Scott - Thank you so much Barbara Oakley for joining me today. I know that many of my readers probably already know about you. They may have even found my blog through your very popular Massively Open Online Course (I believe it's the most popular course of all time!) It's called Learning How to Learn and it was done with Terry Sejnowksi.

I think you've also given a lot of insight into the learning process and how you can think about that better. So, in particular you've written two books now. One was a Mind For Numbers which is about how you can succeed in learning and in the second book you've just recently talked about and released is Mindshift. It's about changing your attitudes towards learning.

Dr. Oakley - It's a pleasure to be here Scott it's always fun for me for to follow your work!

Scott - Thank you. So I wanted to start with a small issues that I think is quite an interesting one and the research on should you listen to music while you're studying?

Dr. Oakley - That's an interesting question and it's kinda funny because when I speak in public that's always one of the biggest questions I have and I think it's because we often hear that you shouldn't listen to music but the interesting thing is that if you go an look at the research on whether or not you should listen to music you can find research that supports pretty much any position you'd like to have supported!

So if you don't like music you'll find research that says no, don't listen to music and you'll find other research that says that it's quite alright!

The only things that research says for sure is that you shouldn't listen to super loud music when you're trying to study and if the music has lyrics and you're trying to do anything verbal (reading) you may not want to listen to music because the lyrics will interfere with learning.

But in general, listening to music that you like can be helpful to studying!

Scott - I'll just speak from personal experience rather than research but I have found there are certain activities that are learning-related that I do really well with music and some that I cannot do at all. That might align with what you are talking about in terms of your ability to process words. For me, for instance, when I am doing a writing task, I cannot listen to any music at all. I get distracted, I can't focus, the internal voice in my head gets drowned out. Whereas if I am doing a programming task, which on the surface looks similar, I actually have no problem with that. Does your research support this idea that for certain tasks it's good to listen to music and for others it's better to stay away from it?

Dr. Oakley - Yes, if you really have to focus intently on a difficult task where you don't want to make mistakes, for example your taxes, you would not want to listen to music. It might disturb what you are doing. I haven't found anything in particular that says writing and listening to music might be counter-intuitive but for me personally I avoid it. If I am grading tests, for me, listening to music helps me get through it. So I think it depends a lot on the task.

This brings me to a related topic. Let's say you are trying to memorize a list so it's an intense, focused task and you're trying to do it quickly. So for example you're in a memory competition, in that case you're not going to want to listen to music. You might even have headphones to block out sound.

But let's say you're a med school student and you're trying to learn how the heart works. You might want to do that in a coffee shop. What happens is, you'll be studying away and let's say someone click a cup. What that little disruption does is draws you into default mode activity. It's a very different neural network that's much broader. It's a neural resting state. That momentary respite gives you a bigger picture of whatever you're learning.

Sometimes stepping back, which a little bit of noise can make you do, helps you alternate between the tight focus and bigger picture that you need to have when it comes to learning something like how the heart works.

Scott - That's very interesting and in your recent book Mindshift where you take about the role of focus and distraction and obviously focus is something that a lot of students struggle with. You have a nuanced view of that and in your book you say, "Focus is good but not all learning requires focus." What do you think the role of concentration and focus is in learning?

Dr. Oakley - Learning is a little bit like roasting a slab of beef, you cook it for awhile then when you take it out, it sits for a while. You need to do that or the roast won't taste quite right. It's like that with learning. You're focusing, and then you take a little break. During that time you're going into a resting state. The information is naturally going when it wants to go. That's the time when your brain does a consolidation.

So you can almost think about it, when you're focusing, you're ordering books from Amazon then when you're resting state, the books have arrived and now you're putting a label on them, storing them in your library, and organizing them so you'll know how to grab them later. That's what happens when you're in resting state. It's a state when you can consolidate these activities.

Scott - So this is very interesting because you're saying that not studying or not spending time learning might have a beneficial effect on problem solving, learning, or building those skills. What do you think the practical application is for this? What does this imply about how I should be organizing my study time?

Dr. Oakley - It certainly doesn't imply that you can magically put it in your brain by not studying but the best practical takeaway is that you focus and then when you reach that point where you're tired of it or you're frustrated, that means, switch your focus. If you can switch it to a different topic. Let's say you're studying language, switch to math. If you can't do that and you're very tired, then take a walk. There's evidence that good consolidation takes place when you're getting good physical motion or exercise.

The practical takeaway is when you're getting tired, switch your attention to something else. Rather than multi-task, just switch your attention which will allow you to work in a more fresh manner.

Scott - A lot of students I've met, especially during exam time, give up their exercise regimes when their work load or study schedule gets too hectic. What do you feel about that as it relates to studying?

Dr. Oakley - Realistically there are some times that are really busy and you've got three days of testing and that's what you've got to focus on. But let's say you've got two weeks you should try to walk between classes. Try to capture some physical activity. You will find that whatever little physical break you can get will make you fresher at whatever you're trying to work on.

Scott - Let's jump to a new topic: career development. One of the popular ways of thinking about your career is the T model which is where you have a deep specialty in one area and a broader, shallower knowledge in another area. You advocate the Pie Model where you have two specialities or two things that you know very well. Why do you think learning two things very well versus one is a beneficial career strategy to adopt?

Dr. Oakley - For one thing, we know that there are big changes coming up in careers. Artificial Intelligence is making big inroads. Even in highly specialized careers like the law, medicine, engineering and so forth, it provides some sense of career resiliency. If you've got something to fall back on, it can help make your career a little safer.

More than that, when you learn something else in depth, it invariably adds to whatever your first field is. You'll bring insights often through metaphor to whatever the original field is. It can be extremely helpful.

For me, my first career was as a Russian Translator and you might think, well what does that have to do with becoming an Electrical Engineer? Well it turns out that learning a language gives you some meta-skills about how to learn in general. It was particularly helpful because it made learning math and science not easy, but easier. This is because knew some of the techniques that could help.

Learning a second skill, keeps you mentally flexible and it shows your employer that you're not just a one trick pony. It helps you keep learning incorporated in your lifestyle.

It shows that you're open to learning new thing and that is unquestionably beneficial to your job.

Scott - Definitely. I think I'd like to end the interview by asking you, after all the research, through your course Learning How To Learn (where you worked with millions of students) so what do you think is the most useful piece of advice that is the most infrequently applied when it comes to learning?

Dr. Oakley - It's unquestionably the idea of chunking. Chunking is a way of gaining procedural fluency in whatever topic you're trying to become an expert in. To explain that, let's take something simple like backing up a car. So when you first back up a car it's so hard, do you look behind you? Do you look in the side mirror? Do you look in the front mirror? It's very difficult and you might be thinking, I will never be able to back up a car.

But within a few days or a week or two, you begin to learn to back up the car. In fact, after a little bit, you can do it while you're talking to your friends or listening to the radio. It's super easy. So backing up a car has become one united neural chunk in your mind so all you have to do is call that into your working memory. Because it's one thing, it doesn't block out other parts of your working memory so you can actually do other things at the same time.

When you learn how to dance or play a musical instrument it's the same thing. You learn one chord at a time and then chain those chunks together into one longer chunk. It's also when you're learning in language as well as math and science. We make the big mistake people make in math or programming. We will do the problem, turn it in, and never think about it again. Well, you don't want to do that. You would never sing a song one time and say, I know that song!

You want to take that homework problem or a key example problem in your textbook and see if you can work it cold. If you need to look at something for a hint, do that. But then try again. See if you can work it cold. Practice that for several days until it becomes like backing up a car. After awhile you don't really need to think about it.

When you know the problems that well suddenly you'll be looking at exam problems that the instructor might have you do and you can knit together two very different ideas. It will seem easy. So I think this idea of chunking is the most important and most neglected idea in learning.