front of them*.

This book's subtitle is *Break Through Obstacles to Learning and Discover Your Hidden Potential*. This covers enormous scope, as we've seen while meeting people around the world, from many walks of life, who've made mindshifts. But, especially when we delve into the science, a common thread becomes clear: People can often do more, change more, and

learn more—often far more—than they’ve ever dreamed possible. Our potential is hidden in plain sight all around us.

I was inspired to write this book because, like Dutch online gamer Tanja de Bie, I am a midlife second chancer. Long after I was supposed to be set in my career and set in my ways, I was lucky enough to have the opportunity to transform myself from a person whose only apparent talent was in language and the humanities. This allowed me to turn to a new career trajectory that eventually led to my becoming a professor of engineering.

These days, working behind the scenes running the MOOC “Learning How to Learn,” I’m newly inspired by all the changes that learners are making. Over and over, I see that people have the ability to learn and change at every age and stage—not only from the humanities to engineering, as I did—but in virtually any direction. This sort of mindshift isn’t just about following your passions, but about *broadening* your passions—reenvisioning yourself in new directions, both in your private life and in your career, and then taking the steps as a learner to *expand your horizons*.

I’ve heard thousands of inspirational stories while writing this book. What this should tell you is that the biographical vignettes I highlight in *Mindshift* give just the tiniest glimpse of what’s possible. *Mindshift* could easily have had ten times the stories I included, but it would still be tied together by the common thread of people using learning to reshape their work and their lives.

There are two overlapping aspects of learning, and we’ve explored both in this book. The first is to realize that mindshift—deep changes in life that occur through learning—is something that can be done at any age, with any goal in mind. Books and other ways of learning can help spur a series of changes—as we saw with Claudia Meadows’s escape from depression and Adam Khoo’s success in professional and personal life through retooling of his attitude. Super-MOOCers show us how powerful, fun, and even addictive learning can be. It also keeps our minds fresh as we age. Indeed, the retirees I’ve met who have a zest for learning remind me of extraordinarily mature intellectual teenagers—the kind of people who are just plain fun to hang out with.

The second aspect of mindshift relates to career: career selection, career enhancement, and career switching. Each of these demands not only a hunger to learn, but also an ability to look dispassionately at the direction and goals of your learning. Sometimes, as with physics-major-turned-neuroscientist Terrence Sejnowski, it can be worthwhile to step back and assess the big picture of a discipline. Upon recognizing the limitations of his particular branch of physics, he turned to neuroscience, where he was able to make far more significant contributions. In contrast, master marketer Ali Naqvi landed in a field—search engine optimization—where his limited computer-related skillset was a problem. He stepped up, using MOOCs to fill the gaps in his expertise. His growing competence resulted in promotion after promotion, which allowed him to move rapidly into management.

It's important to remember that both Terry and Ali found that their seemingly irrelevant past provided value in their new careers. Terry's training in physics gave him the underpinning for the mathematical models he uses in neuroscience. Ali's background in golf gave him the emotional awareness to avoid letting past mistakes affect his future actions, as well as a special aptitude for sports-related marketing.

In fact, a common theme throughout this book is that background and training from the past that at first seem entirely useless often prove valuable in your new job. For example, Arnim Rodeck's analytical way of thinking, which grew from his training as an electrical engineer, enhanced his later-life shift to woodworking. Tanja de Bie's seemingly frivolous experience in gaming resulted in an awesome job managing online communities. Jonathan Kroll's background in Romance languages helped him learn computer science. And musician-turned-med-student Graham Keir was able to make more effective medical diagnoses because of his musical expertise.

Graham Keir's unlikely shift from his beloved music to the hard science of medicine also illustrates how we can broaden seemingly invincible "this is the only life for me" passions to encompass entirely new passions—even in areas we had previously despised. The increasing availability of online learning tools makes this more doable than ever. Graham, as we saw, started his mindshift by looking at a simple precalculus e-book on his iPhone, which allowed him to run through concepts while riding the bus to performances or to school. Others are using digital tools and MOOCs to

enhance their knowledge in their specialties, or to second-skill—to explore new career possibilities and general interests.

What's so beautiful about the online learning world is that it lends itself well to how the brain learns. With MOOCs, for example, teaching can be condensed into bite-size, highly memorable videos that grab your attention. Every video lecture can be the *best* lecture a professor has ever given. Powerful online tools can allow you to practice over and over again until each concept is chunked and becomes second nature. When coupled with conventional textbooks and even “in-person” guidance with activities within a classroom, online learning can become part of the “best of all worlds” of learning.

The socially connected learning communities of MOOCs provide another bonus. As MOOCs mature, these communities will continue to improve. And MOOCs are indeed maturing—in the previous chapter you got enough of a peek behind the scenes of MOOC-making to perhaps sense the direction of the best MOOCs future.

What's particularly encouraging is that thoughtful, creative, broadly available online teaching not only improves the lives of students, but also calls for teachers to up their game. The new teaching materials are also kicking off a digital learning revolution in the ed-tech scene, which is in turn reinvigorating the education-learning sector. Of course, there's even more going on with the trends in do-it-yourself tinker-type learning, most prominently including “makerspaces” in libraries and community centers where people can access 3-D printers and various tools.

For every job . . . the number one thing we look for is general cognitive ability, and it's not IQ. It's learning ability. It's the ability to process on the fly. It's the ability to pull together disparate bits of information.⁴

—Laszlo Bock,
senior vice president of People Operations at Google Inc.

Part of the challenge with mindshift is that, early on, *most of us aren't taught how to learn*. This means that in our youth, we frequently fall into

some pursuit that, at least at the time, we feel we're better at. Then we presume that that's our passion—it's what we should do. This thinking is reinforced since our grades tend to suffer when we wander outside what we're "naturally" good at. We tend to forget that some things take longer to get good at—and as we do get good, those things can, in turn, become new passions. There's more: As mathematics educator Princess Allotey has shown, when our passions are temporarily blocked by unlucky twists of fate, we can use that time, not just to develop broader passions, but also to become more well-rounded human beings. Princess's public speaking abilities, as well as her ability to move past her feelings of imposterhood, will serve her in good stead throughout her life.

Since access to standardized learning was almost entirely limited to brick-and-mortar schools designed for the young over the course of the past several centuries, societies fell into a sort of "learning is only for the young" mentality. But thanks to MOOCs and other online learning opportunities, people are beginning to recognize that learning is for everyone, at all stages of life. This is why innovative countries like Singapore are putting emphasis on learning lifestyles that value learning of any kind, no matter what the subject or goal.

Knowledge of the brain's workings can allow us to leverage every aspect of our learning. In this book, I've tried to convey some of the latest hopeful insights about how adults can keep learning and growing well into advanced maturity—and how a learning lifestyle helps prevent the mental stagnation and decline we often associate with old age. The digital medium is part of this. For example, as researchers Daphne Bavelier and Adam Gazzaley have shown, video games can provide fantastic new ways of not only maintaining but enhancing our cognitive abilities. But nondigital approaches such as meditation may also enhance various aspects of the learning process. We've seen how focused-attention forms of meditation boost the neural networks involved in our ability to concentrate, while open monitoring may improve the diffuse, imaginative processes related to the default mode network.

★ **Now You Try!**

Key Ideas in *Mindshift*

Under the title “Key Mindshift Ideas,” make a list of what you thought were the key points of this book. (This will help you to chunk and remember those ideas.) Do you think others’ lists would look like yours? Why might other lists differ?

Owning the Situation

Other mammals seem to learn in many of the same ways we humans do—they even show evidence of using focused and diffuse modes.⁵ It’s just that a typical mammal’s inability to use speech can make learning a lot tougher. Think of a dog as it bounces around trying to guess what you want—*Did you want me to roll over? No . . . How about to sit up? Drat . . . that’s not it either. Please— just tell me what you want me to do and I’ll do it!*

Not being able to communicate, it seems, was part of Specs’s problem.

Specs was a jet black horse with a sprinkle of white spots on his rump—hence the name Specs, short for Speckles. He’d had a tough birth and had been sickly his first month of life, but he was an adorable little scrapper who quickly became something of a pet. The rancher’s teen daughter, Edwina, had planned to keep him, so she began to teach him tricks she’d learned from an old ranch hand. One of the first tricks Edwina taught him was to lie down. Unfortunately, the way she did it was by repeatedly kicking Specs’s left leg and yanking his head around, which made him lose his balance and fall over.

Louise, reflecting on this sort of training, said, “Some people think teaching tricks to a horse is cute, but it has to be done correctly because what you teach a horse, they *own*.” In other words, seemingly minor tricks can become a fundamental part of a horse’s way of interacting with humans.

And Specs *did* own this particular trick. Lying down became his default behavior. Whenever he got stressed, he’d just drop to the ground—after all, that’s what people had apparently wanted him to do. In any case, Specs had discovered that lying down, no matter what the provocation, usually made any unpleasantness stop. Even better, it gave him power to control the people around him. For example, if someone was riding Specs and he didn’t

feel like being ridden, all he had to do was stop, drop, and roll. That put an end to being ridden, straightaway.

Lying down wasn't the only thing Specs learned from Edwina. Edwina used tools to elicit the behavior she wanted—pain-causing tools. To get Specs to back up, she would thump his chest with a metal hoof pick. He would back up, but it was clear what he'd learned: *I will back up now because you are annoying me, but don't expect me to do it if you don't have that stupid hoof pick hitting me!*

Among the behaviors that horses display when they are frustrated and don't respect or trust whom they're dealing with are kicking, biting, and stomping. Specs used them all. Edwina had other horses that were bigger and more tractable than Specs, so she ended up riding them and leaving Specs to his own devices. Specs wasn't big enough for regular farm work, so Edwina's father packed Specs off to a riding program for handicapped children. Horses for these children need to be very gentle and show a great deal of patience. That wasn't Specs—so he ended up back at the ranch.

Horses can learn behavior, like lying down, that can be either good or bad. Edwina hadn't meant to be hurtful in her attempts to train Specs—she'd just followed the ranch hand's recommendations. But due to the way Edwina had treated him early on, Specs exhibited an attitude of resentment toward learning and toward people themselves. He didn't understand what he was being taught. If he could have talked, it almost seemed he would say, "The way I'm treated is so unfair!" It was clear that, from his perspective, learning was annoying—in fact, *people* were annoying.

This feeling that learning is annoying, to be done only in response to being prodded, isn't seen just in horses—it's in people, too. Early on, high school dropout Zach Caceres watched as many of his friends, turned off from learning, fell into far more problematic behaviors. Of course, Zach's friends weren't locked in a stall or tied to a post—they had more options than Specs. So instead, they messed around in class, tuning out teachers they had no respect for, only doing the bare minimum to pass (echoing Specs—*I will do it now, but don't expect me to do it if I don't have to!*). Zach's friends soon got into drugs or found that violence worked to get them what they wanted. It was the human equivalent of Specs's road to hell.

[Annoying]

The Breakthrough

Back when Louise was a child in rural Forks, Washington, fifty years ago, she'd had a sweet and gentle horse that had happily ferried her around. This half-century-old experience was part of the problem—Louise thought she knew horses. The truth was, with a cantankerous critter like Specs, she was a sixty-two-year-old neophyte, in way over her head. Nothing she tried was working. Specs's belligerent behavior—pushing back, kicking, biting—could have been handled by an experienced horsewoman who would have whipped him into shape in no time. But for Louise, Specs's aggressive behaviors were just scary and upsetting. In any case, whipping a horse into shape wasn't Louise's style.

In desperation, Louise set her horse-training books aside and reached out online to a horse-training expert. (In other words, like many we've seen in *Mindshift*, she found herself a mentor.) Louise says: "The trainer would send me assignments and I would take video of ourselves doing them. Man, she was tough—I got yelled at many times for my mistakes, all because she was concerned about my safety. She worked with me for two years. I kept quiet about it because no one would have believed that I was trying to solve my problems by working with someone who lived on the opposite coast—but we did it! I owe her a great deal—thank goodness for online learning."

Louise was startled to discover, first off, that Specs hadn't learned to respect a person's personal space. For example, when Louise would go into the corral to spend time with Specs, he would push right up to her chair, nosing her glasses askew, grabbing her book with his teeth, even knocking over her chair as she jumped aside to avoid him. He had never learned patience, so he would push her aside to get what he wanted—usually food. Specs had also learned that if he bit, reared, balked, or lay down, he could get his way. Of course, all this made him very unsafe for Louise to be around.

Louise wondered how she could even begin to tackle all these issues. But she eventually had a breakthrough. It came when the horse trainer taught Louise the intricacies of the simple "bridge and target" way of communicating with horses.⁶ In brief, "bridge and target" involves teaching an animal the *target* that you want the animal to move toward. (In Specs's

case, it was a two-foot plastic disk with an X on it.) The *bridge* to get the animal to the target is a sort of clucking sound you make as the animal approaches the thing—the nearer the animal gets, the faster you cluck. Bridging is similar to the hot and cold game that children play, using a faster clucking sound that communicates *warmer, warmer, that's it!*

Just as teacher Anne Sullivan found a way to reach blind, deaf, and unruly Helen Keller by signing words on her hand, bridge and target finally provided a way to get through to Specs. Through this technique, Specs discovered that if *he himself* decided to head toward a target (active learning!), he not only could get a sign from a person about whether he was on the right track, but he could get a blueberry treat when he got there. *He* was the decider! There was nobody pushing him around with metal hoof picks or making him fall over.

The trainer taught Louise to start *watching* Specs—really watching, so she could read his attitude and demeanor. By observing him, Louise saw that though Specs would do what she requested, he would sometimes do it with his eyes narrowed, his ears pressed back angrily, and his body tensed in a sort of *I'll do it, but screw you* way.

Louise observes that the trick to reading an animal is to look for the thought behind the behavior, not just whether they're accomplishing the task at hand. For example, there's the kid who finally cleans his room after he's told to do it umpteen times. Sure, he does tidy up—but only after stomping off with a disrespectful “FINE!” and then mumbling bad things about his mom under his breath.

Well, doing the job with a bad attitude isn't quite the same as doing the job. Louise notes that “Attitude trumps everything. You have to be very conscious of what you are rewarding.”

→ Key Mindshift

Attitude

→ ~~override~~
Attitude trumps everything.

Reading attitude starts with remembering to look for it, Louise advises. “You actually can feel when a horse is happy and relaxed, as opposed to

when they are tense and something is wrong.”

This is the part that is hard to get from a book, Louise observes. “It is the intuitive part of learning that comes with experience *and* a good mentor to point these things out.”

Another invaluable aspect of Louise’s learning was videotaping and evaluating her performance. As Louise explains, “I would think I was hot stuff as a trainer,” but then her mentor would look at the video and tell her what was really going on.

When Louise first started training Specs, at the trainer’s direction, she kept herself behind the fence for a few weeks. Specs’s first lesson was simply to learn to keep his head on his side of the fence—while maintaining a happy attitude: his ears forward (generally a positive sign in horses) and his body relaxed. Doing that would get him a reward. Louise did punish Specs for rudeness—but his punishment was simply that she left, which, in turn, meant that he lost the opportunity to get treats. Adding a cost for bad behavior increased Louise’s significance in Specs’s eyes, because if he didn’t play by the rules, she left—game over. Oddly enough, this also meant that Specs had control over the situation.

Louise gradually began working with Specs in the corral. She learned to watch for and encourage exhaling, which, just like in humans, is a sign of emotional and physical relaxation. She says, “If either one of us is anxious, I will audibly exhale a big calm breath, and he will often do the same.” She explains that doing this—simply breathing—changes the emotional picture for both of them.

As Louise and Specs’s mutual language developed, Specs began to learn more and more. He learned how to play soccer, fetch, paint pictures with a brush, zoom past Louise in a round of “keep away from the barn,” and play the piano Liberace-style by sliding his nose zestfully over the keyboard. Louise would watch from the window of her kitchen and see Specs practicing lessons on his own, and even creating new ideas to show her.

Specs now *loves* having his hooves trimmed, reaching out to nibble Louise affectionately as he extends a hoof out as if he’s getting a manicure at a spa. Louise can now ride Specs without a saddle or bridle—she simply lets him know by her voice which way she would like them both to go.

So, ultimately, bridge and target provided a language that Louise and Specs could use to communicate. Even better, the communication allowed

Specs to save face—yes, it seems even horses have a sense of personal pride—and to enjoy success. Specs now had the ability to control his environment in positive ways and get rewarded for it.

Looking back on the progress the two of them made, Louise observes, “If there’s trust and respect with any animal and you find a way to communicate with them, they will communicate back. And you will begin to find hidden levels of potential there.”

Louise herself, like Specs, has undergone a mindshift. With two sisters who are teachers, she can’t help but reflect on the human parallels to Specs’s transformation—that teachers in public schools often don’t have students’ respect or trust, and that there is limited punishment allowed as consequences for impolite, disrespectful, or dangerous behavior.

Louise says, “Specs rebelled against what he did not understand or thought was unfair. Most horses just accept and don’t challenge. If Specs is different from many horses, part of that difference is that trying to pressure him just created more fight in him. Sometimes, even today, Specs will test the limits with an old behavior such as nipping. However, he accepts the correction calmly, like a child busted when he tests his parents.”

Today, to see Specs and Louise together is to marvel: The pair have a clear respect and love for each other. Specs isn’t just interested in the treats and attention that Louise offers. *He loves the ability to learn.*

Louise recently added the idea of chunking to her teaching—she finds that after three repetitions, Specs usually gets the idea of some new task or trick, whether it’s to pick up and paint with a paintbrush, hop up on a pedestal, or close a gate. She marvels as Specs uses deliberate practice to perfect his skills—perhaps in kicking a ball toward a net, picking up a rubber baton to drop it through a hoop, or cantering in a tight circle (not necessarily easy for a horse). Louise feels that Specs truly wants to master what he is learning. What’s particularly fun for her is how human-like Specs is in his learning: He’ll struggle with something new, but, each time, he comes back to it better than when he’d left off.

To Louise’s amazement, Specs isn’t just a student—he’s an innovative creator who enjoys coming up with new ideas. As Louise has discovered, “When you develop a sophisticated learner, as Specs is, he will show his creativity to please himself, not you. Part of Specs’s creativity is that he has learned how to manipulate me to get what *he* wants. This is very different

than his just learning tasks that I dream up.” So, for example, when he is ready for company, he will stand on the highest pedestal in the corral and give a single whinny of a certain tone, meaning, “Come out for a visit; maybe some hay please.” In other words, Specs has managed to train *Louise* to come in response to his call. And Louise listens and responds to Specs—like when he shows opinions about some of the lessons, sometimes offering his own variations. Oddly enough, like a great teacher, Specs has a mirthful side to him—he really loves making Louise laugh. Her joy seems to give him great satisfaction and pride, empowering him as both teacher and learner. His joy affects Louise similarly.

Louise looks back on her path—from being in tears every night to coming to see Specs as a very special gift in her life. She says, “I believe that when Specs began to understand his world, and he discovered he could actively manipulate it in healthy ways, that changed his attitude.” She’s excited about how far she and Specs will go and, she says, “how much more there is to learn” for both of them.

Far from being an equine psychopath, Specs is something of a horse genius. Whether it’s trying to climb into a car with his people, or letting himself in and out of the corral at night to sneak into the house, he’s always game to explore new worlds—and to show off what he knows for anyone there to watch.

Opening the Door

If you’ve read this book, you undoubtedly have a thirst for knowledge. I’m hoping what you’ve read has widened the scope of what you thought you could do, helping you broaden your passion for discovery. Remember that it took nearly fifty thousand years for humans to see the use of horses under our very noses. How many insights today are right in front of you that could make a dramatic difference in your life once you discover them? Learning can be an overwhelming pursuit, but it also provides a way for us to meet some of our deepest needs to live as full, vibrant beings.

However, like Specs, many rebel against learning, or resign themselves to staying where they are in life. What about people like these, you might ask? How can they make a mindshift?

If I can leave you with one last message in this book, it is this: Sometimes it just takes that one special person, a mentor, to unlock—or reframe—the doors, as Louise has done with Specs. I hope this book has inspired you to turn to others—to those who are shut down. May your own discoveries open the minds of those you touch, so they, too, can discover the beauty and joy of learning.

self - 7 /

★ Now You Try!

Mastering Your *Mindshift*

Now is the time to review your notes and thoughts in relation to this book. We've covered many areas, but your observations should fall into distinct categories: broadening your passion, creating your dream, mind tricks for success, and of course, many others. When you read through your notes and reflect on your thoughts, what common threads about yourself, your goals, and your dreams do you perceive in your writing? Under the title "Mastering My Mindshift," write your synthesizing thoughts about your personal breakthroughs and epiphanies. What are your concrete plans now as a result of what you've discovered about yourself through the course of reading this book?

One final question. Through your reflections, you have undoubtedly found a positive path toward your future. Is there a way to start someone else on a positive path as well?

→ mindset
- learning
- aspiration
- luck
- reframing