

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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I. Introduction

"The wise know their weakness too well to assume infallibility; and he who knows most, knows best how little he knows." Thomas Jefferson.¹

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?² 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 and acquisitions lawyer whether her achievements resulted from taking more depositions.

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,³ there is far less research on changing what *students* do than on what law schools do.

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1. THE PROCEEDINGS OF THE GOVERNMENT OF THE UNITED STATES, IN MAINTAINING THE PUBLIC RIGHT TO THE BEACH OF THE MISSISSIPPI, ADJACENT TO NEW-ORLEANS, AGAINST THE INTRUSION OF EDWARD LIVINGSTON (1812).
2. See, e.g., Karen Sloan, *Arizona Summit Defends Encouraging Grads to Delay Bar Exam*, THE NATIONAL LAW JOURNAL (June 11, 2015), <https://www.law.com/nationallawjournal/almID/1202729108185&back=law/>.
3. See generally Susan Stuart & Ruth Vance, *Bringing a Knife to the Gunfight: The Academically*

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 incorrectly; 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 from 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.

This essay will detail how to begin to make that happen. Using the example of recent successful efforts at Florida International University College of Law (FIU Law), this piece will detail some of the cognitive science and educational psychology methods that build better learners. Part II discusses FIU Law’s recent approach of expressly teaching cognitive science and educational

Underprepared Law Student & Legal Education Reform, 48 VAL. U. L. REV. 41 (2013) (discussing weaknesses in students’ metacognitive ability due to a lack of critical-thinking foundation); Anthony Niedwiecki, *Teaching for Lifelong Learning: Improving the Metacognitive Skills of Law Students Through More Effective Formative Assessment Techniques*, 40 CAP. U. L. REV. 149 (2012) (focusing on adding formative assessment pedagogies); Robin Boyle, *Employing Active-Learning Techniques and Metacognition in Law School: Shifting Energy from Professor to Student*, 81 U. DET. MERCY L. REV. 1 (2013) (discussing pedagogical changes to enhance students’ metacognition).

psychology concepts to law students. Part II also briefly discusses the successes our students have achieved in the wake of those changes—earning the top bar exam pass rate in Florida in five of the past six exams. Part III then details the theories of cognitive science and educational psychology that facilitate more optimal learning: metacognition and self-regulated learning; retrieval practice; spaced repetition; and cognitive schema. Part IV then constructs a broader picture of these methods, noting how to leverage specific study methods that lead to better learning for law school, the bar exam, and a life of practicing law.

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*.⁴ This part briefly explains a few examples of how FIU Law reconstructed academic and bar support to focus on better learning instead of on remediation.⁵

A. A Brief Introduction to the Theories Integrated into the Program

In 2013, FIU Law began creating a new type of academic support. To emphasize the program's goals, it took the name Academic Excellence Program (AEP). The AEP aims to teach our students, from day one of law school, how to make more effective learning methods the centerpiece of their studies. Not everyone buys in, but enough buy in to make a difference.

There are a number of different courses in the AEP, but a full description of those courses is beyond the scope of this essay. A number of concepts unite the curriculum, though. The first are metacognition and self-regulated learning. As I will describe in Part III, these two concepts involve students actively and objectively taking stock of whether they truly understand the material and then taking steps to remedy any weaknesses.⁶ Considered higher-order thinking, metacognition is one of the keys to true learning. Each of the courses in the AEP promotes metacognition and self-regulated learning by, for instance, requiring students to write self-evaluations of their mock exam essays. This fosters students' ability to rely on their own sense of quality assessment instead of having to rely on external sources (such as bar prep company essay graders, who can be notoriously inconsistent).

One of the best ways for students to monitor their understanding and performance objectively is through forced-recall practice, also known as the

4. The most significant causes of our improved bar pass rate are our students and our faculty (including our Director of Bar Preparation, Professor Raul Ruiz). At the end of the day, having such dedicated students and colleagues makes my job a lot easier.
5. The AEP does not use the word "remedial" in describing FIU Law's programs or our classes. It is not what we do, and it is not what students need.
6. See Boyle, *supra* note 3, at 16.

testing effect.⁷ This theory holds that one of the best ways to learn is by active testing without prompting, or what we might call blind testing. This forces the brain to work harder than in other methods, thus encoding long-term memory and supporting doctrinal understanding.⁸ The AEP uses this theory in every course we offer. From the first semester's Introduction to the Study of Law through to the sixth semester's U.S. Law & Procedure course (taught by my colleague, Professor Raul Ruiz), students take many practice exams in the classroom and are encouraged to take more on their own.

Another concept running throughout our program is cognitive schema theory. As I will describe in Part III, the idea of this theory is generally that the brain has a formal way of organizing interconnected ideas, and a precondition to mastery of the material is understanding the hierarchy, order, and organization—or schema—of that material.⁹ To do so, learners must construct that schema by consolidating the information for themselves in the organized fashion the material takes on. Our U.S. Law & Procedure course takes advantage of this by teaching students how to avoid the detrimental effects of overrelying on bar prep companies' canned outlines and instead relying more on those companies' stronger aspects, such as question banks and essay problems. Similarly, our Introduction to the Study of Law course encourages students to outline each of their doctrinal courses *each week* throughout the semester instead of waiting until the end. This method, which is unorthodox, according to the law school grapevine,¹⁰ allows students to

7. Mark A. McDaniel et al., *Testing the testing effect in the classroom*, 19 EUROPEAN J. OF COGNITIVE PSYCH. 494 (2007).
8. See *id.*; Shana K. Carpenter, *Testing Enhances the Transfer of Learning*, CURRENT DIRECTIONS IN PSYCHOLOGICAL SCIENCE 1, 1-5 (2012), http://public.psych.iastate.edu/shacarp/Carpenter_Current_Directions_in_press.pdf.
9. See generally Sharon J. Derry, *Cognitive Schema Theory in the Constructivist Debate*, 31 EDUCATIONAL PSYCHOLOGIST 163 (2011), <https://www.tlu.ee/~kpata/haridustehnoloogiaTLU/schematheory.pdf>.
10. See *Outlining Myth #1: Outline as You Go Along*, LAWSCHOOLNINJABOOK.COM (June 1, 2010), <http://lawschoolninja.com/2010/06/outlining-myth-1-outline-as-you-go-along/> (giving possibly the worst advice in the history of law school, nay the history of law); *Make your own law school outlines: It is important*, LAW-SCHOOL-HACKER.COM, <http://www.law-school-hacker.com/law-school-outlines.html> (stating some solid advice on law school study, but getting it wrong on outlining). These sources each advise students to wait on outlining until the end of the semester. As I have discussed, this ignores the science of learning. But, in predicating their advice on the notion that students need to put together the big picture of the course, and that that can occur only at the end, they ignore the notion that one can outline throughout the semester (and thus record the information at its strongest) and then compose the big picture at the end—through outlining the master outline or master flowcharting it. The reader should note that experts in the field of law school learning seem unanimously to recommend outlining early and often. See Herbert N. Ramy, *Creating a Course Outline*, SUFFOLK UNIV. LAW SCHOOL, at 2, <https://www.kentlaw.iit.edu/sites/ck/files/public/departments/cso/aar/OutlineRamy.pdf> (advising students to start in the first month); *Outlining Law School Courses*, [https://law.ucdavis.edu/academic-success/files/Outlining-Law-School-](https://law.ucdavis.edu/academic-success/files/Outlining-Law-School)

build that cognitive schema over time, thus allowing further learning to be built upon the already stable schema.

This method intersects with another educational psychology concept called spaced repetition. This scientifically proven theory holds that most study does not efficiently encode memory, because the brain requires repeated immersion in the material at specific intervals.¹¹ The student who crams personal jurisdiction into her head ten days before the exam does less well than the student who used spaced repetition to encode the information gradually into long-term memory. Properly used, spaced repetition also allows the learner to concentrate only on her weaker materials at more frequent intervals, thus creating more efficiency than the student who repeatedly reviews all materials.¹² My colleague Professor Ruiz teaches this concept in FIU Law's U.S. Law & Procedure course so students can prioritize their learning during bar prep instead of following the often overcluttered and redundant schedules of bar prep companies. To be clear, I am not suggesting in any way that students should not use a bar prep company after graduation. To the contrary, working with such experts is absolutely crucial, and these companies employ many strong learning methods. Students should recognize, however, where they need to personalize the programs.

These are a few examples of the concepts taught uniformly throughout the Academic Excellence Program. Their benefits have supported students' success in law school and on the bar examination. In the next section I will provide some rough sketches of those results.

B. The Results of Implementing These Theories into the Program

When the Academic Excellence Program began implementation in 2013, we altered the previously existing program one step at a time, making modest changes each semester. To some degree, parts of the framework of the program remained unchanged, but the AEP added several courses and reworked the pedagogy and curriculum of each aspect of the program. As each cohort of bar-takers experienced more of the new changes in the program, bar exam results improved.

A description of those changes will help put in context the contemporaneous relative pass rate improvements. The previous program had offerings in the second, third, and final semesters (in addition to informal activities in the first). The new AEP changed these offerings and added courses in the first and fifth semesters. Details follow.

Courses.pdf (suggesting the third or fourth week as the optimal time to start).

11. Sean H.K. Kang, *Spaced Repetition Promotes Efficient and Effective Learning: Policy Implications for Instruction*, 3 POLICY INSIGHTS FROM THE BEHAVIORAL & BRAIN SCIENCES 12, 13 (2016), [https://www.dartmouth.edu/~cogedlab/pubs/Kang\(2016,PIBBS\).pdf](https://www.dartmouth.edu/~cogedlab/pubs/Kang(2016,PIBBS).pdf).
12. PETER C. BROWN ET AL., MAKE IT STICK: THE SCIENCE OF SUCCESSFUL LEARNING 64 (2014).

In students' first semester, we replaced a series of informal skills workshops with the weekly Introduction to the Study of Law course introduced in Part II.A. That course begins with four classes on traditional fundamental law school skills, like outlining, close case reading, and time management. In the next unit, we explicitly teach legal analysis. Although we briefly teach paradigms of organization (IRAC, etc.), we spend most of the classes in that unit on the deeper aspects of legal reasoning and analysis. In many ways, this unit is similar to portions of Columbia Law School's Legal Methods course.¹³ The final unit of the course focuses on preparation for examinations, culminating in an end-of-term mock exam. Like all classes in the AEP, each unit of the course incorporates concepts from the science of learning. Statistical analyses show that students who participate in the course regularly and complete the exercises perform better on first-semester exams than those who attend less regularly or complete fewer exercises.¹⁴

In students' second semester, certain students enroll in the Legal Reasoning course. Although a form of this course existed before the AEP, its curriculum and pedagogy have changed substantially. Instead of focusing on background skills, this course focuses more deeply on analysis. Five papers are assigned throughout the semester, each simulating an exam in students' doctrinal courses. Importantly, students must write a self-critique of each paper, thus engaging metacognition. (Each of the AEP's for-credit courses employs this method). Again, data analysis shows that students who work diligently in this course outperform similarly situated students not enrolled in the course.¹⁵

In students' third semester, Legal Analysis is available as an elective for certain students. Similar to the Legal Reasoning course, Legal Analysis is contextualized with the Evidence course students take in the third semester. Again students write five exam-like papers and self-evaluate their work. This class, too, existed before the AEP, but its methods changed with establishment of the new program. Again, analyses show that enrolled students perform better in both Evidence and their other courses, even outperforming students with higher GPAs.¹⁶

In students' fifth semester, certain students may enroll in Advanced Legal Analysis as an elective. Taught by my colleague Professor Ruiz, this course is situated in the penultimate semester of law school, and the focus of the course now swings more toward the analytical thinking required on the bar exam. Students write numerous essays, complete dozens of multiple-choice questions, and receive grading and feedback from bar exam graders. The course is a new addition to the AEP's curriculum and, as such, the data sample sizes are not yet sufficient for statistical analysis.

13. See e.g., *Legal Methods at Columbia Law School*, COLUMBIA LAW SCHOOL, <https://www.law.columbia.edu/courses/sections/23631>.

14. Statistics on file with the author.

15. *Id.*

16. *Id.*

Finally, the U.S. Law & Procedure course is an elective offered in the final semester. It is available to all graduating students, and for the past few semesters, ninety-nine percent of the class (which average in size around 140) enrolled. The course meets two days a week, one day focusing on the Multistate Bar Exam and the other focusing on Florida subjects. This course existed before the AEP but is now taught by Professor Ruiz (who modified the course substantially) and an adjunct. Importantly, the new AEP faculty chose to discontinue outsourcing parts of this course to a bar preparation company. We then implemented methods comporting more with the science of learning. Statistical analyses of the course, comparing enrollees against non-enrollees, is not available because nearly all students enroll. Data suggest, however, that the course improved students' likelihood of passing the bar exam, as discussed *infra*.

As we implemented or modified each of these courses one at a time over several years, the law school's bar pass rate rose. The contemporaneousness of the changes and the relative pass rate increases encouraged us that the AEP was benefiting students. The following chart demonstrates that contemporaneousness.

July 2012	80.2%	80.3%	+0.1	7	
Feb 2013	80.2%	91.7%	+11.5	4	
July 2013	77.2%	82.8%	+5.6	4	
Feb 2014	72.9%	81.3%	+8.4	3	1L LR Curriculum
July 2014	71.8%	78.2%	+6.4	4	1L ISL + 2L LA Curriculum
Feb 2015	64.3%	63%	-1.3	9	3L USL&P Sub
July 2015	68.9%	89%	+20.1	1	3L USL&P Curric./ First AEP Students @ Bar Exam
Feb 2016	58.4%	84.6%	+26.2	1	“ “ “
July 2016	68.2%	87.5%	+19.3	1	AEP Fully Implemented
Feb 2017	57.7%	78.9%	11.2	2	AEP Fully Implemented
July 2017	71.3%	87.8%	16.5	1	“ “ “
Feb 2018	57.9%	85.0%	27.1	1	“ “ “

For a more detailed explanation of this chart, see the footnote below.¹⁷

17. Just before the February 2014 bar exam, the AEP implemented changes to the 1L Legal

Each of the changes referenced above included concepts arising out of the science of learning. While our incoming indicators remained mostly unchanged, our students nonetheless outperformed those indicators. Although there can be many explanations for that outperformance, the context seems to suggest that the AEP's employment of the science of learning had some functional impact. In the next part, I will detail some of the many concepts from cognitive science and educational psychology.

III. Concepts From Cognitive Science and Educational Psychology that Build Better Learners

In "Make 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.¹⁸

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.¹⁹ Like the other theories

Reasoning course. The changes to the AEP, therefore, did not affect graduates taking the exam. Just after the July 2014 exam, the AEP added the 1L Introduction to the Study of Law (ISL) course and modified the 2L Legal Reasoning course. Again, changes were not available during these graduates' first and second years. For the February bar exam, again, no AEP changes affected the bar-takers. However, a visiting professor taught the U.S. Law & Procedure course for this cohort. The decreased passage rate gave rise to the reasonable hypothesis that the previous Director of Bar Preparation, who had taught the course, was more effective than the substitute. Students taking the July 2015 exam were the first to have had access to the changes in the AEP. Those students were the first to experience the revised curricula of the 2L Legal Analysis and U.S. Law & Procedure. The new Director of Bar Preparation, Professor Ruiz, taught the U.S. Law & Procedure course for this cohort. At this point, the law school's bar passage rate became the highest of any law school in Florida. This trend continued through the group of graduates who experienced the full implementation of the AEP.

18. BROWN ET AL., *supra* note 12, at Preface.

19. Carol Springer Sargent & Andrea A. Curcio, *Empirical Evidence that Formative Assessments Improve Final Exams*, 61 J. LEGAL. EDUC. 379, 380-81 (2012) (citing Andrea A. Curcio et al., *Does Practice Make Perfect? An Empirical Examination of the Impact of Practice Essays on Essay Exam*

discussed 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 self-regulated learning, or SRL, could be game-changers in legal education.²⁰

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,²¹ 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.²²

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, toward 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)²³ 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 it?" A recent study found that students with higher incoming indicators improved performance better after formative

Performance, 35 FLA. ST. U. L. REV. 271, 280-82, 302-06 (2008)).

20. See generally Elizabeth M. Bloom, *A Law School Game Changer: (Trans)formative Feedback*, 41 OHIO N.U. L. REV. 227 (2015) (discussing the impact of metacognition and self-regulated learning on students' learning).
21. See Rebecca C. Flanagan, *The Kids Aren't Alright: Rethinking the Law Student Skills Deficit*, 15 BYU EDUC. & L.J. 135, 147 (2014).
22. Cheryl B. Preston, Penée Wood Stewart, & Louise R. Moulding, *Teaching "Thinking Like A Lawyer": Metacognition and Law Students*, 2014 BYU L. REV. 1053, 1054 (2014).
23. Anthony Niedwiecki, *Teaching for Lifelong Learning: Improving the Metacognitive Skills of Law Students through More Effective Formative Assessment Techniques*, 40 CAP. U. L. REV. 149, 156 (2012); Michael Hunter Schwartz, *Teaching Law Students to be Self-Regulated Learners*, 2003 L. REV. M.S.U.-D.C.L. 447, 452-53 (2003).

assessment than others, and the authors theorized that those students' stronger metacognitive skills explained that difference.²⁴

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.”²⁵ 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 toward finding and eliminating weaknesses.²⁶ Given that the heart of this approach is self-awareness and critique, it is no surprise that studies have shown that the trait most associated with academic success in law school is a healthy skepticism.²⁷

Importantly, SRL necessitates that students own the learning and not outsource that responsibility to others. (Hence my aversion to students receiving “tutoring.”) Certain practices in law school can hinder that goal. When the crowd mentality persuades 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.²⁸ When faculty dissuade students from taking practice exams—either explicitly or implicitly by declining to post old exams—that hinders SRL. These practices leave students 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 misunderstandings or even determine objectively

24. See Sargent & Curcio, *supra* note 19, at 302-03.

25. Schwartz, *supra* note 23, at 452 (quoting Paul R. Pintrich, Understanding Self-Regulated Learning, in 1995 NEW DIRECTIONS FOR TEACHING AND LEARNING: UNDERSTANDING SELF-REGULATED LEARNING No. 63, at 5 (Paul R. Pintrich ed., 1995)).

26. *Id.*

27. See Jason M. Satterfield, John Monahan, & Martin E. P. Seligman, *Law School Performance Predicted by Explanatory Style*, 15 BEHAVIORAL SCIENCES & THE LAW 95, 103 (1997) (finding that in the law school setting, skepticism is more strongly correlated with success than optimism).

28. Louis N. Schulze, Jr. & A. Adam Ding, *Alternative Justifications for Academic Support III: An Empirical Analysis of the Impact of Academic Support on Perceived Autonomy Support and Humanizing Law Schools*, 38 OHIO N.U. L. REV. 999, 1011 (2012).

whether they have them. These are the Rumsfeldian unknown unknowns²⁹—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 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,”³⁰ 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,³¹ self-testing on its substance, and taking practice exams.)

Third: objectively self-test. 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 have successfully synthesized the law in the previous steps. If they find weaknesses, they should return to step one and shore up their knowledge.

Professor Ruiz and 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

29. David A. Graham, *Rumsfeld’s Knowns and Unknowns: The Intellectual History of a Quip*, THE ATLANTIC (Mar. 27, 2014), <https://www.theatlantic.com/politics/archive/2014/03/rumsfelds-knowns-and-unknowns-the-intellectual-history-of-a-quip/359719/>.

30. See Jaap M.J. Murre & Joeri Dros, *Replication and Analysis of Ebbinghaus’ Forgetting Curve*, PLoS ONE 10 (2015), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4492928/> (detailing Ebbinghaus’s famous forgetting experiments in the 1880s showing the intervals of memory decay).

31. In this process, I counsel students that they need to convert the trees of their master outlining into the forest of the seeing the whole course. They can do this in many ways, two of which are “outlining the outline” or “master flowcharting” the course. Both of these methods allow students to review the information, solidify their cognitive schema of the course, and construct their big-picture understanding of the course.

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 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.³²

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).³³ 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.³⁴ According to Roediger & Butler (2011), these free-recall exercises enhance encoding in a manner superior to other methods.³⁵ 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 student is asked to “explain common-law self-defense” and must 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 due instead to enhancing cognitive

32. Dear Harvard: Call me. *Wink*.

33. ABA STANDARDS AND RULES OF PROCEDURE FOR APPROVAL OF LAW SCHOOLS NO. 314, AMERICAN BAR ASS’N (2016- 2017).

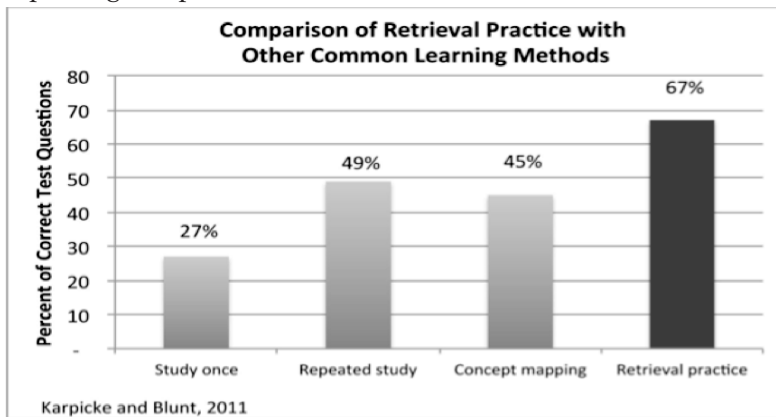
34. Henry L. Roediger III & Andrew C. Butler, *The critical role of retrieval practice in long-term retention*, TRENDS IN COGNITIVE SCIENCES 20, 20 (2011), <https://www.ncbi.nlm.nih.gov/pubmed/20951630>.

35. *Id.* at 24 (figure 4).

“retrieval routes.”³⁶ The processing of information through free recall solidifies these routes through the impact of “desirable difficulties”—the idea being that when learning is harder, it is more effective.³⁷

And that is one reason students do not like and do not use retrieval practice. When they get answers wrong, they feel as if they are not learning the material (despite the fact that they really are). By contrast, when they reread notes or outlines, they feel as if they are learning because they recognize the material when they read it through again. The problem, according to Karpicke, Butler & Roediger (2009),³⁸ 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.³⁹ This is why so many students say that they “knew the material backward and forward” 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.⁴⁰ The following chart demonstrates the results of studies proving this point.⁴¹



36. Henry L. Roediger, III & Jeffrey D. Karpicke, *Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention*, 17 PSYCH. SCI. 250, 253 (2006), http://learninglab.psych.purdue.edu/downloads/2006_Roediger_Karpicke_PsychSci.pdf.

37. *Id.* at 254.

38. Jeffrey D. Karpicke et al., *Metacognitive Strategies in Student Learning: Do Students Practise Retrieval When They Study on Their Own?* 17 MEMORY 471, 478 (2009), http://learninglab.psych.purdue.edu/downloads/2009_Karpicke_Butler_Roediger.pdf.

39. BROWN ET AL., *supra* note 12, at 40.

40. See generally Jeffrey D. Karpicke & Janell R. Blunt, *Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping*, 331 SCI. MAG. Feb. 2011, 772, 772 (2011), http://learninglab.psych.purdue.edu/downloads/2011_Karpicke_Blunt_Science.pdf.

41. *Id.* at 773 (figure 1).

In fact, the testing effect actually works before the introduction of material and even in the absence of individual feedback.⁴² 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 reteaching 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 before 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 toward 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 based on the simple fact that learning is enhanced when information is distributed over time instead of learned in a “massed” (or crammed) fashion.⁴³ 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 14 and ignore that concept until just a week before their exam on December 2, that approach constitutes missed practice and is dramatically inferior to interspersing multiple retrievals at certain specific intervals.

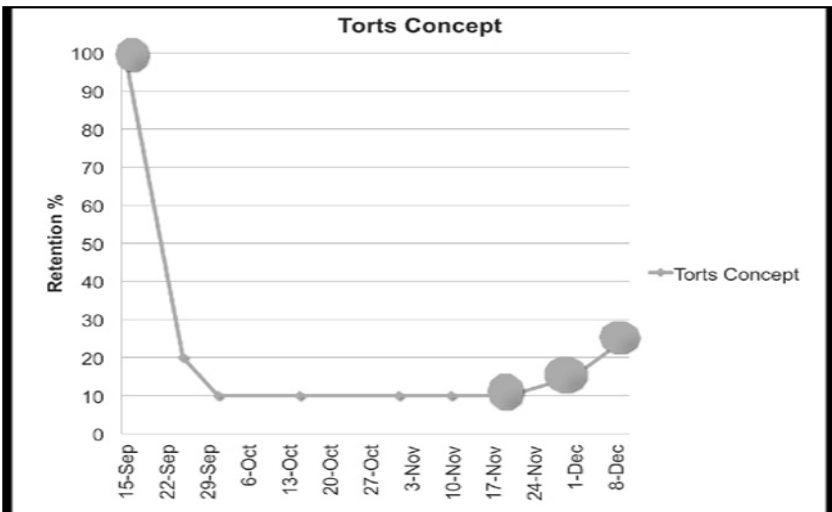
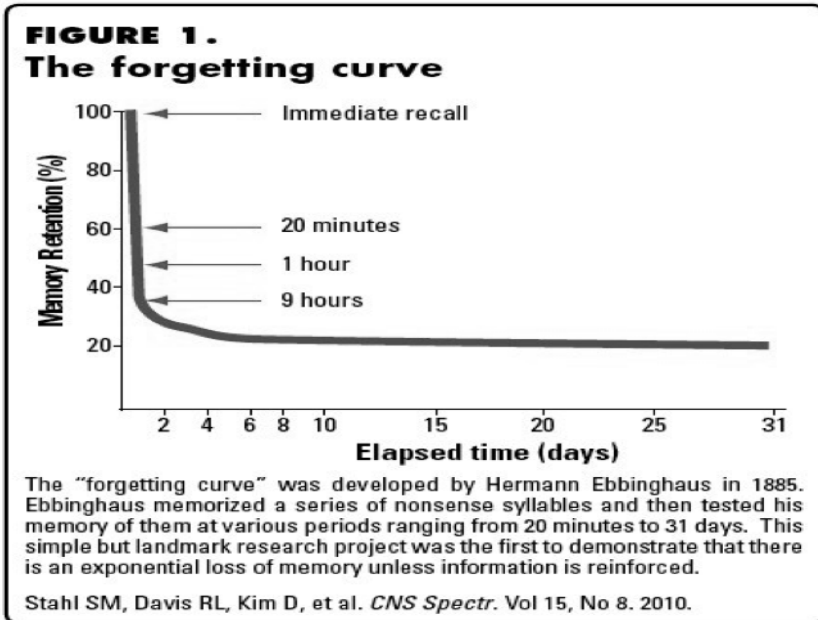
42. Roediger & Karpicke, *supra* note 36, at 253.

43. Kang, *supra* note 11, at 13.

The neuroscience behind this effect is instructive. Neurogenesis is the generation of neurons over time in the areas of the brain involved in learning.⁴⁴ Between the neurons are spaces called synapses, whose job is to communicate among neurons.⁴⁵ This is the basis of memory. If unused, synaptic connections weaken.⁴⁶ But if more learning occurs, the strength of the signal (called synaptic plasticity) returns.⁴⁷

44. Matteo Mainetti & Giorgio A. Ascoli, *A Neural Mechanism for Background Information-Gated Learning Based on Axonal-Dendritic Overlaps*, 11 PLOS COMP. BIO. (2015), <http://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1004155>.
45. David M. Lovinger, *Communication Networks in the Brain Neurons, Receptors, Neurotransmitters, and Alcohol*, 31 ALCOHOL RESEARCH & HEALTH 196, 197 (2008), <https://pubs.niaaa.nih.gov/publications/arh313/196-214.pdf>.
46. Elodie Bruel-Jungerman et al., *Brain Plasticity Mechanisms and Memory: A Party of Four*, 13 THE NEUROSCIENTIST 492, 497 (2007).
47. *See id.* at 493.

The speed at which the neural networks deteriorate is deemed the “forgetting curve.”⁴⁸ The following figures demonstrate that curve:⁴⁹



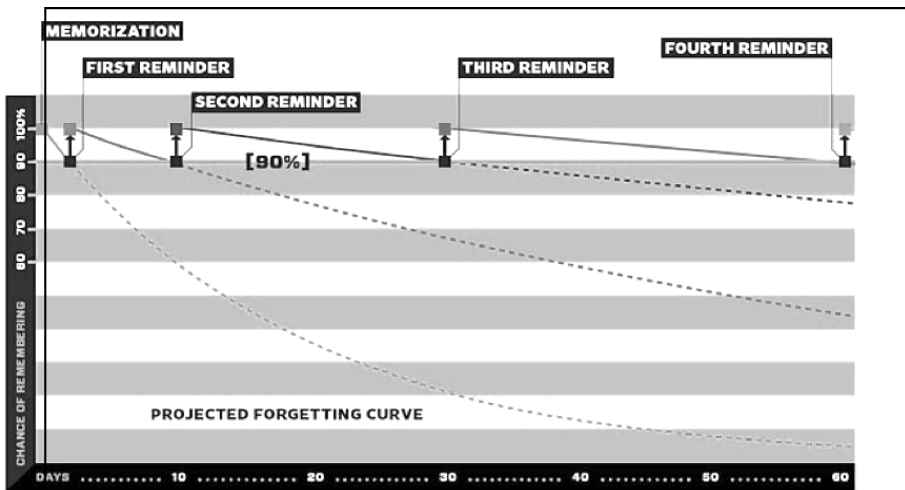
These figures should frighten students (and when I present this material in

48. BROWN ET AL., *supra* note 12, at 28.

49. HERMANN EBBINGHAUS, *MEMORY: A CONTRIBUTION TO EXPERIMENTAL PSYCHOLOGY* 76 (trans. Henry A. Ruger & Clara E. Bussenius 1913).

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 figure⁵⁰ 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.⁵¹ Note, however, that the learner should not 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 one another, they increase their durability and need less frequent stimulation until they begin to decline again; this is known as “the lag effect.”⁵² Also, materials that learners know well require less review than the materials they know less well, thus allowing yet more spacing.⁵³ These two features—longer intervals

50. Gary Wolf, *Want to Remember Everything You'll Ever Learn? Surrender to this Algorithm*, WIRED (Apr. 21, 2008), <https://www.wired.com/2008/04/ff-wozniak/>.

51. Mark Mayford et al., *Synapses and Memory Storage*, COLD SPRING HARBOR PERSPECT. BIO. 1, 1 (2012), <http://cshperspectives.cshlp.org/content/4/6/a005751.full.pdf+html>.

52. Michael J. Kahana & Marc W. Howard, *Spacing and Lag Effects in Free Recall of Pure Lists*, 12 PSYCHONOMIC BULLETIN & REV. 159, 159 (2005), <https://memory.psych.upenn.edu/files/pubs/KahaHowao5.pdf>.

53. BROWN ET AL., *supra* note 12, at 64.

and prioritizing less well-known material—make the spaced repetition process more efficient than otherwise would be the case.

I should address one counter-argument. 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 (nontheoretical) 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 cannot thoroughly understand FRE 801 if you do not remember what that rule says or what the Committee Notes state. You cannot spot a specific Confrontation Clause issue if the brain has not encoded the “primary purpose” rule. You cannot 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 enhances memory, but also aids understanding.⁵⁴ Learning occurs not through some literal recording mechanism but instead by the relationship between the meaning of one bit of information and the meaning of and associations with preexisting knowledge.⁵⁵ 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.

Finally, 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,

54. Kang, *supra* note 11, at 15 (stating that although the benefits of spaced repetition on memory are better-documented, evidence exists that “indicates that spacing can enhance meaningful learning that generalizes to new situations”).

55. See Mainette & Ascoli, *supra* note 44, at 4.

or CST. Like the other topics I have discussed in this essay, CST is widely accepted in educational psychology.⁵⁶

Like self-regulated learning, CST is a subset of constructivism.⁵⁷ Constructivism holds that real learning happens when students make a concept their own by actively discovering knowledge using their own reasoning processes.⁵⁸ The ideal educational objective is not the amassing of “stuff” but instead that instruction should be focused mainly on developing learners’ thinking⁵⁹—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.”⁶⁰ 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.⁶¹ A cognitive schema is a heuristic that promotes the encoding and retrieval of knowledge.⁶² 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

56. Derry, *supra* note 9, at 1.

57. *Id.*

58. See generally Kaya Yilmaz, *Constructivism: Its Theoretical Underpinnings, Variations, and Its Implications for Classroom Instruction*, EDUC. HORIZONS 161 (2008). Constructivism has some interesting epistemological aspects. Unlike behavioral and cognitive theories of learning, constructivism holds that there is no absolute knowledge, extant from the learner herself. See *id.* at 162 (knowledge is not discoverable from the natural world but instead is put together in a framework subjectively constructed by the individual); see *id.* (Since the learning—and the entire nature of knowledge—is so subjective, providing instruction on “stuff” is inherently absurd. The instruction instead should focus on the process of thinking and understanding, thus rendering instructors as facilitators instead of lecturers.).

59. *Id.* at 163, 165 (“As a theory, constructivism proposes that learning is neither a stimulus-response phenomenon nor a passive process of receiving knowledge; instead, as an adaptive activity requiring building conceptual structures and self-regulation through reflection and abstraction, learning is an active process of knowledge construction influenced by how one interacts with and interprets new ideas and events.”).

60. See Alison King, *From Sage on the Stage to Guide on the Side*, 41 COLLEGE TEACHING 30, 30 (1993).

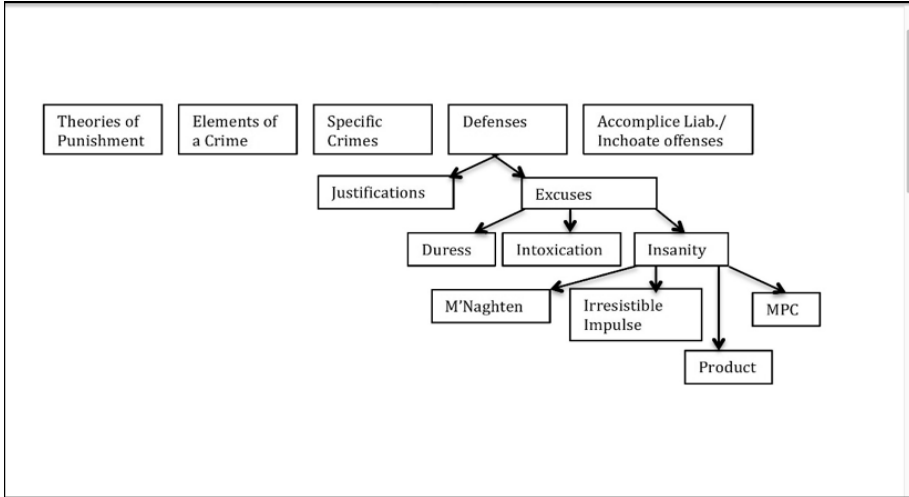
61. Derry, *supra* note 9, at 165.

62. See generally Leah M. Christensen, *The Psychology Behind Case Briefing: A Powerful Cognitive Schema*, 29 CAMPBELL L. REV. 5, 11 (2006) (describing schema theory). Christensen notes that novice learners essentially lack a preexisting schema that is directly on-point. *Id.* at 12-13. By contrast, experts have full-fledged and extensive schemata about multiple subjects. *Id.* at 12-13. This contrast can lead to difficulty for the instructor in coping with the knowledge gap between themselves and learners.

of loci,” a tool that has existed since Aristotle)⁶³ structures ideas and facilitates learning, encoding, and recall.

A law school example:

In my criminal law class, students should have “put the course together” something like this (detailing only the insanity defense):



No doubt law professors could mentally construct something like this instantly. To the expert, the substance of schemata is simple; we know the information almost reflexively and the mental structure of the information is downright obvious. But for novice learners, schemata pose a distinct obstacle. Their knowledge is limited, but a failure to construct an accurate schema inhibits learning and obfuscates understanding.

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 have 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 has become clear to me over the years that this is a frequent problem that affects students’ performance substantially.

63. Sarah Zielinski, *The Secret of Sherlock’s Mind Palace*, SMITHSONIAN.COM (Feb. 3, 2014), <http://www.smithsonianmag.com/arts-culture/secrets-sherlocks-mind-palace-180949567/>.

The problem is even worse in bar study. Some bar preparation companies place particular emphasis on the outlines they have been refining for thirty years. Not long ago, those outlines were the epicenter—and selling point—of the courses, and I am sure there is no rush to de-emphasize materials it has 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 reread 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 among 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 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 persuade 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

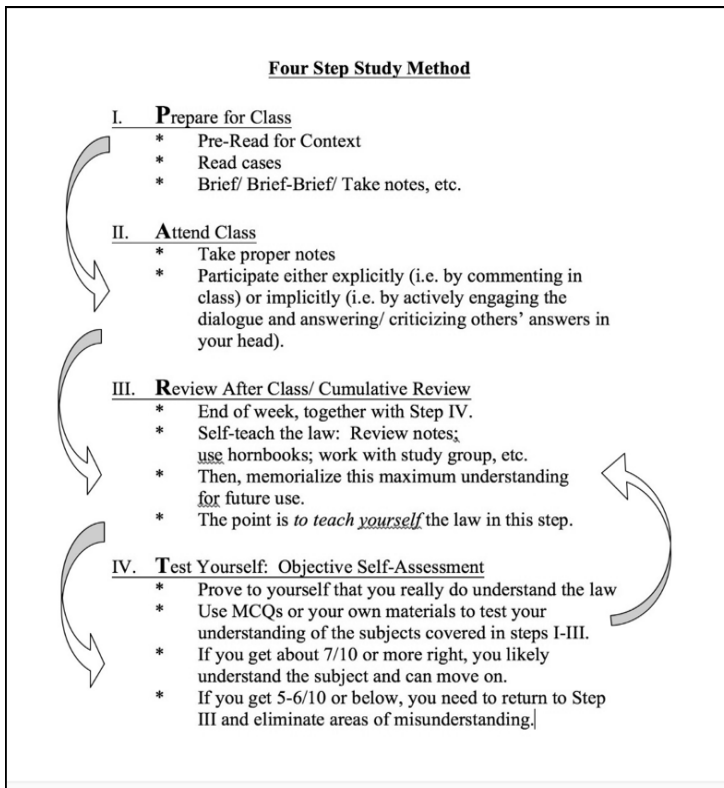
This section discusses two of the many methods I emphasize for students currently enrolled in law school and for the benefit of their law school studies: the "Four-Step Study Plan"⁶⁴ and schema + spaced repetition. These methods might not work, *per se*, in bar exam studies, but the underlying concepts certainly do.

64. ©, Copyright, Trademark, All Patents Pending.

1. The Four-Step Study Plan

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.⁶⁵ 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 will have time to clarify during exam prep. Then they realize they do not.

Because of 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.



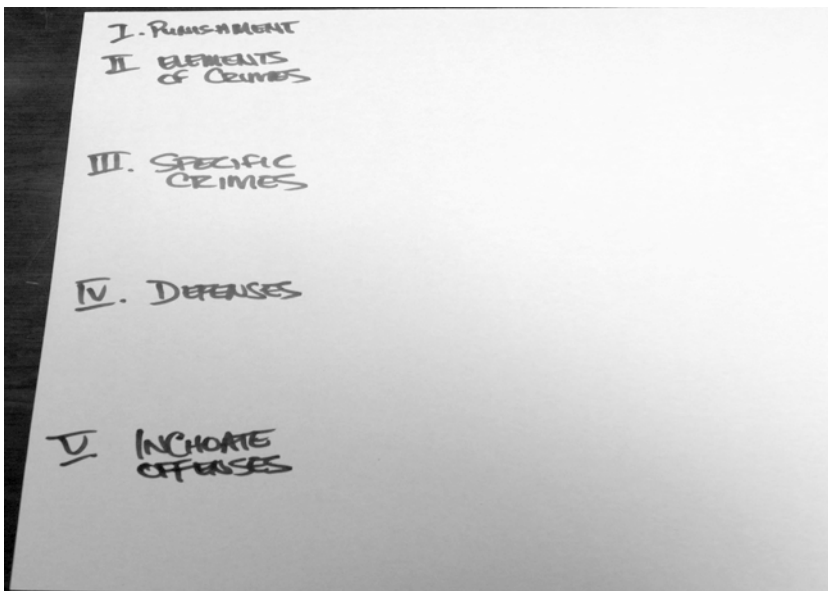
65. See Graham, *supra* note 29 and accompanying text.

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.

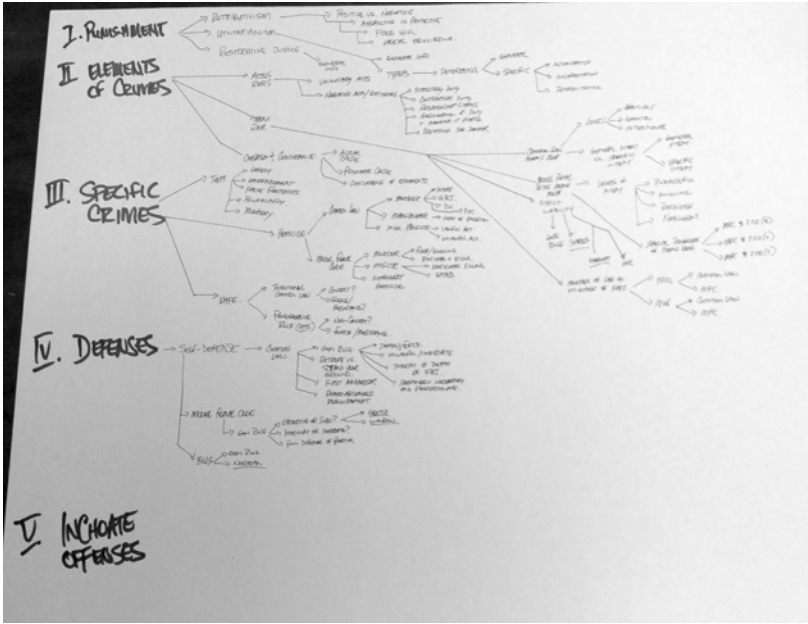
While I try to persuade students to take this approach from day one, some do not. When students underperform in the first semester, however, switching to this plan in the second has led to statistically significant grade increases. I have seen students go from sub-2.00 first-semester GPAs to 3.50 second-semester GPAs; from the bottom of the class to dean's list; from the brink of dismissal to a top ten percent semester GPA and booked 1L courses. As this approach comports with what we know about how learning really works, especially compared with traditional methods, it produces results.

2. Scheme + spaced repetition

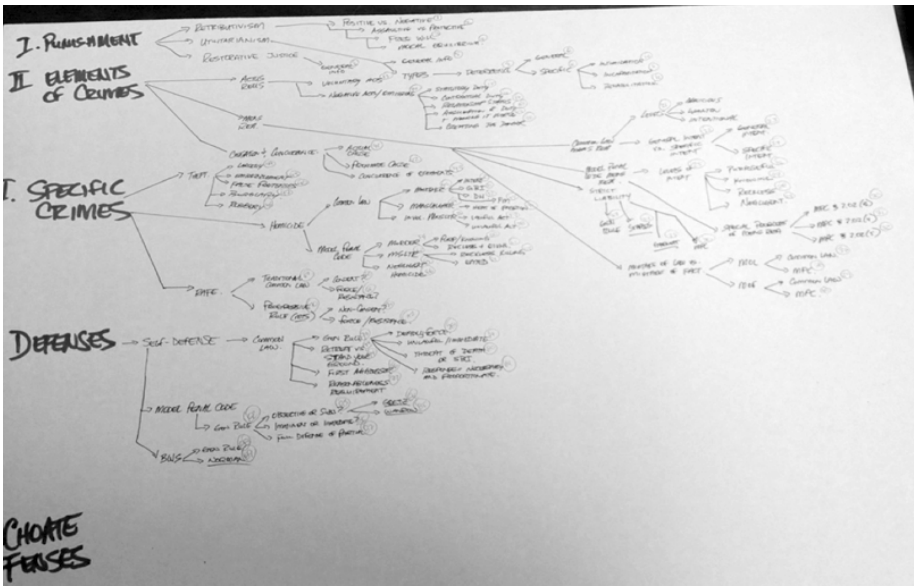
Another method, again completed weekly, takes advantage of both schema theory and spaced repetition to promote understanding and “digestion” of a course. At the beginning of the semester, students sketch the “big picture” of the course, using either the course syllabus or the casebook’s table of contents. An example:

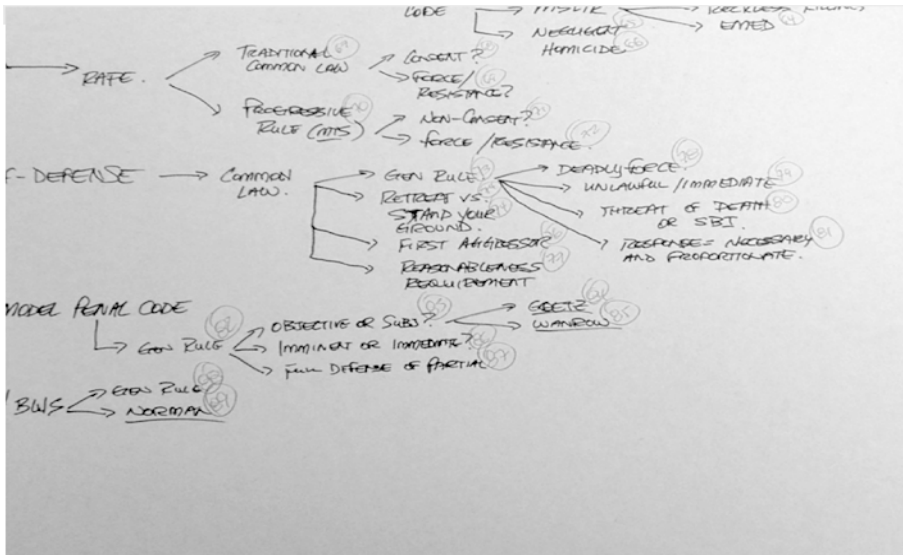


Each week, students add detail to the schema, like so:



At some point each week, space constraints will make it impossible to include microdetails on the schema. When students get to this “detail point,” they mark that point with a number. These numbers then continue in order at subsequent detail points:





Those numbers each correspond to a notecard, on which the student records the details of the particular legal issue. This should include rules, cases, hypos, etc.:

(76) DEFENSES → SELF-DEFENSE - CL → 1ST AGGRESSOR

U.S. v. PETERSON; ~~SEARCHES~~ V STEALING HIS AIRCARS.
 V GOES TO LEAVE BUT D. GETS GUN. V STEPS TO D TO FIGHT W/ CALIBER SO D SHOTS V AND CLAIMS SELF-DEFENSE.

HELD: D CANNOT CLAIM SELF-DEFENSE B/C HE WAS FIRST AGGRESSOR.

RULES: ① IF D IS 1ST AGGRESSOR, D CANNOT CLAIM SELF-DEFENSE.
 ② D CAN REGAIN RIGHT TO USE SELF-DEFENSE BY COMMUNICATING COMPLETE WITHDRAWAL

On the back of the card, the student writes a word or phrase summarizing the contents of the details to be used in self-testing using spaced repetition, as described below. In this case, the student would write “Self-Defense/ First Aggressor/ Peterson.”

Until this point, this method employs cognitive schema to help the student see the organization of the course and create the cognitive pathways to the knowledge. After this point, it uses spaced repetition to help the student encode the knowledge, reinforce it, and grow the neurons and synaptic connections involved in storage.

After adding to the course schema as described above at the end of the week, students then cumulatively test themselves on the course materials using the cards created as detail points. They look at the card content summary on the back of the card, prompting them to mentally rehearse everything about that subject. When finished, they flip the card over and judge how well they knew the material.

Importantly, students do not need to test themselves constantly on all cards; we know from spaced repetition that the better one knows a subject, the less one must revisit it.⁶⁶ Accordingly, after self-testing on a card, the student should grade her knowledge as strong, medium, or weak. If her knowledge is strong, she places that card in a green rubber band. If her knowledge is medium, a yellow rubber band, and weak gets a red rubber band. A student reviews the green pile every third week, the yellow pile every other week, and the red pile each week. As the student's performance improves on a card, she moves it to the next highest pile of cards and continues this throughout the semester.

This method takes advantage of schema theory, spaced repetition, and even the testing effect. It has been estimated that an overall spacing period of three months can result in ninety percent retention compared with just twenty percent when the material is crammed.⁶⁷ For students seeking a more high-tech version of this process, they can use SRS, which allows them to make their own virtual cards and uses an algorithm to retest each card at the optimal point.⁶⁸

In the next subpart, I will discuss methods that harness cognitive and educational psychology to support students' bar exam study.

B. Bar Exam Study Methods Employing Cognitive Science and Educational Psychology

Subsection III.A pulled together theory and practice by describing law school study methods that harness cognitive science and educational psychology to enhance performance. I will do the same thing here but in the context of bar study.

As a caveat, I should mention that there are myriad methods that schools and students can adopt to improve bar passage. I lack sufficient space here to catalog even all of the measures we use at our school. What must be

66. BROWN ET AL., *supra* note 12, at 64; Gabriel H. Teninbaum, *Spaced Repetition: A Method for Learning More Law in Less Time*, 17 J. HIGH TECH. L. 273 (forthcoming 2017) (detailing spaced repetition system that makes it possible for law students to retain four times the "amount" of doctrine than usual).

67. See Teninbaum, *supra* note 66.

68. See <http://www.spacedrepetition.com/>.

understood, though, is that there is no one-size-fits-all method to improve bar passage. (Granted, there are plenty of folks offering to sell students (and law schools) so-called silver bullets, but most do not work.).

So, as a precursor to this section, I will say this: Law schools need to stop believing (and investing) in quick fixes and magic bullets. Further, if a school's median incoming LSAT is poor, no single, siloed, nonintegrated, or externalized program can magically improve a fifty-five percent pass rate to ninety-four percent. Magic wands cannot cure questionable admissions practices. Claims to the contrary exist solely to skim on supportive measures while ignoring reality. Instead, any earnest effort to bolster bar passage requires a serious, rigorous, multifaceted program contextualized within doctrinal learning.

But I digress. This section discusses science-based bar preparation methods students can leverage themselves.

*1. Multiple-Choice Questions (MCQs) early and often -
retrieval practice, spaced repetition, and metacognition*

To their credit, most major bar prep companies now include multiple-choice questions ("MCQs") early in bar prep. Usually, MCQs closely follow a lecture on the same subject. Then, a few days later, another set of MCQs on that same subject prods the student to return to the material, thus implicating spaced repetition.

The problem is that many students do not do this. Why?

Students have been conditioned to believe that MCQs provide only summative assessment; they assess whether you have properly learned something that you have "fully studied" and cannot be used for formative assessment or learning itself. A high grade means you did well, and a low grade means you did poorly. The student response, then, is "I do not want to freak myself out, so I won't take MCQs until 'after I learn'"—in other words, it is a summative assessment, not a formative one.

This approach is flawed because it ignores metacognition. Students can use MCQs to assess their strengths and weaknesses. If a student answers twenty-five MCQs two days after the torts lecture and gets four of the five "duty" questions wrong, she knows she needs to focus on that subject. Many students avoid this feedback because they view wrong answers not as a metacognitive opportunity to improve but as an indictment of their knowledge, ability, and chances of success. This "fixed mindset"⁶⁹ stymies students' ability to eliminate their weaknesses and perform better on the exam. (Those interested in law student performance must acquaint themselves with the literature on "mindset," scientifically known as "implicit theories of personality."⁷⁰ The AEP also focuses on this concept to some degree.)

69. CAROL S. DWECK, *MINDSET: THE NEW PSYCHOLOGY OF SUCCESS* (2007).

70. See Ying-yi Hong, Chi-yue Chiu, Carol S Dweck & Russell Sacks, *Implicit Theories and Evaluative Processes in Person Cognition*, 33 *JOURNAL OF EXPERIMENTAL SOCIAL PSYCHOLOGY* 296, 297 (1997).

Avoiding MCQs is also a flawed strategy because it ignores the benefits of both retrieval practice and spaced repetition. We know that students learn better from forced retrieval exercises (e.g., MCQs) than from listening to lectures. Because students have been conditioned to believe that MCQs serve only the purpose of summative assessment, they believe that MCQs are not necessary or desirable until the end of bar study. In turn, postponing MCQs until late June jettisons the more effective learning method embodied in forced retrieval. We also know that students learn materials better from testing in a particularly spaced manner. Delaying MCQs until July jams learning into short-term memory instead of encoding it into durable memory, where it is more effective.

2. *Mixed practice and desirable difficulties*

One theory from educational psychology I have not discussed is “mixed practice.” This theory is a subtopic under retrieval practice, but it is a bit more nuanced. The idea is that there are two types of retrieval practice. The first is “blocked practice”—whereby the learner tests herself on the same subject throughout the retrieval practice.⁷¹ The second is “mixed practice”—whereby the learner integrates different subjects into a session of retrieval practice.⁷² So, if you are well along in bar prep and you take a set of twenty-five MCQs all on constitutional law, that is a blocked set. If you intermingle all seven topics (or even just two), that is mixed practice.

This is actually something of a contested topic in bar study. Some law schools’ programs instruct students to focus on one MBE subject at a time during retrieval practice (not that most people use that term) until very near the end of bar prep. This allows students to “feel good” that they are improving on that subject.

But “feeling good” does not get you a bar card.

Studies show that mixed practice provides far more effective learning.⁷³ So, for instance, if a bar prep program starts the summer with three torts lectures, it is fine only to take torts questions at that time. But when the program then gives three lectures on contracts those next few days, students should intermingle the torts and contracts MCQs as soon as possible during retrieval practice sessions. As more subjects come into the mix, students should add those subjects into the mixed practice of MCQs.

Most do not do this. Why?

The answer is because they immediately see their scores drop—often like a rock. Each major bar prep company provides (useful) real-time metrics tools

71. See Doug Rohrer & Kelli Taylor, *The Shuffling of Mathematics Problems Improves Learning*, 35 INSTR. SCI. 481, 481 (2007), <https://www.gwern.net/docs/spacedrepetition/2007-rohrer.pdf> (detailing experimental proof of the vast superiority of mixed practice over blocked practice); BROWN ET AL., *supra* note 12, at 46-62.

72. Rohrer & Taylor, *supra* note 71, at 481; BROWN ET AL., *supra* note 12, at 46-62.

73. Rohrer & Taylor, *supra* note 71, at 481; BROWN ET AL., *supra* note 12, at 46-62.

showing student performance. A student will see that she has performed at about a sixty percent level in straight sets. When she introduces mixed sets into her retrieval practice—whack—scores plummet to the 40s. At that point, many students scurry back to blocked sets to make themselves feel better—and, in so doing, deprive themselves of better learning.

Enter “desirable difficulty.” This concept from educational psychology holds (very basically) that hard learning is better learning.⁷⁴ If the learning process is easy, the student did not really learn as much. However, the pervasive narrative among law students is that if learning is hard, you do not have “it”—that native aptitude for the study of law. Because students do not want to label themselves as having a low aptitude for law, they sometimes avoid the hard learning. This is the entire concept of Dr. Carol Dweck’s concept of “mindset,” introduced above, a discussion of which could easily take up a separate essay.

But schools could avoid this problem altogether with just one simple act: letting students know ahead of time that their scores will be dropping when mixed sets start.

But most do not.

3. Stop listening to gurus – self-regulated learning

In a hurried effort to stem the tide of crashing bar pass rates, some law schools have implemented stopgap measures designed to prevent future rate decreases. Too many schools have done so by buying into the “one-size-fits-all” learning methods, usually by putting together an isolated, siloed final-semester bar prep class. Lacking expertise in the specific disciplines of bar preparation and academic support, deans and faculty find themselves attracted to relatively inexpensive programs offered by independent contractors or outside companies who slickly boast of ninety-five percent pass rates and promises of turning every 145 LSAT student into a 150 MBE score. Like those from the self-help guru cottage industry of the 1970s, these gurus are long on talk and short on substance.

What is wrong with the gurus? First, they deprive students of self-regulated learning. One of the most important facets of learning is that students should manage their own learning, understand their own weaknesses, and plan how to improve.⁷⁵ Bar exam gurus undermine this by offering “tutoring.” That word sounds terrific to faculty and students, but it is actually one of the least effective methods of learning law. Tutoring outsources the responsibility of learning to the tutor, thus undermining the student’s development and use of self-regulation. When a student suspects that she is not getting it, she ignores

74. BROWN ET AL., *supra* note 12, at 68-69 (citing Elizabeth L. Bjork & Robert Bjork, *Making Things Hard on Yourself, But in a Good Way: Creating Desirable Difficulties to Enhance Learning*, *PSYCHOLOGY AND THE REAL WORLD: ESSAYS ILLUSTRATING FUNDAMENTAL CONTRIBUTIONS TO SOCIETY* 56 (2011)).

75. *See supra*, Part III.A (detailing self-regulated learning).

that problem, and does nothing about it, because she is sure the tutor is on top of it. The weaknesses, therefore, never get remediated.⁷⁶

Second, any guru offering to “game” the bar exam by predicting the topics on the stated day of an upcoming bar exam is leading students astray. Not only are these predictions usually wrong,⁷⁷ but this practice also undermines students’ self-regulation. Instead of strategizing about how to digest all the information necessary to be prepared for the exams, students jump at the possibility of skipping subjects. This reliance on faulty prognostication takes away students’ management of their learning. And, by the way, we know the prognostications are wrong because bar examiners tell us that they intentionally try to avoid gaming by gurus.

V. Conclusion

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 lifelong 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, halfhearted kind of way. Nor can it be accomplished by teaching to the test. (Teaching to the test is 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

76. Some schools proudly boast on their websites that every 1L student gets a tutor! To incoming prelaw students that sounds fantastic—the perfect rationalization for the illogic of shelling out \$45,000 a year for a thirty-five percent chance of attaining a full-time, bar-passage-required position after graduation. Unfortunately, even a passing knowledge of educational psychology tells us that this slick marketing doles out empty promises. You will never see the word “tutor” used in any FIU Law AEP information.

77. See *MEE Predictions: February 2017 Bar Exam*, EFFICIENT BAR PREP, <http://www.efficientbarprep.com/mee-predictions/> (last visited Mar. 17, 2017) (incorrectly predicting that Conflict of Laws would not appear on the February 2017 Multistate Essay Exam); BAR EXAM GURU, <https://barexamguru.com/tag/better-than-barbri/> (last visited Mar. 17, 2017) (predicting erroneously that murder would be a topic on day three of the July 2013 California bar exam); CALIFORNIA EXPUNGEMENT LAW OFFICE, <http://www.caexpungementlaw.com/single-post/2014/07/24/Swami-Sez-July-2014-California-Bar-Exam-Projections-andor-Predictions-Part-I-> (last visited Mar. 17, 2017) (stating incorrectly that remedies and community property were “highly unlikely” to be tested on the July 2014 California bar exam); BAR EXAM GURU, <https://barexamguru.com/category/bar-exam-predictions/> (last visited Mar. 17, 2017) (predicting incorrectly that murder would be on the July 2015 California bar exam essays of performance tests). Cf. *You and the Bar Exam—Can You Predict What Will Be on the Exam?*, SANTA CLARA LAW (Sept. 8, 2015), <http://law.scu.edu/bar-exam/you-and-the-bar-exam-can-you-predict-what-will-be-on-the-exam/> (stating that even as State Bar Exam Director, the author could not predict the subjects year to year).

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.