Using Science to Build Better Learners: One School's Successful Efforts to Raise its Bar Passage Rates in an Era of Decline

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"The wise know their weakness too well to assume infallibility; and he who knows most, knows best how little he knows." Thomas Jefferson

I. Introduction

Bar examination pass rates are plummeting. Many laws schools are searching urgently for some way to stem the tide of decline. Silver bullet cure-alls are attractive, all too often adopted, and almost never fruitful. So what should schools do?

Should a school teach to the test? Induce less proficient students into not taking the bar exam? Reteach doctrine in a bar prep course? Begin bar prep in 1L year? Spoon-feed black letter law? Require faculty to use only multiple-choice questions in exams? Only essay questions? The answer to all these questions is "no," but the questions themselves miss the point—like asking a Mergers & Acquisitions lawyer whether her achievements were due to taking more depos.

The right questions do not focus on what *we* can do to change results but on what *students* can do for themselves. Although scholars have rightly focused on how to change curricula and pedagogy to meet the current crisis, there is far less research on changing what *students* do instead of what law schools do. My claim in this Essay is that proposals to change law schools, while certainly significant, tend to overlook the important fact that most students learn and study wrong; fixing that ailment is where the academy should focus its attention.

To be fair, this problem is not just a law school problem. Since high school, students have been sold a false bill of goods: Diligent students supposedly read ahead and highlight furiously; good students allegedly acquire an outline and reread it over and over; top-achieving students purportedly game their professors by sticking solely to the study methods handed down by lore and anecdote; "studying" is the epicenter of grades.

Rowing against that tide is daunting. Convincing students of the efficacy of unorthodox methods faces the strong undercurrent of asking students to act differently than their peers and even run afoul of some professors' advice. But empirical studies demonstrate that the orthodox methods defy everything we know from science about how the brain acquires knowledge and develops analytical skills. Rereading is one of the worst ways to encode memory, yet tradition dictates that students study for exams and the bar by reading outlines endlessly. Following another person's dictates on learning outsources the regulation of that learning and kills the crucial skill of metacognition, yet students blindly follow syllabi and bar prep courses' one-size-fits-all programs. Relying solely on lectures prevents students from building their own cognitive schema, yet students spend weeks having their minds wired externally. Failing to leverage spaced repetition and forced recall practice makes learning far less effective and efficient, yet many students do not start testing themselves, if at all, until just days before finals or the bar exam. But, there are tools to correct all of this.

The problem is that these tools feel counterintuitive, and they are outside the norm of law

student study methods. That is where the opportunity for reform comes in. Instead of controlling students' behavior by requiring more bar prep courses, teaching to the test, or artificially altering summative assessment methods, schools should work to rewire students' understanding of how learning works. Just as we rewire students' brains to think like a lawyer's, so too should we rewire their brains to be more absorbent.

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II. Expressly Teaching Cognitive Science and Educational Psychology to Build Better Learners

FIU Law's bar pass rate has increased and outperformed predictions at a time when the national average rate is decreasing substantially. But, our pass rate did not stem from what we have done new for our students; it comes at least partially from what we have taught them to do for themselves. This Part briefly explains a few examples of how FIU Law reconstructed academic support to focus on better learning instead of on remediation.

III. Concepts from Cognitive Science and Educational Psychology That Build Better Learners

In "Making it Stick," Brown, *et al* wrote:

> People generally are going about learning in the wrong ways. Empirical research into how we learn and remember shows that much of what we take for gospel about how to learn turns out to be largely wasted effort. Even college and medical students – whose main job is learning – rely on study techniques that are far from optimal. At the same time, this field of research . . . has yielded a body of insights that constitute a growing science of learning: highly effective, evidence-based strategies to replace less effective but widely accepted practices that are rooted in theory, lore, and intuition. But there's a catch: the most effective learning strategies are not intuitive.

This quote nicely summarizes the philosophy of the Academic Excellence Program. In this Part, I will go into more detail about metacognition, self-regulated learning, retrieval practice (i.e. "the testing effect"), spaced repetition, and cognitive schema theory.

A. Situating the Responsibility for Learning: Metacognition and Self-Regulated Learning

The two interrelated subjects of metacognition and self-regulated learning have some exposure in legal education, and that exposure has led to studies concluding these theories lead to better results. Like the other theories discuss in this Essay, however, too few students know about these concepts, and the traditional law school environment does not emphasize their use. This is problematic, because metacognition and SRL could be game-changers in legal education.

An important problem exists in terms of how students view their role in their legal education. In high school, the overabundance of standardized testing leads to teaching-to- the-test. Teaching-to-the-test leads to excessive control over students' learning in an attempt to control test results. In college, the modern devaluation of critical-thinking skills, created perhaps by a de-emphasis on liberal arts education, leads to a failure to teach students to control their own learning.

It is not a surprise, then, that one study showed that law students, despite their high intelligence, generally do not start law school with strong metacognitive skills.

As a result, many students enter law school ready for their professors not only to teach them law but also to police their learning process. Too many students assume that faculty are (or should be) giving them all they need to succeed. They assume that reading the assigned materials, briefing cases, and attending classes will suffice. Outlining starts, if at all, towards the end of the semester; and as exams approach, common wisdom has it that students should reread outlines and take a look at professors' old exams to game how they test.

This is woefully inadequate…. Enter metacognition and SRL….

The broadest definition of metacognition derives from its origins in epistemology. There, metacognition is the process of knowing that one knows. More narrowly, according to Beran, et al (2012) in the field of cognitive science, metacognition is monitoring and regulating the internal process of cognition. The commonly used phrase is "thinking about thinking." In educational psychology, the emphasis is on monitoring and questioning one's learning with the purpose of improving the result of the learning task; "do I really get it, and what should I do about?" A recent study found that students with higher incoming indicators improved performance better after formative assessment than others, and the authors theorized that those students' stronger metacognitive skills explained that difference.

Meanwhile, one can think of self-regulated learning as actualizing metacognition. As Dean Michael Hunter Schwartz quoted, SRL "involves the active, goal-directed, self- control of behavior, motivation, and cognition for academic tasks by an individual student." Learning is something students do, not something that is done to them. SRL involves planning how to learn, monitoring the learning as cognition occurs, and then critically reflecting on the success of the learning task with an eye towards finding and eliminating weaknesses. Given that the heart of this approach is self-awareness and critique, it is no surprise that studies have shown that healthy skepticism is a trait most associated with academic success in law school.

Importantly, SRL necessitates that students own the learning and not outsource hat responsibility to others. (Hence, my aversion to students receiving "tutoring.") Certain practices in law school can hinder that goal. When the crowd mentality convinces students to stick to the conventional wisdom of law school studying, that hinders SRL. When faculty tell students that they may not use any materials other than the casebook, that hinders SRL. When faculty dissuade students from taking practice exams – either explicitly or implicitly by declining to post old exams – that hinders SRL. Due to these practices, students are unable to assess their own strengths and weaknesses objectively, and their learning suffers.

Instead, the law school environment needs to promote SRL. To that end, legal educators need to convey that, because of the volume of law to learn, students' exam prep starts the day after orientation. To start that prep, students need to do several things on a weekly basis.

Obviously, students need to prepare for class adequately and attend class. In my experience, most new law students follow these steps but do no more. They leave class with misunderstandings (whether they know it or not), and they do nothing to fix the misunderstanding or even determine objectively whether they have them. This is the Rumsfeldian unknown unknowns – they do not

know what they do not know.

As a result, I counsel my 1Ls to take three additional steps at the end of each week. First: Synthesize. In this step, students need to synthesize the law fully by using their reading notes, class notes, and whatever hornbooks are appropriate. (This is where we sometimes fail students. Rightly believing that a great deal of commercial schlock exists in the supplement market, faculty sometimes tell students not to use any resources other than the casebook. This not only ignores the fact that plenty of hornbooks are of solid quality, but it also ignores the need for students to correct their own learning weaknesses. When I taught criminal law, for instance, I recommended Dressler's "Understanding Criminal Law," and I gave students the advice to stay away from the resources of lesser quality).

Second: Outline. Here, students should memorialize their synthesized knowledge immediately. Thanks to the "forgetting curve," at the end of a given week students know much more about that week's doctrine than they will know even just a few days later. As such, they should memorialize this knowledge at the time when it is at its peak. An additional benefit is that if students outline material weekly, they won't have 600 pages of the casebook to outline at the end of the semester. (The end of the semester is then devoted to outlining or "master flowcharting" the outline, self-testing on its substance, and taking practice exams.)

Third: Objective Self-Testing. After synthesizing and memorializing, students should objectively test themselves on their learning. Using multiple-choice questions, CALIs, Examples & Explanations problems, or any other method of questioning, students should prove to themselves that they successfully synthesized the law in the previous steps. If they find weaknesses, they should return to the step one and sure up their knowledge.

I have consistently found that this approach substantially improves students' knowledge and performance. Using these methods, students employ metacognition and engage in the three steps of SRL. Not only does this approach benefit students in law school and on the bar exam, it also makes them better lawyers. While other new associates need handholding and feedback from senior associates and partners, self- regulated learners can better monitor their own knowledge and performance.

In the next section, I will address the concept of "retrieval practice."

B. Retrieval Practice: The Testing Effect.

In the last section, I noted that I would provide more details about teaching students how to teach themselves so as to improve their performance. I should be clear here that I am not espousing the old Kingsfieldian line of "[y]ou teach yourselves the law, but I train your minds [to think like a lawyer]." What I am saying instead is: "Law school academic support courses should teach you how to teach yourselves so that you can take your doctrinal classroom learning further." In this regard, these types of courses are not in any way remedial and, because all students can be better learners, even the most highly-ranked schools can and should adopt them.

This section's focus is "retrieval practice," otherwise known as "the testing effect." (Although somewhat related, this is not the same as formative assessment, one of the major aspects of new ABA accreditation standards). Students can use forced retrieval practice to learn with greater

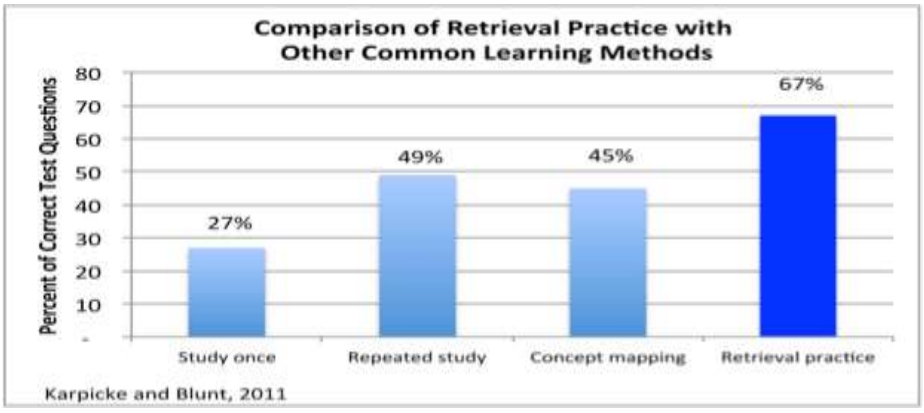
effectiveness and efficiency than traditional studying. The problem is that most do not even know about it, let alone use it.

So, what is "retrieval practice"? Retrieval practice consists of using free-recall exercises to trigger one's knowledge or understanding of a subject not for assessment purposes but actually to promote learning itself. According to Roediger & Butler (2011), these free-recall exercises enhance encoding in a manner superior to other methods. Importantly, these exercises cannot say: "Which one of the following is a correct explanation of common law self-defense" – with a list of different explanations, one of which is correct. Instead, "free" recall requires the student to articulate the answer absent any cueing. Thus, if the question was: "Explain common law self-defense," and the student had to recall that information without any prompts, that tactic solidifies the knowledge better than simply rereading an explanation of common law self-defense repeatedly.

Some might claim that the increased fluency with the information is due simply to re-exposure. But Roediger and Karpicke (2006) disproved this hypothesis, showing that the testing effect is not due to repeated exposure but is instead due to enhancing cognitive "retrieval routes." The processing of information through free-recall solidifies these routes through the impact of "desirable difficulties" – the idea that when learning is harder, it is more effective.

And that is one reason why students do not like and do not use retrieval practice. When they get answers wrong, they feel like they are not learning the material (despite the fact that they really are). By contrast, when they reread notes or outlines, they feel like they are learning because they recognize the material when they read it through again. The problem, according to Karpicke, Butler, & Roediger (2009), is that this is not real learning but instead the "illusion of competence" – it feels like learning because you "know" the information, but in reality you're merely recognizing it. This is why so many students say that they "knew the material backward and forwards" even when their exams show otherwise.

Many students spend substantial time in bar prep and during the "reading week" just before finals doing just that – rereading. That is a significant mistake because rereading is one of the worst ways to learn material and self-testing is actually one of the best. The following chart demonstrates the results of studies proving this point.



In fact, the testing effect actually works before the introduction of material and even in the absence of individual feedback. Thus, testing is also a way to learn subjects initially and not just to promote retention. Thanks to the inaccurate learning training many students receive in high school

and college, which emphasizes testing not as a way to learn but only as a way to assess, these concepts seem downright absurd.

And that brings me to my broader point. Instead of considering tactics like re-teaching or spoon-feeding doctrine to promote bar passage, law schools should be undoing the learning misunderstandings that so many students bring into their legal education. As a starter, law schools should provide students access to rigorous practice exams and encourage them actually to complete (and not merely peruse) those exams prior to finals to take advantage of the testing effect.

Does all this mean giving students constant forced retrieval quizzes in classes? No. Although frequent testing would be ideal, widespread adoption of such a scenario might be unlikely. Instead, I contend that students – with the support of their instructors in helping them select appropriate resources – should be engaged in these retrieval practice exercises on their own. This would take advantage of the testing effect and promote self-regulated learning and metacognition. I will take up those concepts in the next Part.

C. Spaced Repetition.

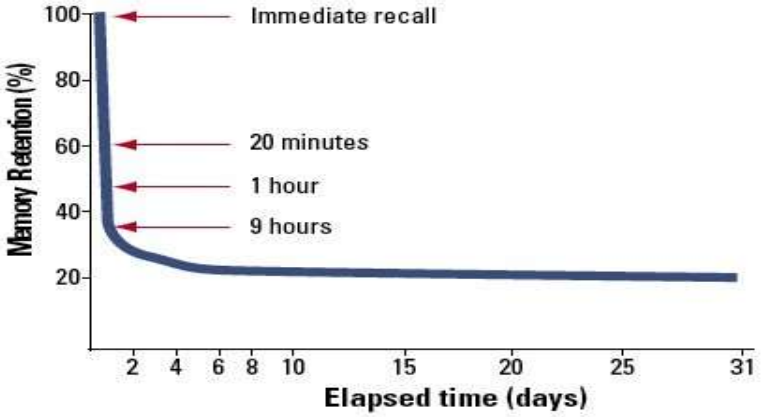
In Part III.B, I detailed the Testing Effect and argued that students should frequently and objectively test their knowledge and analytic abilities. I also noted that faculty should support these efforts by guiding students towards quality materials and away from inferior ones. In Part III.A, I discussed metacognition and self-regulated learning and contended that schools seeking higher bar pass rates should move away from controlling students' learning processes and instead train students to monitor their own comprehension and abilities. In this Section, I will examine spaced repetition, the idea that revisiting information at specified intervals solidifies memory and ultimately drastically increases knowledge and understanding.

Spaced repetition is the simple fact that learning is enhanced when information is distributed over time instead of learned in a "massed" (or crammed) fashion. This phenomenon is one of the most consistently replicated effects in experimental psychology, and a robust literature exists confirming the effect in many different contexts. It works like this: If students learn a concept on September 14th and ignore that concept until just a week before their exam on December 2nd, that approach constitutes massed practice and is dramatically inferior to interspersing multiple retrievals at certain specific intervals.

The neuroscience behind this effect is instructive. Neurogenesis is the generation of neurons over time in the areas of the brain involved in learning. Between the neurons are spaces called synapses, whose job is to communicate between neurons. This is the basis of memory. If unused, synaptic connections weaken. But if more learning occurs, the strength of the signal (called synaptic plasticity) returns.

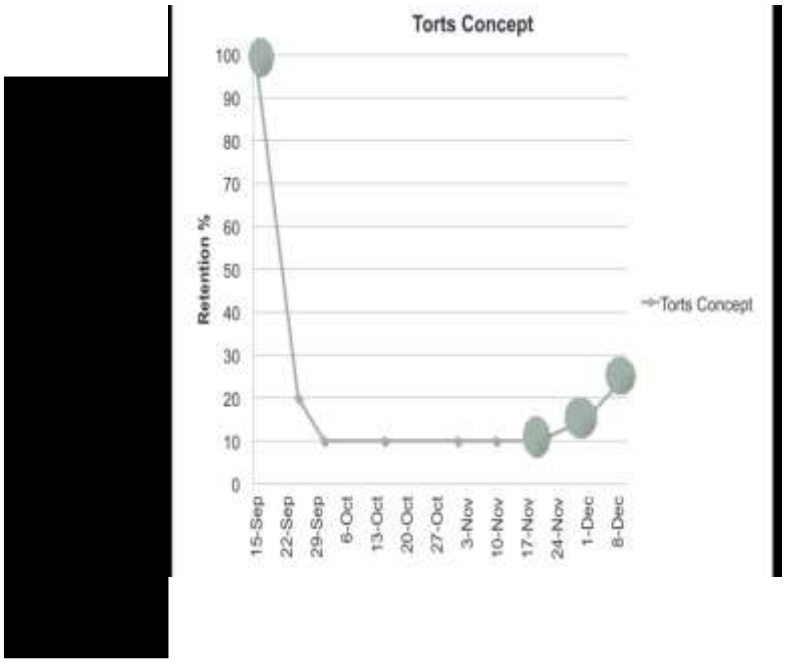
The speed with which the neural networks deteriorate is deemed the "forgetting curve." The following figures demonstrate that curve:

FIGURE 1.
The forgetting curve



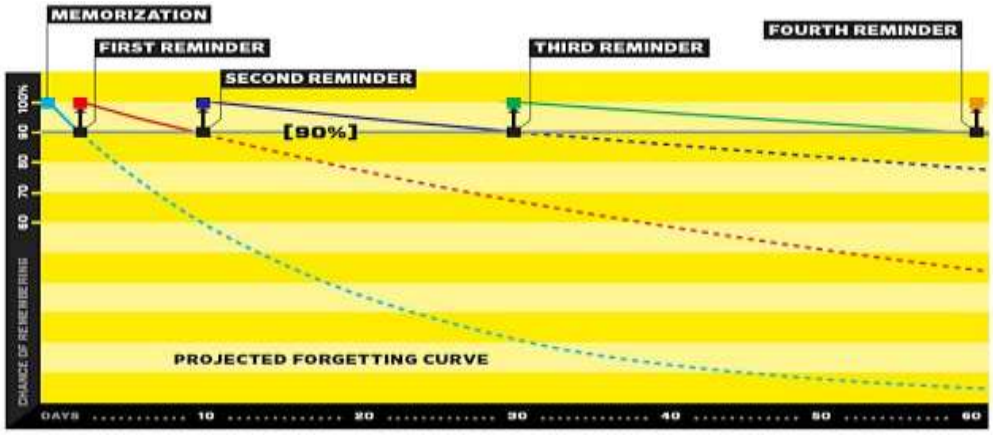
The "forgetting curve" was developed by Hermann Ebbinghaus in 1885. Ebbinghaus memorized a series of nonsense syllables and then tested his memory of them at various periods ranging from 20 minutes to 31 days. This simple but landmark research project was the first to demonstrate that there is an exponential loss of memory unless information is reinforced.

Stahl SM, Davis RL, Kim D, et al. *CNS Spectr*. Vol 15, No 8. 2010.



These figures should frighten students (and when I present this material in class, it often elicits a gasp) because they mirror the way most law students approach learning. They walk out of a class on res ipsa loquitur and "feel" like they got it; that might be true or might be untrue. But, even assuming that it is true, students often ignore that material for the next two months and review it again just a few weeks before exams. Given what we know about the forgetting effect, you can see that even with the cramming that occurs before exams ("Torts Concept" figure), the memory does not return to optimal levels.

This figure shows how spaced repetition could allow students to walk into the exam with far more knowledge:



By spacing repetitive memory interventions, the learner essentially keeps the neurons, and the synaptic signals between them, alive by repeatedly activating them. Note, however, that the learner shouldn't review the material at regular intervals. The figure above shows that the first interval is shorter than the second, which is shorter than the third, etc. It turns out that as the neurons are reactivated and the synapses again carry signals to each other, they increase their durability and need less frequent stimulation until they begin to decline again; this is known as "the lag effect." Also, materials that the learner knows well require less review than the materials students know less well, thus allowing yet more spacing. These two features – longer intervals and prioritizing less well-known material – make the spaced repetition process more efficient than otherwise would be the case.

I should address one counterargument. I would imagine that some would claim that exam success – and building lawyerly competence – is not about the rote memorization of information. Legal concepts are sometimes indeterminate and are therefore different from more determinate materials, like anatomy or (non-theoretical) mathematics. Success on exams is also based on analytical skills and issue spotting. Given that, spaced repetition becomes irrelevant.

I would rebut this argument in several ways. First, comprehension, issue spotting, and analysis are predicated upon knowing doctrine. You can not thoroughly understand FRE 801 if you do not remember what that rule says or what the Committee Notes state. You can not spot a specific Confrontation Clause issue if the brain has not encoded the "primary purpose" rule. You can not argue for your client that FRE 403 prohibits otherwise relevant evidence if you do not remember that unfair prejudice (et al) must substantially outweigh probativeness.

Second, we know that spaced repetition not only positively impacts memory, but also aids understanding. Learning occurs not through some literal recording mechanism but instead by the relationship between the meaning of one bit of information to the meaning of and associations with

preexisting knowledge. Therefore, comprehension of the second matter is contingent upon the memory and meaning of the preexisting knowledge. This notion touches upon the concept of "cognitive schema," which I will explain in Part III.D.

Lastly, my claim is not that spaced repetition is the only method of study. To develop comprehension and analytical skills, students also should (among other things) take practice exams, complete "issue spotter drills," and understand the analyses used in the cases they read.

The implications of spaced repetition for pedagogical change are substantial. As I have noted before, however, the purpose of my Essay is not to discuss how faculty can change their classrooms but instead to discuss how students can change their learning. (I will address specific study techniques – for this and the other topics covered in this Essay–in Part IV). In short, spaced repetition, a mostly ignored technique, could enhance students' performance both in law school and the bar exam.

D. Cognitive Schema Theory.

I would like to discuss one last concept that students can leverage to understand law more effectively. This concept is cognitive schema theory (CST). Like the other topics I have discussed in this Essay, CST is widely accepted in educational psychology.

Like self-regulated learning, CST is a subset of constructivism. Constructivism holds that real learning happens when students make a concept their own by actively discovering knowledge using their own reasoning processes. The ideal educational objective is not the amassing of "stuff" but instead that instruction should be focused mainly on developing learners' thinking – the exact thesis of this Essay. It embodies the old maxim that instructors should be the "guide on the side" instead of the "sage on the stage." The problem, as I have noted before, is the misguided impression that instructors are indeed there to be the sage on the stage and that the sage is obliged to make doctrine and schema effortlessly obvious. So, what is CST, and how can it help?

CST focuses on the active construction of knowledge by creating cognitive structures around which information can be assimilated and stored in long-term memory. A cognitive schema is a heuristic that promotes the encoding and retrieval of knowledge. In essence, organizational frameworks or mental structures aid the learner both in putting together the arrangement of a topic and in recalling that information. For instance, the memory palace (or "method of loci," a tool that is existed since Aristotle) structures ideas and facilitates learning, encoding, and recall.

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Why does this matter? In law school, the seemingly linear nature of the progression of courses over a semester leaves students thinking that the material is linear, too; there are no subsets or sub-subsets, just a bunch of unconnected rules. Students' outlines often have too few subsets and sub-subsets; they do not break the material down into appropriate "levels." Then, when they take exams and try to access the information they've learned, their minds have to sort through 160 isolated topics in search of the needle in the haystack. Instead, students should create mental pathways to each of those 160 topics by realizing that all of them fit into, say, five main topics. Each of those topics breaks into maybe three or four subtopics, each of which contains three or four sub-subtopics, etc. It is become clear to me over the years that this is a frequent problem that impacts students' performance substantially.

The problem is even worse in bar study. Some bar preparation companies place particular emphasis on the outlines they've been refining for thirty years. Not long ago, those outlines were the epicenter – and selling point – of the courses, and I am sure there's no rush to de-emphasize materials It is taken so long to create. As a result, some companies present the organization of the subjects as a fait accompli, and many students never really construct that organization independently. Instead, assignments require students simply to re-read the outlines repeatedly, leaving them continuously hazy about the schema of the given topic.

The problem with all of this is that when students do not see the organization of the subject – the connections between what seem like distinct topics – they learn, issue spot, and recall less well. In an exam, they are sifting through 160 unconnected rules, slowly searching for that needle in the haystack. But, we know that by applying cognitive schema and connecting the rules in a way that creates mental pathways, students actually can improve performance significantly.

In my Part IV, I will describe methods of study, both in law school and for the bar exam, that employ cognitive schema, the testing effect, self-regulated learning, and spaced repetition to enhance performance.

IV. Putting it All Together: Using Unorthodox Methods Stemming From Cognitive Science And Educational Psychology to Build Better Learners

This Essay has addressed four concepts from educational and cognitive psychology: (1) retrieval practice ("the testing effect"); (2) metacognition and self- regulated learning; (3) spaced repetition; and (4) cognitive schema theory. Each of these concepts alone can improve students' performance in law school and on the bar. Together, they can make an enormous difference. The problem is that it is hard to convince students to use these methods when so many forces convey the message that they should stick to popular but antiquated and ineffective methods.

In the first section of this Part, I will describe a number of specific methods that differ from traditional ones but improve students' success in law school. In the second, I will do the same in the context of bar exam study.

A. Law School Study Methods Employing Cognitive Science and Educational Psychology.

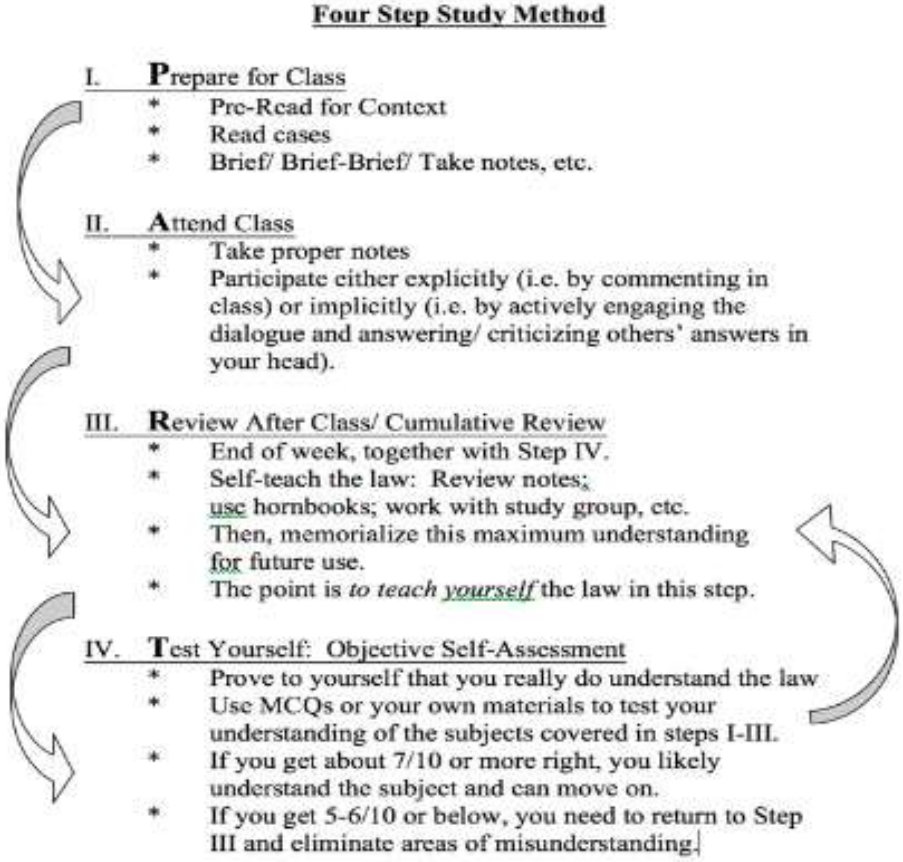
This section discusses two of the many methods I emphasize for students currently enrolled in law school and for the benefit of their law school studies. They include: (1) the "Four Step Study Plan"; and (2) schema + spaced repetition. These methods might not work, per se, in bar exam studies, but the underlying concepts certainly do.

1. <u>The Four-Step Study Plan.</u>

Many students spend the entire first-semester reading cases, attending classes, and doing little else. That is a mistake for two reasons. First, although reading cases helps students see analysis, it is crucial actually to practice it. Second, as students go along in the semester, they often lack appreciation of whether what they think they know is the same as what they actually know – the Rumsfeldian "unknown unknowns" I referenced previously. They leave the classroom either

thinking they understood the material or realizing that they did not. But, instead of clarifying, they often leave that process to the end of the semester, thinking they'll have time to clarify during exam prep. Then they realize they do not.

Due to this, students need to put the course together throughout the semester and test their own knowledge via self-regulated learning. Enter the Four Step Study Plan, pictured below.



This is a weekly plan, executed by students, incorporating self-regulated learning, metacognition, and the testing effect. By outlining each week throughout the semester, students memorialize their knowledge when it is at its sharpest, start setting up their cognitive schema of the course, and minimize the amount of outlining and clarifying just before exams (at which point they should be practicing and studying). The multiple- choice questions then allow them to assess objectively whether they truly understand the materials. If they get seven or eight questions out of ten correct, they can move on to the next subject. If not, they circle back to Step Three to clarify their understanding.

While I try to persuade students to take this approach from day one, some do not. When students underperform in the first semester, however, switching to this plan in the second has led to statistically significant grade increases. I have seen students go from sub-2.00 first semester GPAs to 3.50 second semester GPAs; from the bottom of the class to Dean's List; from the brink of dismissal to a top 10% semester GPA and booked 1L courses. Because this approach comports with

what we know about how learning really works, especially compared to traditional methods, it produces results.

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V. Conclusions

The increased use of new pedagogies in legal education is progress, but that progress is a necessary but insufficient condition for improvement. The academy also needs to think less about engineering short-term results using orthodox methods and more about producing life-long students of the law by empowering their use of the science of learning. Asking what our students can do for themselves requires us to cede to them the autonomy of learning so that they can control their own development and forge their own success.

The bottom line is that fostering bar passage success is not an easy task, and it cannot be accomplished in a half-baked, after-the-fact, half-hearted kind of way. Nor can it be accomplished by teaching to the test. (Teaching to the test is actually contrary to everything I have written in this Essay.) Instead, schools need to adopt methods that are genuinely effective. Some measures, among others, might include adopting statistical analyses to discern the best places for the expenditure of resources; providing quality feedback to students during bar study; using technology to focus students on precise areas of study; and providing students with actionable data about their bar study choices.

Another crucial component of any successful bar pass effort has to be a focus on building better learners through cognitive science and educational psychology. If law schools foster this approach by means of rigorous, holistic, and pervasive programs ranging over time, students come out the other side poised to be better learners and better lawyers.