

Levels of Learning (a.k.a. The Revised Bloom's Taxonomy)

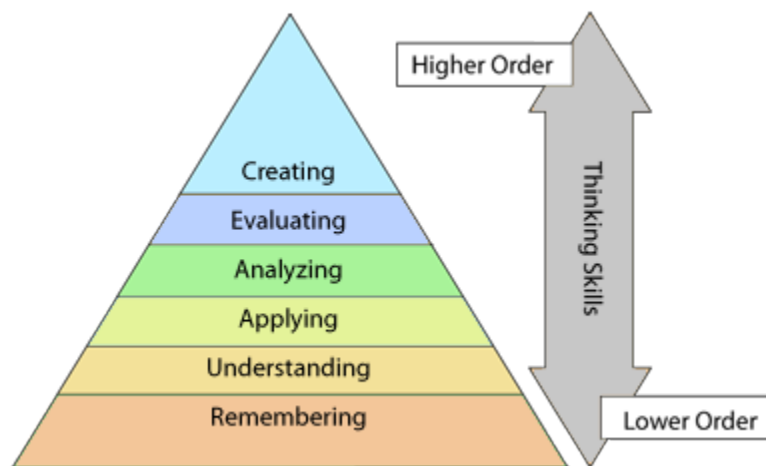
adapted in part from Julia Kregenow; modified by Rica S. French

How do you know if you're actually learning? How do you know if you really "get it"?

If you weren't happy with your exam score or were surprised, perhaps thought the questions were "unfair" then you did not understand the material at the expected level. This could be true in any class. You could "study" for hours, "feel ready" for the exam (whatever that means), and still do poorly – even fail (ack!) – if you "studied" the material at the wrong level(s).

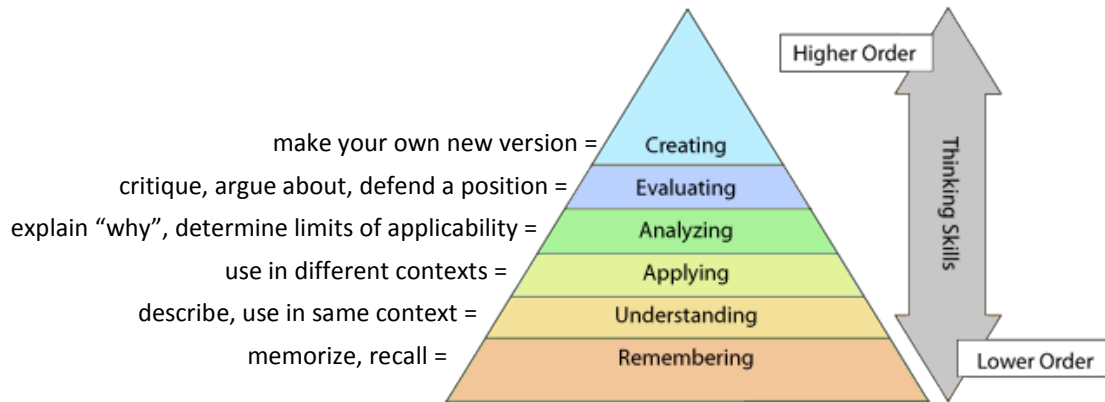
Beyond tests, this has far-reaching implications for your entire life and particularly your education. So it is well worth taking a short aside to discuss what "learning" really means and the various levels of mastery.

There are many levels of "getting" something, from low to high, and I strongly recommend keeping tabs on roughly what level you are on for the many different things you're trying to learn. The figure below illustrates these levels. It is often referred to as *Bloom's taxonomy* or sometimes the *revised Bloom's taxonomy*, which arose as we learned more about the human brain, how it works, cognition, and the processes required to facilitate storage, retrieval, and use of information.



The lowest form of learning is **remembering**: can you repeat it back? Actually, some don't even consider that "learning" since trained parrots and monkeys can do it. *You can do this without even knowing what you are saying.* (Sound familiar? "I know it; I just can't explain it." Hmm...) Above **remembering** are many higher levels of learning.

How do you know if you are learning at the **remember** level? If you find yourself "studying" using flashcards or memorization or simply reading, this is the level you're operating at. The figure below shows examples of some activities associated with each level of learning that can help you recognize and assess your level of mastery.



In this class, we typically work at all levels. The top level, **creating**, happens less frequently than the others but many of you do achieve this level when you develop your own models for explaining concepts. **Analyzing** and **evaluating** are where the bulk of our work takes place. Sound familiar? Depending upon which class you're in you're probably thinking something along the lines of Lecture Tutorials, "card" questions, pre- and post-LT questions, LT DB posts, etc. All of these activities are carefully sequenced to scaffold your learning by leading you from the lower levels, through the middle ones, and directly to the higher order thinking skills.

Hopefully these kinds of processes occur in all of your classes. Even if you don't get to some of the higher levels based on the class expectations, you are always capable of reaching them. Go beyond what your instructor asks, use discussion boards, go to help sessions and office hours, form study groups where you test each other, etc. Granted, this most often occurs in classes where you are more interested and motivated to learn the material. But you can start to apply what you learn in any class in more general terms, both in other classes and to other aspects of your life. Then you may begin to question the limits of what you are learning and ask just how far it can be applied. This is when you know you're moving beyond **applying** into **analyzing**. Whether you are getting to those levels or not, most college courses do (and should!) reach above the **understanding** level. So get used to it.

There's no general prescription for determining what level of learning college courses expect. Many often try to equate this to the numbering system but this simply does not work (e.g. 100 level courses \approx **remembering** + **understanding**, 200 level \approx **understanding** + **applying** + some **analyzing**, 300 level \approx **applying** + **analyzing** + some **evaluating**, 400 level \approx **analyzing** + **evaluating** + some **creating**, and graduate courses \approx **evaluating** + **creating**...or some other such nonsense). *All courses, regardless of number level, are capable of spanning – and most ***should*** span – the full range of thinking skills.* The numbering system is more appropriately correlated with the *level of detail and specialization in a given discipline area*. This, however, is also not a strict correlation.

Some types of classes, by their very nature, may reach to higher levels of thinking. For example, laboratory courses often require higher levels than their lecture counterparts. Survey classes or vocabulary-building introductory language classes may require only lower levels. Still other classes vary by professor and their chosen style of facilitation. Particularly well-designed classes facilitated by well-versed instructors may expect more while poorly designed classes (facilitated by anyone!) probably don't expect much. Again, these aren't strict boundaries and many factors contribute to the outcomes.

Nevertheless, you are never constrained to stay at a certain level based on your formal education or even your professor's expectations. If you wish to go higher, you can (growth mindset, anyone?). But you should never continue to work at a level *lower* than that expected. Not only are you then missing out on the real educational benefits, you risk failing the course!

So if reading, reviewing, and using flashcards are your primary means of “studying” in college courses that expect higher levels of thinking and mastery like **applying, analyzing, and evaluating**, you’re in real trouble. To be sure, **remembering** is a starting point, and a necessary one at that – you need the background and vocabulary in order to be able to use that information to climb the pyramid. It is no accident that these levels are displayed as a pyramid: the lower levels form the foundation that the higher ones are built upon. You must master the lower ones before moving up. But moving up is not automatic! It takes deliberate effort. You must experience substantive cognitive conflict, struggle, and resolution. This requires different kinds of “studying.”

Probably the most significant portion of the problem for most people is that **remembering** (and possibly some infrequent **understanding**) actually worked in high school for most classes. Many students are surprised when they get to college and that now doesn’t work. It used to but now it doesn’t?!?! Every college professor has heard dismayed protests such as “But I studied for DAYS and I only got a C!” or “But I’m an A student!” or even accusations such as “Your test wasn’t fair.” How can well-meaning, hard-working students get surprised like this? Because they were prepared at the wrong level.

This is compounded by the trouble that (probably) no one tells you this. While professors tend to expect these higher levels in college courses, they don’t always warn you. To be clear, they are not deliberately keeping you in the dark! They typically don’t realize that your level of “studying” is mismatched to the course expectations. Even worse, not only do most professors not realize the low levels of achievement that today’s high schools equate to “success”, *many have actually never seen or heard of Bloom’s taxonomy and the many levels of thinking skills!* No kidding. You never get this in graduate school unless you take specific education courses or your discipline program makes a special effort to train teachers in pedagogy and what it truly means to design pathways to learning. (OMG...especially since most people with graduate degrees end up teaching at least once at some point in their careers! Full disclosure: your instructor [RSF] did, while she was in astronomy graduate school specializing in star clusters and planetary nebulae, have a class about teaching. But...it did not clarify any of this and it was not taught by education specialists – it was taught by other astronomers...who also may have never had this material themselves! The only reason she is aware of this at this level is because of her current specialization in astronomy and physics education research.)

So...if you get away with memorization in some of your college classes, lucky you. Or rather, *unlucky you*, because you’re wasting your valuable time and money and squandering your college education on the lowest possible level of learning – something you could get by reading a library book or internet article on that subject. Remembering facts doesn’t make you a better, smarter person. More importantly, it also doesn’t give you transferable skills or improve your brain plasticity and abilities to think and reason using principles of logic and critical assessment – which ultimately should be the goal of a college education.

I encourage you to challenge yourself to go as high up the pyramid as possible. For any subject. Sure, it’s hard. Learning hurts. But if actual learning and developing your thinking skills isn’t the point of this, then *what is?* What do you think you are spending your hard-earned money and precious scarce “free” time on by taking college courses? What does that mean for your methods of “studying”?

If you participated in the “Mindsets” exercise you know you can. It’s more a question of whether you want to and are willing to put in the necessary time and effort. If so, I’m here to help. (That’s part of what you’re paying me for!)