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Learning for Non-Learners: A concise approach

(2nd Assignment: Final Project on Learning)

Brazil

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Introduction

This book is the final project (2nd assignment) for course “Learning How to Learn: Powerful mental tools to help you master tough subjects” by Dr. Barbara Oakley and Dr. Terrace Sejnowski.

“Learning for Non-Learners: A concise approach” is made for guiding people who struggle on learning something such as academic subject, how to dance or simply make a cake.

Have you seen somebody who seems to perform something you tried to do for a long time and he or she performs “perfectly”? Or even worse – It seems that person did not struggle to learn that particular skill.

There is no magic. There is no secret. There is no “gifted-person”. All they do is to manage how to learn (effective learning process) and practice – practice a lot.

On the following pages, you will learn efficient techniques to boost your learn not only for a test, but for all your life.

How this book is organized

This book has three main chapters:

1 – Focused and diffuse modes of thinking: It covers a briefly explanation how the brain works on learning something new.

2 – Key techniques proven by research to help students learn most efficiently: This chapter describes four effective techniques: Recall, Practice testing, Distributed practice or spaced repetition and Interleaved practice.

3 – Deliberate practice: This chapter covers about how important is deliberated practice. It is also explained the ideas of illusions of competence learning and procrastination – and how to overcome.

1 – Focused and diffuse modes of thinking

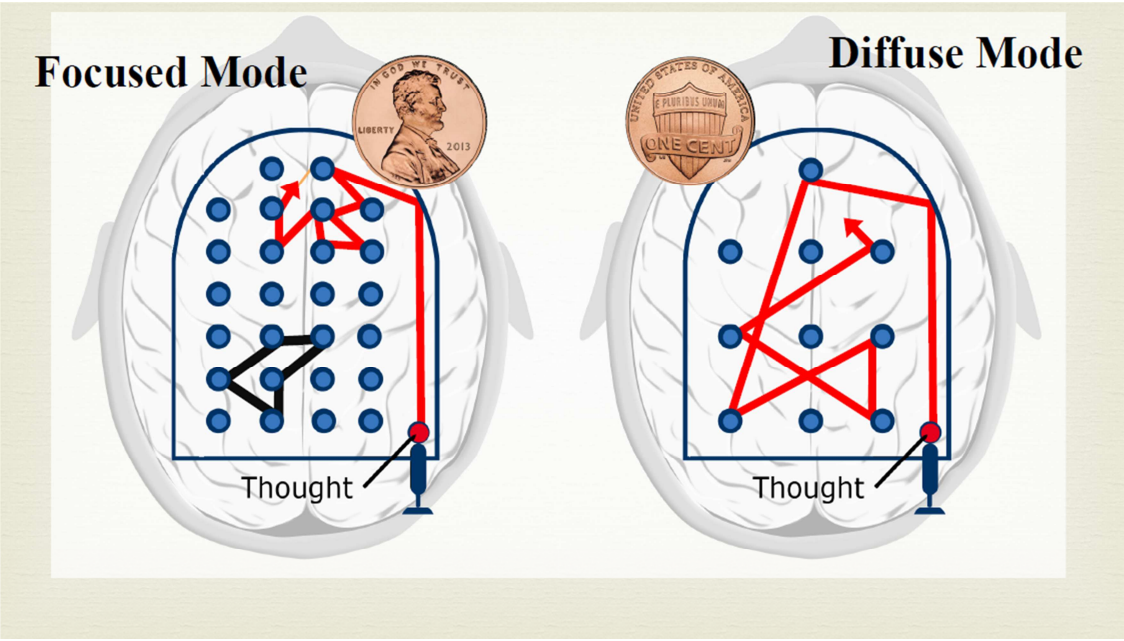
We have two modes of thinking when we are learning something or solving a specific problem: focused mode and diffuse mode.

It is not possible to have these two modes of thinking at the same time. If you are on focused mode, the diffused is switched off and vice-versa. It is like a switch that you use to turn on the lights in a room – it is impossible to have the two states (lights on and off) at the same time.

Focused mode is when you are focused to learn something or trying to find a solution to a problem. You are 100% dedicated, all your resources are applied on that and you work on in a very detailed way.

Diffuse mode is when you are not managing how to find a solution or learning. Maybe you are walking on the beach, taking a shower or watching a soccer match with your friends, but your brain is still "working" on that problem. It is not a detailed mode, it is a bigger perspective but your brain can reach more new ideas easily than the focused mode.

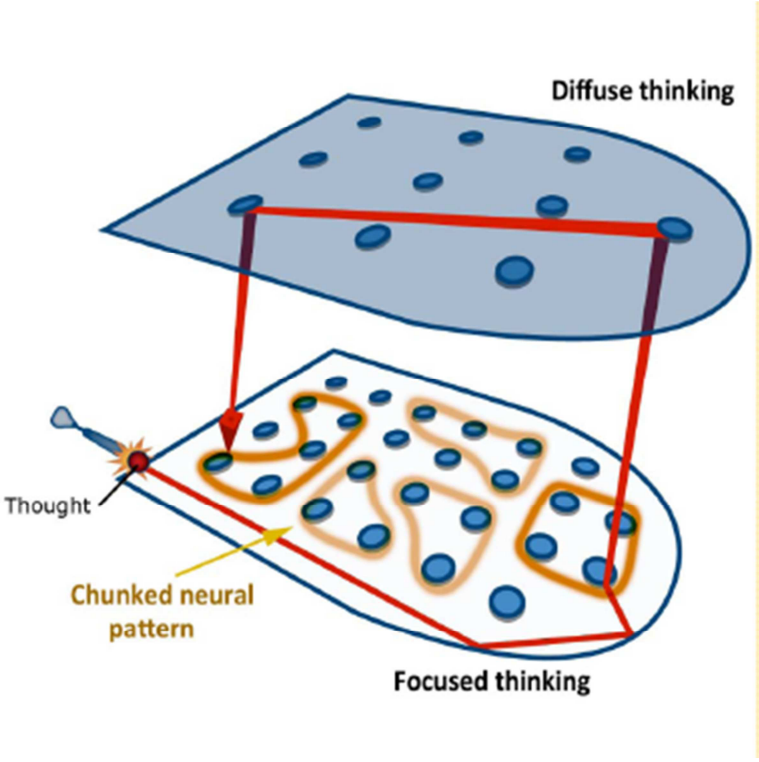
The following picture explains better the two different modes of thinking using an analogy of a pinball game (analogy created by Dr. Barbara Oakley):



Picture 1: Focused and diffuse thinking

The red ball and path is a thought about a particular subject or problem. The blue balls are the bumpers of a pinball game. When you are managing how to solve a problem a thought is launched and it access particular path by bouncing on the bumpers, that is your well-defined memory (or chunk), to solve the problem. It is easy when you are familiar with the problem, but what happens when you need to come up with something new or see the problem with another point of view (black path)? It is easy to see that there are lots of bumpers on the focused mode that block the thought to reach other area of the brain where a new solution lies. This area is easier to be reached on the diffuse mode. The thought runs freely throughout the brain and a new idea may pop up for a difficult solution. But it is from a bigger perspective. It is not as detailed as if the same idea would come from the focused mode, but it is new one still and you can work on that after on the focused mode.

This leads us to an interesting breakthrough: study intently for hours on focused mode may not allow us to come up with new ideas or solutions. We can have our best thought, or “eureka” when we are drinking a coffee on a break time during work or lying down on the grass just looking at the stars!



Picture 2: Chunked pinball library with focused and diffuse modes

2 – Key techniques proven by research to help students learn most efficiently

As said before in this book, there is no magic, secret or gifted-person. There are only techniques applied on a specific subject to master it. If these techniques are applied with discipline and a commitment with yourself to achieve a goal, it is possible to finally learn that subject you always wanted to understand.

Before the techniques are being explained, it is worthwhile to explain some ideas behind these techniques.

The first idea is memory. There are two types of memory: long-term memory and working memory. The long-term memory is used when you recall knowledge. You can recall in a blink of an eye – easy and fast. Working memory is used when you try to understand a concept or solve a problem, connect ideas or working on something new.

These two memories are related, i.e. they work together to receive an information and store it. To move a new concept from working memory to long-term memory it is required repetition for a few times and more after when the concept moved to the long-term memory to consolidate it. It is also possible to move a concept or idea from long-term memory to working memory to process information or just think about it.

The second idea for the techniques is called chunking. Chunking is the act of create a chunk, that allows to join together bits of information together through a meaning. Practice and repeat over and over again creates bigger chunks. For example, if you are trying to learn to play a difficult song, you can break it down and study each part separately slowly over and over again until you can play each part perfectly – this creates small chunks. Once you have learned all parts you can join them together and it is possible to play the whole song perfectly – a bigger chunk has been created.

The last idea is more common for us all. It is about sleep. Yes, sleeping is an important part of learning. When you are sleeping the brain cleans some toxins created when we are awake and also helps to consolidate memories and get rid of the weak ones. So, sleep well means learning well!

The simplest technique for learn better is called “recall”. It is simple but is very effective. This technique consists in when you finish reading a chapter of a textbook or an article, just look away and try to remember what you have just read. It is far more effective than just reread passively the same material. It is OK if you don’t remember on the first time. You can read the material again and try to remember once more. You gradually consolidate your chunks about the material and it is easier to move the information to the long-term memory – repetition makes permanent!

Tips for recall: It is possible to recall something using flashcards with Leitner System. In this system there are boxes with flashcards inside them. The first box has flashcards that you are not familiar with or need to study more. When you learn something from a particular flashcard, you are allowed to move this card to another box that is not as reviewed as the first one. If you can’t remember one or more flashcard from the second box, you must return the flashcard to the first box until you have learned it completely.

According to John Dunlosky on his article “Strengthening the Student Tooxbox”, the most effective way to learn something is what he called “practice testing”.

Practice testing consists in practicing the material you have already learned or studied from a lecture notes as if it is a test. It does not mean just reread the material. It is consciously redoing the exercises and trying to recall as much as you can. For instance, a student who practices solving calculus exercise has more possibilities to earn higher grade on a real test

then a student who just attend to a lecture and reread how to solve a calculus problem.

The practice testing creates and strengthens the chunks related to the subject and it helps to store them on the long-term memory. It is a bit hard to do but the outcome is much better once you have a feedback what you have learned and what you need to pay more attention.

Tips for practice studying: If you have read a text try to recall as much as you can from it. If you don't remember it completely, read the text again and recall the information without looking at it. Studies related to math are possible to try to solve the exercises without look the answer section. After solve it, try to analyze your answer and think if it makes sense to the exercise. If you are sure about it, compare with the answer on the book. If you failed it study the theory again to find out what you have missed.

The second most effective way to learn is called "distributed practice", or "spaced repetition". This technique consists in practice a particular subject or skill over a period of time with pauses. For example, it is possible to study a subject every other day or study three day in a row and study again on the fifth day… on the seventh day… and so on. The spaced repetition allows the chunks related to the subject or skills become stronger before them fade away and also helps to store them to the long-term memory. A student might has an impression that distributed practice is slower than cramming all the subject in one night of study but its effect related to long-term memory are much better and the retrieving process becomes easier. This spaced study technique also gives feedback on what you have learned and what you have forgotten.

Tips for distributed practice: Create a study schedule helps the student to organize their studies with other activities. Practice each study sections using the practice testing technique and pay attention on your evolving during the study sections. You might get surprised with the result! Try to space the sections more and more when you are mastering the material, as said before, it is possible to study every other day. After that, one study

section followed by two days with no study or another activity and one more study section.

The last technique but not the least important is called “interleaved practice”. This technique consists in mix different types of subjects in one study section. It helps the student change easily different chunks and figure out how a particular chunk fits in a specific problem. Interleaving different subjects also helps to come up with new ideas applying a solution in a specific subject to another completely different. The student might find difficult mixing different subjects in one study section, but once you get into it, it is easier to recall different ideas and solutions for problems.

Tips for interleaved practice: Mix your studies as much as you can. If you are studying a particular book, try to solve different sections. You don’t need to start from chapter one. You can start from chapter 3, skip to chapter 5 and return the chapter 4. If you have different subjects, mix them in one self-test. Ask a friend to create a test for you with exercises randomly chosen from different books and chapters.

3 – Deliberate Practice

Deliberate practice can be summarized with a three-word phase: Practice makes permanent. It is not possible to master a subject or a skill if you don't practice. Practice is common in sports such as soccer, baseball, volleyball, etc. To master a particular sport, a person has to practice over and over again for hours, days and even months to finally achieve the perfect performance.

The same concept applies for studying a subject (both academic and non-academic). It requires practice to achieve the perfection. Applying the techniques covered on chapter two is a deliberated practice. It is an active activity, (it is not like passively reread a text) i.e. it must be on how to perform something and pay attention on the outcome of it. If it is not as it was expected, adjustments are required and is necessary to perform the activity again but now enhanced and compare the outcomes. Let's take math for example. To master math it is necessary to do exercises over and over again until a particular subject is mastered – learned. Mistakes are part of the learning process. Without them we don't have any idea how strong the chunks are and how much we need to study.

For an effective deliberated practice, we should pay attention on two concepts called "illusion of competence in learning" and "procrastination". These two concepts have a significant influence on deliberated practice.

Illusions of competence in learning are the idea that a student has about how much master a subject or skill. For example, a student has a textbook and he or she thinks that this particular subject is mastered by only owning it (this person thinks: "it is OK, I have the book and I can retrieve the knowledge whenever I can). It is Ok to have a book for further reference but the knowledge is not in the student's memory, so the subject is not actually learned.

The best way to avoid this illusion of competence is practicing the material you have learned. Applying the key techniques on chapter two allows the

student to find out what subjects are not fully mastered and need more time to study it.

Procrastination is really dangerous for a student who wants to master a subject or skill. It is related to habits that bit by bit it becomes bigger and bigger until the student loses the interest by choosing another activity more pleasant or study the whole material the night before a test. Understanding what is procrastination helps to avoid it and makes the studies easier and even more pleasant!

Students put off a study section due to the discomfort feeling about that particular activity. The brain focus the attention to a more enjoyable activity, but the feeling of "pleasure" is temporarily and increases the discomfort feeling on the next time they need to study the material. The key to overcome procrastination is not to get rid of the feeling but how to deal with. It is normal to start a study section with a sort of discomfort. However it's gone once a study section has been started. It is like when someone needs to work out, yet the discomfort feeling suddenly appears. Once get dressed properly and start working out the pain disappears. The most difficult thing about working out is dress properly to it!

One simple technique to overcome procrastination is called the Pomodoro Technique. All it is required is a timer. Set the time for 25 minutes and start a study section totally focused, without interruption. When the timer goes off, it is allowed to relax for a short period of time. It is important to give yourself a reward (something pleasant as watching tv, chatting to someone or surfing on internet) after the 25 minutes study section. The Pomodoro technique focuses on the process of learning something, not about the result that causes the pain.

Avoiding procrastination and illusions of competence in learning, deliberate practice is much more efficient. As a result higher grades are earned and the most important: the knowledge is learned and easily to retrieve.

Conclusion

How to do something or being able to do an excellent performance on sport competition, academic career or a play is not required to have a gift. All skills can be learned when applied motivation, discipline and of course efficient techniques to learn. Learning how to learn is also a skill and therefore can be improved during the time with the same motivation and discipline as any other subject.

When we learn how to learn, we ended up learning about ourselves that improves our learning skills, that unlocks hidden doors that allow to learn more about us… in an endless circle.

Image Credits

- Focused and diffuse thinking, image © Kevin Mendez, 2014.

- Chunked pinball library with focused and diffuse modes, ©Kevin Mendez, 2014

Sources

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