Learning *Strategies* to grow your knowledge

A guide for medical students

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How to prepare for learning in medical school

Everyone is smart at med school and that includes you! You didn't get to this point by being bottom of the class! Your ability to learn, retain and evaluate information will stand you in good stead at med school but be prepared for the approach to learning things to be a little different to what you may have experienced to date. Here are some of things to be aware of:

Normal school-life	Medical school-life	Medical student thoughts
One textbook with all the information we need to learn	Lots of different books all with more or less information	*"Where do I even start trying to learn?"*
A reasonable volume of information to learn	Near-endless amounts of information to absorb	*"How is it possible to learn this much?"*
Purely scientific information needed to be learned	Scientific information alongside clinical information	*"How does this information relate to being a doctor?"*
Ample revision resources including past papers	Conflicting resources without standard past questions	*"How can I test myself at the right level?"*
Set-times to learn your material and homework	Do-it-yourself approach and completely independent learning	*"How should I structure my workload?"*

The good news is that many medical students and doctors alike have had similar thoughts to the above, but you needn't join the list. Read on and learn how to maximize your learning, thereby saving time and reducing stress.

The following evidence – based techniques were designed with success in mind and the good news is that they can be easily assimilated into revision routines.

1.
Spaced Practice

Spreading out your learning works!

If you are used to the binge and purge way of learning, that is cramming at the last minute for exams, you may want to reconsider your strategy.

This method might in the past, have been effective for passing exams, but you are a life – long learner now and you need more effective methods. Evidence shows that studying your material in several sessions spread out over a long period, rather than repeatedly learning stuff in a short period, really helps to retain the material.

Why is spacing out your practice better? Because it means you get a more gradual accumulation of knowledge rather than overloading your brain with information that you may find hard to retain. It has even been thought that using this method can potentially double the amount of information that is ultimately remembered, compared to other methods.

So we've learned that spacing out your study sessions helps, but how far should you spread your sessions out?

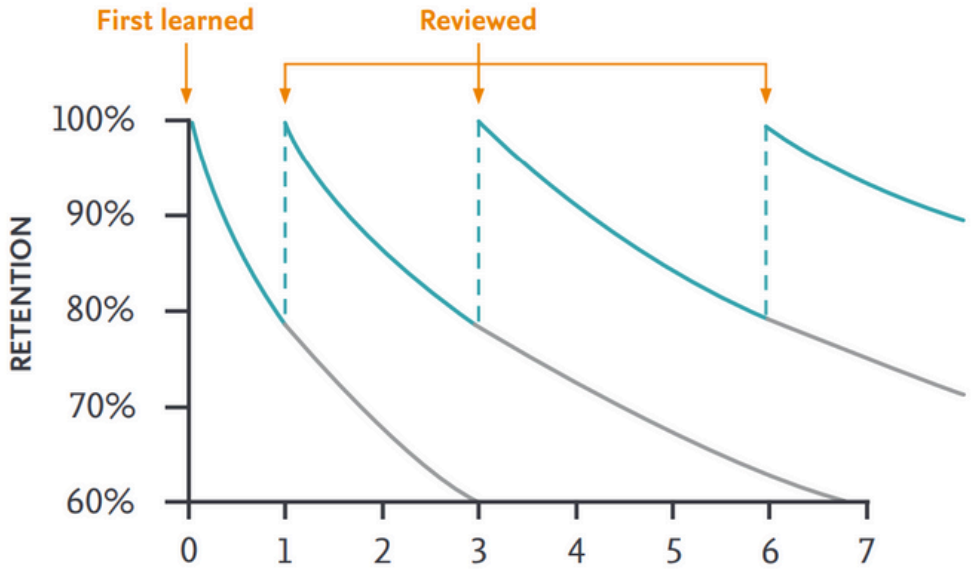
Interestingly, it all depends on how long you want to retain the information for. For a test in a weeks' time, the optimal inter-study gap should be between 20 to 40%, but for a test in a year time, the optimal study gap should be between 5 to 10%. The timing of these learning sessions has powerful effects on your retention and the table below gives some recommendations to help you plan.

Months away from your exam	The minimum time you should space out your learning sessions
1 month	Every *6 days*
2 months	Every *10 days*
3 months	Every *15 days*
4 months	Every *17 days*
5 months	Every *18 days*
6 months	Every *18 days*

As we can see, the optimally efficient gap between study sessions depends dramatically on when you are being tested.

Importantly, it is better to overshoot the duration between your revision than to undershoot. For example, for an exam that is 2 months away, a minimum of 10-day intervals for restudying the material is recommended, meaning 12 days is fine, but not 8. This is because if you keep the gap between sessions too short, it can give you a false perception of a high level of mastery, which You may find that not have retained of a high level of mastery that might not pay off when it comes to the exam.

Typical forgetting curve for newly learned information



Elsevier Success Tip:

Use Osmosis study schedule to incorporate spaced practice in your study routine. Pick your study days, set your hours, and choose rest days that fit your real schedule. This helps you be held accountable while giving you the flexibility for changes.

2. Interleaving

Why it's good to mix things up!

One strategy for learning new material has been to practice one skill at a time or learn one topic at a time before moving onto the next thing. Something like: "I'll get good at this first, and then I'll move on". At medical school, the equivalent to this may be that you learn neuroanatomy one week, then you cover neuropharmacology the next week and embryology the week after that.

This type of learning is known as "blocking," and because it seems so commonsense and easy to schedule, blocking is used in schools, training programs and some medical schools (at least this is how my medical school taught me back when I was studying).

However, there is an alternative strategy that you can use which has been shown to give improved results. It is called interleaving.

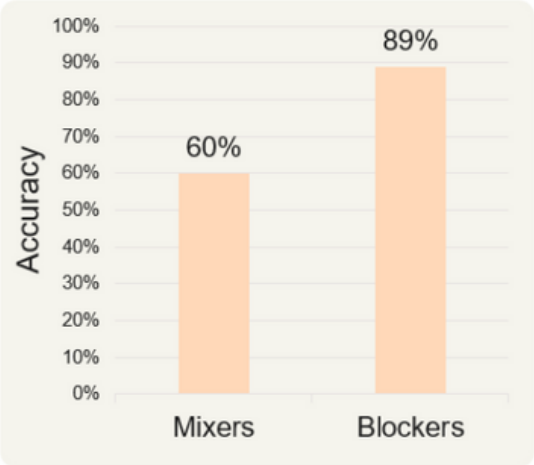
Where blocking involves practicing one thing at a time before the next (e.g. learning topic A, before topic B, before topic C - forming the pattern AAABBBCCC), in interleaving you mix the several topics together (forming the pattern "ABCABCABC").

So, blocking would be "AAABBBCCC" e.g. anatomy, anatomy, pharmacology, pharmacology, embryology, embryology. However, interleaving would be "ABCABCABC" e.g. anatomy, pharmacology, embryology, anatomy, pharmacology, embryology.

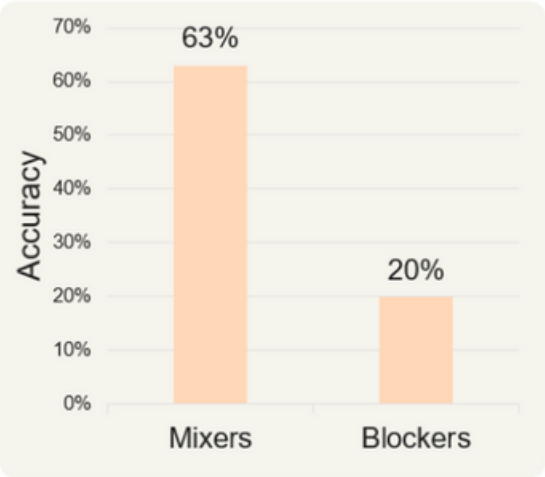
Switching between ideas during a study session and reviewing them in different orders can help!

The evidence to back this up is quite amazing. In one study, a group of students had to learn four types of math problems. One group of students learned the four types of question in a mixed way i.e. using the interleaving method whereas the other group learned the four types of question together i.e. blocking. How did the different strategies affect their learning?

Initially, blocking came out better:



However, when the groups were tested second time at a later date, the group who used the interleaving method, meaning that they mixed the material when learning were way better than those who had used blocking.

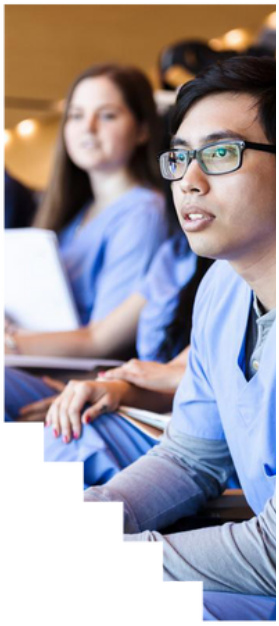


So, what does this mean for you? Mixing up the topics when learning may seem like it is a little harder as it can take a bit longer to learn the material. However, the added effort of mixing can generate better and longer-lasting results! It is important to note that when using the interleaving method, you shouldn't switch between subjects too often, it's all about getting the balance right.

Elsevier Success Tip:

Access thousands of practice questions with ClinicalKey Student, designed to strengthen your learning. Build personalized quizzes including a variety of topics to support the interleaving study strategy.

3.
Retrieval practice



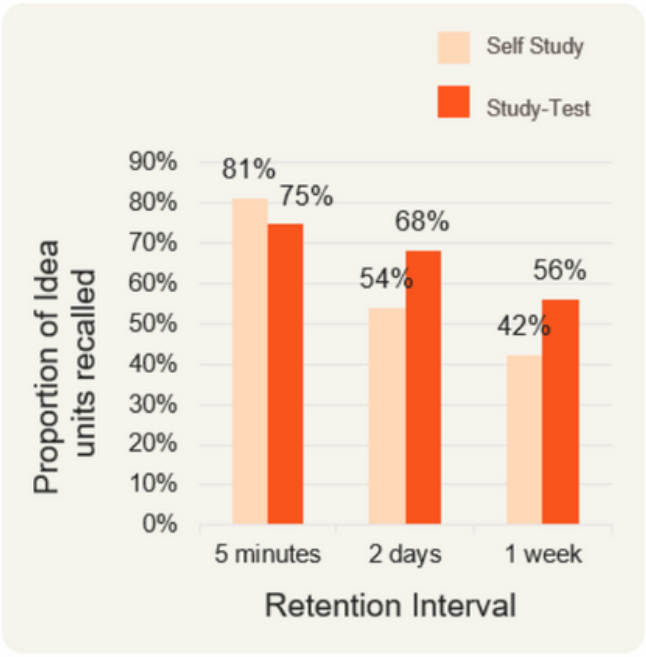
Testing yourself regularly will improve your performance!

As the saying goes; “practice makes perfect” or put another way, acquiring skills and knowledge takes time and effort. The only way to know if your practice is working is by testing yourself.

As it turns out, evidence shows that testing is one of the most important contributing factors to aid your revision and it can drastically improve your memory. Answering questions strengthens your memory as you are retrieving the must–know information through testing with proper feedback.

The data speaks for itself. In one experiment, two groups were given some information to study. One group studied the information and then reviewed it some more. The other group studied the information and were then tested on their knowledge. What were the results? Quite surprising actually!

Testing yourself after studying can be better than studying more



While initially, it may seem better to study more, over time you are much more likely to retain the information if you test yourself. This is even true if the tests are given without actual feedback. This surprising phenomenon is called the testing effect!

So how can you implement this in your revision? Firstly, identify the critical knowledge that you want to learn. It could be the Krebs cycle or the pathophysiology of atherosclerosis, you name it. Once you have established the vital bits you want to learn, you'll need to test yourself on it. Then you can check yourself in spaced intervals. This not only will help you learn (as per the testing effect) but it will also give you more motivation to study as you'll see how you are learning along the way! Additionally, it will get you more used to answering questions so that you feel more prepared when it comes to the exams.

Examples of how you can test yourself:

- Flashcards
- Practice questions online
- Questions in textbooks
- Getting friends to quiz you in a study group
- Past papers

So, when in doubt, test!

Elsevier Success Tip:

Did you know Elsevier's products are designed to support retrieval practice in your study routine?

- Access textbook questions, and other practice questions with ClinicalKey Student
- Find high yield notes, flashcards, and practice questions about Osmosis videos
- Explore 3D anatomy and create custom flashcards with Complete Anatomy

4. Elaboration

Connecting new information to existing knowledge!

This strategy is a little bit more subtle and is something you can think about when trying to take in new material. Elaboration is where you enhance the information of the learning material by relating it to other information that you already know so that you think about it differently.

Mixing ideas in your mind in relation to other things is a great way to remember. An example of elaboration that I have used in the past to great effect, is to imagine a patient in front of you experiencing the pathology that you are learning about. Then think about what you are learning and how you would explain it to them and what you would do.

So, for example, if you are learning about myocardial infarction, imagine you are on the ward with a colleague, and one of your patients has just had an MI.

- How would you explain what has happened to the patient's family member?
- How would you treat the patient there and then? Why?
- What would you see on the ECG and on the blood results?
- How would you explain all the drugs you will be starting the patient on afterwards?

This strategy makes you ask more in-depth questions about how and why things work; deepening your semantic understanding. Instead of just facts on a piece of paper, it connects what seems quite abstract to a real scenario! You'll find that by doing this you are linking ideas, and this will help to improve your memory.

Elsevier Success Tip:

Start by reviewing an Osmosis video to enhance your understanding of myocardial infraction. Next, checkout Complete Anatomy to explain how MI affects the heart's structure and function.

Incorporate the strategy of elaboration by linking the concepts you learned to a real scenario with one of your patients. Imagine using this new information to improve your patient encounter, all while solidifying your own understanding of these concepts.

Good luck *future* doctors!

We hope that you found our guide informative. Our mission is to prepare you for the road ahead.

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