SPACED REPETITION:
A METHOD FOR LEARNING MORE LAW IN LESS TIME

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Abstract

Spaced repetition is a learning method that allows people to learn far more, in far less time. Discovered more than 100 years ago, recent advances in mobile technology have made its potential even greater to change the way law students, bar preppers and others in the legal field learn. This article describes the science of spaced repetition and its potential uses in law. It also describes the author’s work in building a platform for law students, SpacedRepetition.com, to allow them to harness this technology.

Early findings are both exciting and consistent with the benefits of this method found in other fields. In one recent use of the technology, an entire graduating law school class was offered the chance to use SpacedRepetition.com to supplement their traditional bar preparation courses. Those who used the spaced

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repetition method passed the bar exam at a rate 19.2% higher than students who did not make use of it.

“For our whole education depends upon memory, and we shall receive instruction all in vain if all we hear slips from us.”

-Quintilian

I. Introduction

Imagine that you are a law student researching ways to maximize your chances of passing the bar exam. Now imagine that, in your research, you discover a method that has been proven to allow users to remember nearly four times more than other methods,\(^2\) as well as to dramatically improve performance on tests.\(^3\) You find that it has been thoroughly studied and shown effective, time-and-again, for more than 100 years.\(^4\) You also learn that this method has been

\(^1\) 11 MARCUS FABIUS QUINTILLANUS, INSTITUTIO ORATORIA 213 (Harold Edge-worth Butler trans., 1932).
\(^2\) See Piotr Wozniak, Optimization of Learning, § 3.2 (May 10, 1998) (unpublished M.S. thesis, University of Technology in Poznan) (on file with SuperMemo) (comparing commonly used open-source “SR” algorithm with traditional means of memory retention). SR has a 92% retention rate, while a traditional forgetting curve for people who cram information then later try to recall it is approximately 20-25% over the same time intervals. Id.
\(^3\) See B. Price Kerfoot et al., Online “Spaced Education Progress-Testing” of Students to Confront Two Upcoming Challenges to Medical Schools, 86 ACAD. MED. 300, 303 (2011) (controlling for MCAT scores while progress testing); John J. Donovan & David J. Radochevich, A Meta-Analytic Review of the Distribution of Practice Effect: Now You See It, Now You Don’t, 84 J. APPLIED PSYCHOL. 795, 796 (1999) (focusing on how learning and performance are affected by the type of task at hand).
\(^4\) See infra Section II (discussing the background and development of Spaced Repetition).
called the single best way to study by the Association for Psychological Science,\(^5\) “the new way doctors learn” by Time Magazine,\(^6\) and been recommended in the New York Times,\(^7\) Wall Street Journal\(^8\) and Harvard Business Review.\(^9\) You find that celebrity proponents of the method include everyone from a Wikipedia founder\(^10\) to the all-time record holder for single-day winnings on Jeopardy!\(^11\)

In one recent use case of this method in legal education, an entire graduating law school class was given the option to use this technology.\(^12\) Students who chose to do so passed the bar exam at a rate 19.2% higher than classmates who did not.\(^13\) You learn that this result is consistent with the decades of research on the effectiveness of

\(^{5}\) See John Dunlosky, et al., *Improving Students’ Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology*, 14 PSYCHOL. SCI. PUB. INT. 4, 46 (2013) (illustrating that certain practices, such as Distributed Practice and Spaced Repetition, have a higher or lower utility for different types of learners).

\(^{6}\) See Annie Murphy Paul, *The New Way Doctors Learn*, TIME (Mar. 7, 2012), archived at https://perma.cc/PG6L-WPGL (discussing the study tool developed by B. Price Kerfoot and how it has helped medical student achieve better test results).

\(^{7}\) See Henry L. Roediger III, *How Tests Make Us Smarter*, N.Y. TIMES (July 18, 2014), archived at https://perma.cc/GXR2-474J (exploring the ways in which testing can help improve learning). “[R]etrieving knowledge from memory is more beneficial when practice sessions are spaced out so that some forgetting occurs before you try to retrieve again. The added effort required to recall the information makes learning stronger.” *Id.*


\(^{10}\) See Larry Sanger (@lsanger), TWITTER (Jan. 10, 2013), archived at https://perma.cc/SC4R-VJ4R (stating that “[i]f I were still teaching college, I would REQUIRE my students to review question stacks that I had added to a spaced repetition program.”).

\(^{11}\) See Stephen Baker, *Final Jeopardy: Man vs. Machine and the Quest to Know Everything* 212 (2011) (discussing the success of Roger Craig, a computer scientist who was deemed “a monster” on jeopardy for his wildly successful “one-game scoring record with a $77,000 payday”).

\(^{12}\) See 07/07/2016 Administrative Actions, 2016-Ohio-4826 (2016) (listing the persons who applied to take the July 2016 Ohio Bar Examination).

\(^{13}\) See id. (providing list of persons from graduating law school who applied to take the July 2016 Ohio Bar Examination and used spaced repetition to study); see also research records on file with the author (illustrating pass rates for students who used spaced repetition who took the Ohio Bar examination).
this method, including a finding that medical students preparing for their boards remembered nearly three times as much when using this technique.\footnote{See Kerfoot et al., supra note 3, at 303 (illustrating the effectiveness of the spaced education process-testing in aiding medical students study for exams).}

So, if you were this hypothetical law student preparing for the bar (or, for that matter, a law professor or law school dean interested in helping your students), would you be interested in learning more? If so, read on.

What you have discovered is "spaced repetition" ("SR").\footnote{See What is Spaced Repetition?, FLASHCARD LEARNER, archived at https://perma.cc/G7EY-CMSE (defining Spaced Repetition as a “learning technique . . . that [helps] you review information at gradually increasing intervals”).} This learning and memorization method has the potential to improve the way law students learn and prepare for exams, and this paper explores it. Discovered in the 1800s, SR has only now become feasible outside of the lab because modern technology, particularly smart phones and the internet, make it apply and modify a special algorithm that works to best help each individual user.\footnote{See infra Sections II and III (exploring how Spaced Repetition developed and the effectiveness of this method of studying).}

SR is an alternative to traditional “cramming” and has been proven to help users retain knowledge for the long-term with less study time and greater retention rates.\footnote{See Sean Kang, Ask the Scientist: Which is the Best Way to Study? How Often? Does Cramming Work?, TEMPORAL DYNAMICS OF LEARNING CTR. (2010), archived at https://perma.cc/A4R5-F2TK (discussing best practices for studying from a cognitive scientist’s perspective).} Its effectiveness is based on a combination of scientific factors, but it’s simple to apply: users look at electronic flashcards on their smart phone or computer, rate how well they knew the answer, then review the card again when prompted based on an algorithm working behind the scenes.\footnote{See Patricia A. deWinston & Robert A. Bjork, Successful Lecturing: Presenting Information in Ways That Engage Effective Processing, 89 NEW DIRECTIONS FOR TEACHING & LEARNING 19, 24 (2002) (observing positive results and efficiency from implementation of spaced repetition instruction).} When matched with excellent content on the cards, SR users become much more efficient and effective learners and test-takers.\footnote{See Odilia R. Erkaya & Iris S. Drower, Perceptions of an EL Learner on Vocabulary Development, 27 INT’L J. SPECIAL EDUC. 81, 85-86 (2012) (highlighting use of note cards for studying a foreign language as an effective application of spaced repetition).}
To grasp the potential for SR, consider the bar exam: to prepare, students typically complete three years of full-time courses, then, after graduating, take an expensive commercial bar preparation course, during which they spend three months studying full-time.\(^\text{20}\) Still, for many, the difference between failure and success on the bar exam can be a razor’s edge.\(^\text{21}\)

What if, for every student on that edge of failing, we could give them eight more points on the bar, and save them some time in the offing?\(^\text{22}\) That is exactly what SR appears capable of doing.\(^\text{23}\) A study summarizing the results of over fifty 20th century studies testing SR showed that users of this method improved testing results by at least half a standard deviation.\(^\text{24}\) Translating that advantage to the multi-state portion of the bar exam (to say nothing of any advantage it might provide on essay portions), a half a standard deviation improvement would bring a bar examinee earning eight extra points on the MBE alone.\(^\text{25}\) The effect: many who would fail the bar would now pass.\(^\text{26}\)

\(^\text{20}\) See Brian Dalton, Which Bar Exam Prep Course is the Best?, ABOVE THE LAW (May 21, 2013), archived at https://perma.cc/5N7A-BHQB (outlining bar examination preparation process and costs for law school graduates).


\(^\text{22}\) See Team Learn Sheets, Performance Test Strategy: Simple Trick to Add 5 or More Points to Your Score, LEAN SHEETS (last visited Feb. 6, 2017), archived at https://perma.cc/2DVC-KZNM (discussing unique ways to increase your score by studying more efficiently).

\(^\text{23}\) See What is Spaced Repetition? supra note 15 (suggesting that spaced repetition results in more efficient retention of information). By helping students increase the amount of information they retain while decreasing the amount of time and effort spent on memorization, they will be more prepared and perform better on the Bar Exam. Id.

\(^\text{24}\) See Donovan & Radosevich, supra note 3, at 801 (summarizing the findings of the author’s research). The improvement demonstrated in the study reflect outdated technology and, presumably, the results would be even better with the use of Internet and smart phone technology. Id.

\(^\text{25}\) See Donovan & Radosevich, supra note 3 (applying the results from the study to law students taking the bar exam).

\(^\text{26}\) See 2012 Statistics, NATIONAL CONFERENCE OF BAR EXAMINERS (Apr. 11, 2013), archived at https://perma.cc/56ND-GZLX (quantifying the average MBE passing scores). For 2012, the mean MBE score was 141.6 and the standard deviation is 15.8. Id. Assuming a normal distribution, a predicted half standard deviation benefit by using SRS would play out as follows: a 5th centile score of 116 improves to 13th centile, score predicted to be 124; a 10th centile score of 121
In the following pages, this article explains in greater detail how SR works, and summarizes the research behind it. The article will then explain the role SR can play in legal education, together with a plan to implement it. This article also describes the platform that I have built with the hopes of ultimately providing a tool to help all legal professionals improve their learning.

II. What Spaced Repetition Is and How it Works

SR works because it allows for harnessing of three psychological phenomena that aid learning and memory: (1) the forgetting curve dictates that we can predict when a person will forget information; (2) the spacing effect shows that studying just before we would predict forgetting causes exponential benefits in remembering; and (3) the testing effect stands for the principle that testing oneself along the way reinforces these benefits. Below, this section provides a more detailed summary of how each of these phenomena work.

A. The Forgetting Curve

improves to 21st centile, score predicted to be 129; a 15th centile score of 125 improves to 29th centile, score predicted to be 133; a 20th centile score of 128 improves to 37th centile, score predicted to be 136; a 25th centile score of 131 improves to 43rd centile, score predicted to be 139; a 30th centile score of 133 improves to 49th centile, score predicted to be 141. Id.

27 See infra Part III (summarizing science of SR).
28 See infra Part IV (describing key research on SR).
29 See infra Part V (applying SR research to legal education).
30 See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS (last visited Jan. 23, 2017), archived at https://perma.cc/M8P9-2KXH (explaining on the home page of the website that was created to help improve learning and exam passage rates).
31 See HERMANN EBBINGHAUS, MEMORY: A CONTRIBUTION TO EXPERIMENTAL PSYCHOLOGY 76 (Henry A. Ruger & Clara E. Bussenius trans., Columbia Univ., 1913) (1885) (discussing the “forgetting curve” and when people are most likely to remember the most information); see also Nicholas J. Cepeda et al., Spacing Effects in Learning A Temporal Ridgeline of Optimal Retention, 19 PSYCH. SCI. 1095, 1095 (2008) (explaining studies undergone by the “spacing effect”); Henry L. Roediger, III & Jeffrey D. Karpicke, Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention, 17 PSYCH. SCI. 249, 249 (2006) (stating that frequent testing will help to better retain relevant information).
Memories decay with time.  

This is an almost universal experience and scholars of memory describe the predictable decline in the probability of recall as the “forgetting curve.” Recognition, and identification, of the forgetting curve is vital to SR because SR cues users to restudy immediately before information users have learned is predicted to be forgotten based on that individual’s forgetting curve. The value of doing this is based on the empirically-documented insight that there is an ideal moment at which to reinforce a piece of information to help one retain it: wait too long, information is not recalled at all; study too soon and time is wasted time because it is recalled too readily.

The forgetting curve was discovered by a German psychologist, Hermann Ebbinghaus, in 1885. To demonstrate it, Ebbinghaus had subjects memorize a series of nonsensical syllables and tested recall of them at various periods of time, from twenty minutes to one month, after they initially learned them. By repeatedly testing subjects’ ability to remember the syllables after various delays from first learning them, he was able to describe the shape of the forgetting curve.

It will probably be claimed that the fact that forgetting would be very rapid at the beginning of the process and very slow at the end should have been foreseen. However, it would be just as reasonable to be surprised at this initial rapidity and later slowness as they come to light here.

32 See EBBINGHAUS, supra note 31, at 76 (proposing that all ideas will eventually be forgotten if unenforced).
33 See EBBINGHAUS, supra note 31, at 76 (characterizing the “forgetting curve” as the process of forgetting information more rapidly as time progresses).
34 See John T. Wixted & Ebbe B. Ebbesen, On the Form of Forgetting, 2(6) PSYCHOL. SCI. 409, 413 (1991) (discussing the percent decline in memory as related to the forgetting curve).
35 See Gary Wolf, Want to Remember Everything You’ll Ever Learn? Surrender to This Algorithm, WIRRED (Apr. 21, 2008), archived at https://perma.cc/BN4P-JR8W (describing the algorithm that predicts the most efficient time for memory reinforcement).
36 See snasta, Overcoming the Ebbinghaus Forgetting Curve–How Soon We Forget, E-LEARNING COUNCIL (June 5, 2010), archived at https://perma.cc/MCN5-HPV3 (indicating that in 1885 Ebbinghaus’ experimentation with memorization of words led to the discovery of the learning curve, also known as the Ebbinghaus Curve).
37 See EBBINGHAUS, supra note 31, at 76 (listing methods of testing memorization of syllables by subjects).
curve and demonstrate the exponential rate at which learned information decays from memory.\(^\text{38}\)

In his classic experiment, Ebbinghaus found that, beginning the moment after a person learns information, their ability to recall it decays.\(^\text{39}\) For nonsense syllables, only twenty minutes later, the average user has a less-than-60% likelihood of recalling a given syllable.\(^\text{40}\) An hour after learning it, it’s less than 50%.\(^\text{41}\) A day later, they have lost nearly 70% of the information.\(^\text{42}\) At a month, the learner retains just 20% of the material they had learned.\(^\text{43}\) Ebbinghaus found that the forgetting curve is, essentially, universal for given

\(^{38}\) See Ebbinghaus, supra note 31, at 77-78 (distilling the results of several experiments down to equations to map out the learning curve).

\(^{39}\) See Ebbinghaus, supra note 31, at 78 (calculating the increased memory loss as inverse to the amount of time passed).

\(^{40}\) See Ebbinghaus, supra note 31, at 79 (stating that after 18 minutes only 56% of information was retained by test subjects).

\(^{41}\) See snasta, supra note 36 (graphing memory retention after one hour at 44.2%).

\(^{42}\) See snasta, supra note 36 (estimating memory retention after one day at 33.7%).

\(^{43}\) See snasta, supra note 36 (showing memory retention after one month at 21.1%).
subject matter, and the rate of memory decay differs little between individuals. 44

Ebbinghaus also showed that the curve demonstrates “exponential decay,” meaning that a large fraction of material learned is lost quickly. 45 However, even though the initial decline is steep, the rate of decay declines with time. 46 In the context of memory, this means that the longer a memory has been retained, the less likely it is to be lost for any future increment of additional time: material that “survives” becomes progressively less likely to be forgotten in each additional increment of time. 47 It also follows that if one wishes to remember information for the long term, the longer they are able to retain it in the initial stages of study the slower the information will decay. 48

For users of SR, this means that a few early review keeps many memories “alive” while still efficiently identifying those items that have inevitably been forgotten for restudy. 49 Success at early tests allows the interval to the next scheduled rehearsal to be expanded until they get onto the flatter bit of the curve. 50 The result is

44 See Annette Taylor, Encyclopedia of Human Memory 488 (1st ed. 2013) (concluding that a generalized forgetting pattern existed among multiple subjects). The speed of decay does differ when certain variables are present, though whenever a given set of variables are present, the rate of decay is predictable. Id. Ebbinghaus showed the forgetting curve is steepest for nonsensical material and, in contrast, nearly flat for vivid or traumatic memories. Id. The speed of forgetting depends on a number of factors, including the difficulty of the learned material, how meaningful the material is to the subject, representation of material, and other physiological factors including stress and sleep. Id.

45 See id. at 489 (noting that people forgot material learned three to six years after learning it in school).

46 See id. (stating that the information remembered after the three to six year period is remembered for a lifetime).


49 See Wolf, supra note 35 (highlighting the learning method utilized by spaced repetition).

50 See T. Landauer & R. Bjork, Optimum Rehearsal Patterns and Name Learning, Practical Aspects of Memory 631 (M.M. Gruneberg, P.E. Morris, & R.N. Sykes eds. 1978) (detailing the results of one study showing how an expanding pattern is beneficial).
that the longer a memory has been retained, the less likely it is to be lost for any future increment of additional time.\textsuperscript{51}

\section*{B. The Spacing Effect}

The spacing effect is a corollary to the forgetting curve.\textsuperscript{52} This principle holds that properly spacing repetitions of studying \textit{slows} the rate of memory decay, effectively adjusting the slope of the forgetting curve, thereby allowing longer periods to occur between review sessions.\textsuperscript{53} The spacing effect increases over time, so that by the fourth and fifth reviews of a given piece of information, the increasing intervals between review sessions become pronounced, with the user no longer having to review after a few hours to not suffer a significant loss of information, but instead, only has to review again after several days or weeks.\textsuperscript{54}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{spacing_effect.png}
\caption{Graph illustrating the spacing effect on memory retention.}
\end{figure}

\begin{itemize}
\item \textsuperscript{51} See Mastin, \textit{supra} note 47 (describing the physiology of long-term memory creation and how it strengthens synapses in the brain).
\item \textsuperscript{52} See Cepeda, \textit{supra} note 31, at 1095 (connecting the forgetting curve to special repetition).
\item \textsuperscript{53} See Cepeda, \textit{supra} note 31, at 1101 (illustrating that too-short or too-long of a spaced repetition would not produce the same results as a properly spaced repetition).
\item \textsuperscript{54} See Wolf, \textit{supra} note 35 (providing an explanation of the data expressed in the graph).
\end{itemize}
This matters because it means that, by weathering the initial storm of studying on a SR algorithm a few times over a few days, users get the dividend of remembering information at a very high rate with little maintenance.\textsuperscript{55} One could imagine that in law school, users would study a few times early in a semester, then have information essentially “banked” for the exam at semester’s end as a result of this phenomenon.\textsuperscript{56} For that matter (and as detailed below in part V on using SR in legal education), a 1L could learn important information for their exams in Contracts or Civil Procedure, and, with very little maintenance after the first year, still remember nearly all of it for the bar exam more than 2 years later.\textsuperscript{57}

\textbf{C. The Testing Effect}

Finally, when people study using SR, they also benefit from the “testing effect,” which holds that people achieve recall of learned information more readily when they have tested themselves on it, as opposed to just passively observing it.\textsuperscript{58} While testing without feedback improves learning and recall,\textsuperscript{59} the effect is stronger when testing is associated with meaningful feedback by exposure to the correct answer.\textsuperscript{60}

\textsuperscript{55} See Wolf, supra note 35 (articulating the importance of continued use in recalling memories).
\textsuperscript{56} See Greg Gatlin, Law Professor Develops Tech Tool that Boosts Student Learning, SUFFOLK UNIV. NEWS & VOICES (Sept. 15, 2014), archived at https://perma.cc/Q5V6-L4QX (describing the advantages of spaced repetition for law students).
\textsuperscript{57} See id. (explaining the benefits of studying for law school exams while using spaced repetition methods); see also infra Part V (outlining the ability for law students to recall information learned in their first year of law school years later).
\textsuperscript{58} See Roediger & Karpicke, supra note 31, at 253 (illustrating the benefits of the “testing effect”); Gwern Branwen, Spaced Repetition, GWERN (Jan. 20, 2017), archived at https://perma.cc/42B5-XM3E (noting the basic principle of the spacing effect).
\textsuperscript{59} See Roediger, supra note 7 (conveying that low-stakes quizzes throughout the semester improve retention of information).
\textsuperscript{60} See Henry L. Roediger, III & Jeffrey D. Karpicke, The Power of Testing Memory: Basic Research and Implications for Educational Practice, 1(3) PERSP. PSYCHOL. SCI. 181, 191-92 (2006) (describing the ideal timing to provide students
Tests not only assess, but are also very positive and productive ways to reinforce learning and increase long-term retention.\textsuperscript{61} Studies have shown that self-testing a single time can be as effective in helping users retain information as passively reviewing information five times.\textsuperscript{62} In a separate study establishing the benefits of testing, a group of students were given varying routines of study or testing, or studying and testing.\textsuperscript{63} A week later, the students who tested remembered 80\% of the vocabulary, versus 35\% for non-testing students.\textsuperscript{64}


\textsuperscript{62} See Branwen, supra note 58 (pointing to a study conducted by Gordon A. Allen, William A. Mahler, and W.K. Estes that shows strength in studying once actively compared to multiple passive sessions).

\textsuperscript{63} See Branwen, supra note 58 (outlining the results of a study where students learned Swahili vocabulary).

\textsuperscript{64} See Branwen, supra note 58 (providing the conclusion of a study in which students retained more by testing and studying the material).
Testing has proven a successful technique to aid in learning in multiple areas.\(^6^5\) For example, in one study, medical residents’ scores were higher when they tested themselves with questions, as opposed to just reviewing information.\(^6^6\) On the GRE exam, testing as a tool to prepare has proven more effective for GRE preparation.\(^6^7\) Similar results have been shown for using testing to learn material ranging from prose passages to scientific topics.\(^6^8\)

So, when users of SR review the content when prompted, they are benefiting from the testing effect by constantly forcing themselves to test what they have learned.\(^6^9\) Understanding the underlying mechanisms of SR is not required to take advantage of this effect.\(^7^0\) Nevertheless, recognizing the science at play behind the learning method is potentially motivating to users, both to help them approach the method with enthusiasm, and to trust in it.\(^7^1\)

### III. Research on the Effectiveness of SR

Put together, systems that leverage the forgetting curve, spacing effect and testing effect are called “spaced repetition systems.”\(^7^2\) These systems have been built and studied in various contexts, in various disciplines, for decades.\(^7^3\)

The theoretical underpinnings for SR, and the richest experimental data to support, it come from simplified laboratory studies in

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\(^6^5\) See Bakkink, supra note 60, at 187 (implying that interim assessments have a positive effect on a final exam).

\(^6^6\) See Branwen, supra note 58 (drawing a conclusion that question-based assessments have a higher impact on retention).

\(^6^7\) See Branwen, supra note 58 (stating that GRE vocabulary cards benefited from the testing effect).

\(^6^8\) See Branwen, supra note 58 (citing the Roediger/Karpicke and Pashler studies on subjects that benefitted from the testing techniques).

\(^6^9\) See Roediger & Karpicke, supra note 60, at 192 (discussing the benefits of spaced retrieval techniques when used in conjunction with testing).

\(^7^0\) See Roediger & Karpicke, supra note 60, at 192 (highlighting the benefits of the testing effect inherent in spaced repetition).

\(^7^1\) See Branwen, supra note 58 (summarizing spaced repetition’s enhanced learning effects).


\(^7^3\) See id. (illustrating historical overview of spaced repetition system).
which subjects memorize random word lists, nonsense words, or random facts with short recall intervals.\textsuperscript{74} These protocols were frequently used in an era before the advent of PCs and smart phones, so manual reminders (by a human) in a lab setting were the only feasibly way to test SR’s effectiveness.\textsuperscript{75} Nonetheless, the research reflects that, among hundreds of studies, SR has proven more effective than cramming in nearly every instance and context.\textsuperscript{76}

A series of studies have also demonstrated SR to be useful for students understand complex and abstract information.\textsuperscript{77} For example, in one experiment, a group of students training to take a high level biology course learned information at a significantly higher rate – and significantly faster – than with other methods.\textsuperscript{78} Users also reported that using the method held attention better than other methods.\textsuperscript{79} In another higher education-related experiment, 216 college students used SR to learn techniques to solve math problems.\textsuperscript{80} The control group had crammed the knowledge of these methods, while the other group got the same total number of training/practice attempts, but used SR to learn them.\textsuperscript{81} The researchers found there was


\textsuperscript{75} See id. at 363 (demonstrating historical laboratory examinations on memory testing before the emergence of modern technology).

\textsuperscript{76} See id. at 359 (noting the better results from spaced performance over massed performance); Donovan & Radosevich, supra note 3, at 795 (reaffirming the superiority of spaced practice conditions as compared to massed practice conditions).

\textsuperscript{77} See Paul Kelley & Terry Whatson, Making long-term memories in minutes: a spaced learning pattern from memory research in education, FRONTIERS IN HUM. NEUROSCIENCE, Sept. 25, 2013, at 1 (providing an example of a study of students using spaced repetition). Many SR studies involve relatively straightforward areas of learning, particularly matching words with definitions. Id.

\textsuperscript{78} See id. at 6 (detailing one study where learning per hour of instruction was significantly higher for the spaced learning groups).

\textsuperscript{79} See id. at 4 (indicating how one user commented that SR “was able to hold my attention the entire time, which was rather interesting as I can sometimes be distracted and lose concentration”).

\textsuperscript{80} See Doug Rohrer & Kelli Taylor, The Effects of Overlearning and Distributed Practise on the Retention of Mathematics Knowledge, 20 APPLIED COGNITIVE PSYCHOL. 1209, 1209 (2006) (explaining briefly how two experiments were conducted testing the effect of overlearning on test scores).

\textsuperscript{81} See id. at 1213 (detailing the methodology of the initial experiment which divided students into “Spacers” and “Massers”).
an “extremely large” benefit for using spaced repetition versus cramming.\(^{82}\) Simply put, the students who spread out the same number of practice repetitions performed better in applying the mathematical principles they were preparing to be tested on.\(^{83}\)

SR has also been proven effective to help users apply complex content.\(^{84}\) In one study, 38 surgical residents received five and a half hours of training in various surgical techniques.\(^{85}\) One group received all of the practice time in one session; the other distributed the practice over four sessions.\(^{86}\) Their total practice time was the same.\(^{87}\) Thirty days after the final training session, each was actually asked to carry out the techniques they had learned.\(^{88}\) Both groups improved, but the SR group outperformed the cramming group in key outcome measures (time, number of hand movements needs to perform a surgery, global ratings as defined by experts).\(^{89}\)

Perhaps of most direct relevance to legal education and law practice, SR has been proven effective in improving knowledge on other high-stakes standardized tests for students in professional fields.\(^{90}\) For example, a study of over 1,000 medical students showed that those aided by SR in learning core curriculum knowledge had almost three times better recall on testing than those without it.\(^{91}\) The study also showed that SR proved helpful in identifying students in

\(^{82}\) See id. at 1209 (outlining the results of the study).

\(^{83}\) See id. (reiterating that long term retention was boosted by spaced repetition versus overlearning).

\(^{84}\) See Chris Loper, Spaced Repetition, NORTHWEST EDUC. SERV. (Jan. 4, 2016), archived at https://perma.cc/4S6G-QRLD (indicating how spaced repetition has been shown to improve skills more quickly than traditional practice regimes).


\(^{86}\) See id. (detailing the methodology of the experiment).

\(^{87}\) See id. (indicating the constants in the experiment).

\(^{88}\) See id. (providing that each resident returned to perform the microsurgical drill and a live rat anastomosis).

\(^{89}\) See id. (describing the outcome of the experiment and showing how the distributed group was superior).

\(^{90}\) See Kelley, supra note 77 (discussing the impact of spaced learned as measured for high-stakes standardized tests).

\(^{91}\) See Kerfoot et al., supra note 3, at 303 (discussing how SR is a “reliable, valid and diagnostically effective method to identify poorly performing students and to significantly improve students’ longer term retention of learning”).
need of extra support. The researcher behind this, B. Price Kerfoot of Harvard Medical School, has also established that SR can substantially improve knowledge of professional guidelines among current practitioners, as well as improve retention of core knowledge amongst medical students. Working physicians (globally) and students (across institutions) showed high levels of acceptance of, and participation in, the learning games.

92 See Kerfoot et al., *supra* note 3, at 303 (indicating that spaced repetition learning was able to identify students at risk of performing below the median on their licensure examinations); see also B. Price Kerfoot et al., *Durable Improvements in Prostate Cancer Screening from Online Spaced Education: A Randomized Controlled Trial*, 39(5) AM. J. PREV. MED. 472, 472 (2010) (applying spaced education to prostate cancer research). Consider the study of continuing medical education that tracked the ability of SR training to improve prostate-cancer screening by 95 primary-care providers. *Id.* Participants using SR showed a 26% decrease in inappropriate cancer screenings on real-life patients, saving them money and minimizing patients’ anxiety. *Id.* at 475-77. For practicing attorneys, SR also has promise to help them know more about their practice area, which, in turn may help with decision making on client matters. *Id.* at 477. There is no reason to think that SR does not have the potential to help attorneys better recall rules of evidence or case law in service of their clients. See also *Welcome to SeRious, SeRIOUS* (2014), archived at https://perma.cc/7SH6-YLYH (applying the use of Spaced Repetition to legal education in order to better prepare future attorneys). Indeed, there is no reason to think that SR would not be helpful in aiding professionals in any number of fields to improve their long-term retention of important information for either testing situations or for ready-recall during the practice of their profession or trade. *Id.*


94 See Kerfoot et al., *supra* note 3, at 300 (describing how Kerfoot devised the spaced repetition tools and how easily adaptable it is for doctors and students to utilize).
In sum, the research has repeatedly shown that SR is a useful tool to improve learning and retention in nearly all areas of education.\(^{95}\) From rote memorization to terms, to integrating concepts reinforced in SR to very complex fields, studies show promise to allow students to learn more, and learn it faster.\(^{96}\) Improving platforms suggest that SR may prove to be even more effective as new technologies develop to give users easier, more efficient, access.\(^{97}\)

IV. Spaced Repetition Platforms

To benefit from SR, a user needs a platform that can show content and apply the SR algorithm.\(^{98}\) What the platforms have in common is that they encourage the use of free recall (i.e. looking at a question and trying to define an answer), as opposed to methods that have proven less effective for creating durable memories.\(^{99}\) They differ greatly, though, in the technology underlying them, ranging from manual systems to web-based tools that can be used on any device with sophisticated algorithms customized to each user.\(^{100}\) This section explores platforms that have been created to date, and then lays out the aspects of the platform being built as part of this project, SpacedRepetition.com.\(^{101}\)

\(^{95}\) See Kerfoot et al., supra note 3, at 304 (explaining how Kerfoot’s digital SR tool can be used in areas of studies other than those pursuing their MD).

\(^{96}\) See Benny Lewis, Spaced Repetition: Never Forget Vocabulary Ever Again, FLUENT IN 3 MONTHS (last visited Jan. 23, 2017), archived at https://perma.cc/6HXT-K9XP (illustrating the benefits to both rote memorization and spaced repetition).

\(^{97}\) See Teresa Martín-Blas & Ana Serrano-Fernández, The Role of New Technologies in the Learning Process: Moodle as a Teaching Tool in Physics, 52 COMPUT. & EDUC. 35, 35 (2009) (illustrating that improving learning platforms with new technology will be effective and efficient for students).

\(^{98}\) See Branwen, supra note 58 (highlighting specific individuals who have benefited from SR platforms).

\(^{99}\) See Branwen, supra note 58 (asserting practices that create durable memories). In order of effectiveness, “research favors questions which force the user to use their memory as much as possible.” Id. This includes free recall, short answer questions, multiple-choice questions, Cloze deletion, and recognition. Id.

\(^{100}\) Compare SeRIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (showing a spaced repetition platform for law students); Repetitions 1.82, REPETITIONS (last visited Jan. 23, 2017), archived at https://perma.cc/9PRR-YV28 (showing spaced repetition platform focused on improving general intelligence).

\(^{101}\) See infra Part IV A (comparing different SR platforms).
A. Analog SR Platforms

Before the digital age, there was no easy way to apply the research findings of SR. Instead, users had to be manually reminded when it was time to study – obviously, not feasible outside of controlled settings. Then, nearly a half century ago, two low-tech implementations of SR were created to make it possible for personal use.

First, in 1967, Paul Pimsleur created a SR system to be used with audio language learning. Users would be presented with a new vocabulary word to study, then would use a stopwatch along with audio instruction to cue themselves to recall information with precise timings. Pimsleur’s initial intervals expanded by 5 with each repetition: students were expected to use a stopwatch to help themselves review a given piece of material 5 seconds, 25 seconds, 2 minutes, 10 minutes, 1 hour, 5 hours, 1 day, 5 days, 25 days, 4 months, and 2 years after initially learning it.

Six years later, in 1973, Sebastian Leitner created a SR system using the “Leitner Box.” The Leitner Box uses a box with several compartments and physical flashcards. Users create flash-
cards, then test themselves to recall the solution written on a flashcard. If the user succeeds, the flashcard advances to the next compartment. But if the user fails, the card goes back one step to the previous compartment. Each succeeding group has a longer period of time before the user is required to review the cards. The method suffers the predictable failing when a user attempts to keep hundreds or thousands of newly learned pieces of information available for using on the SR schedule: it’s just too much to track.

B. Digital SR Platforms

These two analog methods to employ SR are both labor-intensive and limited to applying only simple algorithms. However, with the development of personal computers in the 1980s, SR’s potential grew, as SR began to be implemented with software-based solutions. These systems are both more convenient (no need for a timer, a box, or content written on index cards), and more effective.

Computer-based implementations of SR allow for better results because modern algorithms can specifically adapt to users.

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110 See Robert Harris, Learning Strategy 10: The Leitner Flash Card System, VIRTUALSALT (Feb. 27, 2014), archived at https://perma.cc/NA2G-4FF8 (explaining the method of the Leitner System as a progressive system of re-examining flashcards to see if the user has truly memorized the information).
111 See id. (demonstrating how the software advances based on individualized answers).
112 See id. (providing the method implemented by the Leitner System).
113 See id. (illustrating the frequency of review for each box).
114 See What is Spaced Repetition?, supra note 15 (pointing to potential shortcomings of the Leitner System).
115 See Spaced Repetition, supra note 102 (identifying the inefficiencies of traditional, manual SR methods).
117 See Elmes, supra note 116 (describing the efficiency of digital studying techniques).
118 See Philip Seifi, Want to recall 92% of everything you learn? This algorithm makes forgetting difficult, LINGUALIFT (last visited Jan. 24, 2017), archived at https://perma.cc/8ADK-PHGA (explaining how computer algorithms adapt to a person’s retention level).
Rather than just using a time-interval between reviews, they can ask the user to rate their ability to answer a question posed to them. A higher scored answer (indicating the user knew it very well) prompts the algorithm to not repeat the card as close in time as would a lower-scored card. This improvement allows for individual customization in a way that was previously unimaginable.

Computerized implementations of SR also allow for technology to be employed in ways physical flashcards cannot. Online cards can include features like audio files or a “third side” (additional information to supplement the question/answer of the typical flashcard). They also make things that are hard with physical flashcards easy: they can be easily shared, edited, copied, imported/exported, and re-grouped for studying.

By implementing machine learning, material that is hard appears more often and material that is easy less often, with difficulty defined according to the ease with which the user is able to produce a correct response.

Early implementations, like Anki and Mnemnosyne, were created as software downloads – programs tethered to specific computers. They favor sophisticated computer users (for example, Mnemnosyne is packaged for Ubuntu Linux operating system users;
an OS system that has been largely adopted by skilled computer programmers, but few others). Then, in the early 2000s, various Web 1.0 solutions arose to applying the spaced repetition algorithm online. Unfortunately, many have flaws: a poor algorithm that reduced the benefits of SR, bug-filled, expensive, and so on. Others allow for some tantalizing features, but have limitations that make their widespread use unappealing. In the past several years, various tools have been built, and Wikipedia maintains a robust list of SR projects, together with a chart identifying features of each.

Among the most exciting was the SuperMemo project by Piotr Wozniak. Wozniak, a Polish scientist, has studied optimization of SR algorithms for two decades. As part of his work, he has open-sourced algorithms, so that savvy computer programmers can implement his research into their own software platform.


130 See Site Review: Flashcard Exchange, EDUCATION WORLD (2009), archived at https://perma.cc/9RVG-X7RR (reviewing early spaced repetition website, Flashcard Exchange founded in 2001); see also Liz Karagianis, Quiz Yourself, SPECTRUM (2009), archived at https://perma.cc/ML3V-S3SN (profiling the software behind popular online application called “Quizlet” which was launched in 2007).

131 See Karagianis, supra note 130 (illustrating the immense time and resources required to build a program suitable for launch).

132 See Shellenbarger, supra note 8 (outlining the different features for flashcard software utilizing spaced repetition).

133 See List of Flashcard Software, WIKIPEDIA (last visited Jan. 24, 2017), archived at https://perma.cc/ZH34-RTD3 (listing different spaced repetition software programs available on the market and articulating different features of each spaced repetition program available).

134 See Wolf, supra note 35 (discussing the algorithm that led to Wozniak’s creation of SuperMemo).

135 See Wolf, supra note 35 (highlighting Wozniak’s research in the field of spaced repetition).

C. *SpacedRepetition.com: a SR Platform for a Mobile Generation*

I predict that SR will reach its full potential, along with widespread acceptance, with the creation of SR tools for a mobile-first generation. Nearly every young adult in America has a smartphone. These machines have more computing power than was necessary to put a human on the moon (in fact, the iPhone 6 can carry out instructions 120 million times faster than the computers on the Apollo) and give coders the ability to create remarkably powerful algorithms to maximize efficiency of an SR. Further, smartphones have the ability to access the web using wireless data, give students an ability never before seen to learn anywhere, all on a machine they keep in their pockets.

To do my part, I have spent the past several years building SpacedRepetition.com. This project is intended to, ultimately, be a free tool for law students, bar preppers, and other legal professionals to use. The features of the platform are themselves important,

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137 See Lewis, *supra* note 96 (recognizing that mobile devices allow for easier adoption of spaced repetition programs). This is not to say the software should not also work on laptop and desktop computers. *Id.* One of the benefits of building for the web is that the programs will run on any machine that can access the Internet. *Id.*

138 See Aaron Smith et al., *U.S. Smartphone Use in 2015*, PEW RESEARCH CENTER (Apr. 1, 2015), archived at https://perma.cc/6YWG-PB2N (revealing a 2015 study where 85% of Americans between ages 18-29 have a smart phone). It is likely that the figure is significantly higher among those in law school and law practice. *Id.*


140 See *id.* (recognizing the immense computer power available to coders today).

141 See Smith, *supra* note 138 (emphasizing the importance of smartphones in maintaining access to online information).

142 See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, *supra* note 30 (describing the SeRiouS tool available for free download); *see also New Feature: Invite Others to Co-Own or View Sets*, SERIOUS (last visited Jan. 25, 2017), archived at https://perma.cc/T5FY-KFU3 (describing the goal as a site free for users, with upkeep for the site and server costs paid through grants and/or academic institutions). Until funding is secured, costs will be kept as low as possible for users. *Id.*
Some key aspects built into SpacedRepetition.com based on the advice of hundreds of beta testers who used the site are to:

- **Make it Web-based.** Early efforts to make computerized SR were software downloads – i.e. they required saving a program to a computer’s hard drive and were used only on that computer. Given the growth of processing power in smartphones, and the speed at which the web can process sophisticated apps, the newest versions of SR tools should be web-based, thus allowing for more portability. This will work anywhere there is a web connection and not tether a user to a specific device.

- **Build it using Responsive Design Principles.** Making a tool easy-to-use will improve compliance for users to complete their daily sessions. Optimally, users should be able to use their SR tool anywhere they are: home, school, a coffee shop, or while sitting on a bus. This is feasible using responsive design, which is a method that allows websites to automatically re-format themselves to be easily accessed on smart phones, laptops, and desktops. As long as there is web

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143 See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (providing the methods used by the SeRiouS platform and how they work).
144 See Chen & Teng, The design and development of a computerized tool support for conducting senior projects in software engineering education, 56 COMPUT. & EDUC. 802, 802 (2011) (presenting different approaches in computerized tool support).
145 See SeRiouS as an iPhone App!, SERIOUS (Jan. 2016), archived at https://perma.cc/M73R-BD9Q (extolling the benefits of having the ability to use SeRiouS in a portable manner).
146 See id. (explaining that anyone who uses the SeRiouS iPhone app can use the services at any location where they can connect to the Internet).
147 See Welcome to SeRiouS, SERIOUS (last visited Jan. 25, 2017), archived at https://perma.cc/7SH6-YLYH (highlighting the convenience of having a spaced repetition app on a smartphone, PC, or Mac).
148 See id. (illustrating how the spaced repetition smartphone app allows a user to study anywhere they choose).
access, this allows users of SR to study at a desktop computer, laptop computer, or smart phone; or toggle between them.\textsuperscript{150} Even more so, it allows users to do all of this seamlessly, regardless of whether their computer is a Mac or a PC, or whether their smart phone is an iPhone or a Droid.\textsuperscript{151} For those who want to treat the tool as an app, the site should have an icon available for those who bookmark it to their smartphone, giving the site the feel of an app (i.e. the user would click on the icon to access the tool, just as he or she would for any other app on the phone).\textsuperscript{152} However, instead of running off of native software built specifically for iPhone or Droid, the program runs on the web.\textsuperscript{153}

- **Use the best algorithm, even if it’s hard to implement.** The platform should incorporate the most sophisticated algorithm for applying SR.\textsuperscript{154} Currently, the open-source algorithm, “Super-Memo 2” allows users to retain 92% of what they learn.\textsuperscript{155}

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\textsuperscript{150} See id. (explaining how responsive web design works and can be used between devices); see also SÉRIOUS SOFTWARE FOR SÉRIOUS LAW STUDENTS, supra note 30 (stating “all you need is internet!”).
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\textsuperscript{151} See The New Design Trend: Build a Website; Enable Self-optimization Across All Mobile Devices, supra note 149 (describing the ability to transfer between devices, regardless of the brand).
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\textsuperscript{152} See The New Design Trend: Build a Website; Enable Self-optimization Across All Mobile Devices, supra note 149 (depicting the optimization of user experience of an app across devices).
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\textsuperscript{153} See The New Design Trend: Build a Website; Enable Self-optimization Across All Mobile Devices, supra note 149 (comparing the number of versions required for mobile web apps as opposed to responsive web design).
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\textsuperscript{155} See Piotr Wozniak, Further improvement of SuperMemo: introduction of the matrix of optimal factors, SUPERMEMO (Sept. 17, 1998), archived at https://perma.cc/T24X-HZ6M (analyzing results of SuperMemo 2, SuperMemo 4, and SuperMemo 5 which has a 92% retention rating after 190 days); see also Wozniak, supra note 136 (documenting previous versions of SuperMemo). Some versions allow for review of cards individually or by group based on the difficulty of categories. Id. Nonetheless, creators of SR tools should continually look out for improvements to the algorithms available to help improve users’ retention. Id.
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The algorithm is freely available for implementation for coders with the talent to do so.\footnote{See Piotr Wozniak, SuperMemo 2 Plug-In for SuperMemo for Window: Delphi source code, SUPERMEMO (last visited Jan. 25, 2017), archived at https://perma.cc/6UW6-GHGC (describing SuperMemo 2 algorithm and research on its efficacy).}

- **Have experts create core content.** Content should be shareable.\footnote{See Alcino Ferreira, Rapid-Learning and IT tools for Teaching and Learning Maritime English, 27 INT’L MAR. ENG. CONF. 73, 75 (noting Anki software allows users to share decks between devices).} For example, if an expert in a topic is willing to create cards and share them as a single deck, the system should allow for this.\footnote{See id. (pointing to the useful sharing feature in Anki memorization software).}

Doing so helps to prevent a risk of using SR: that it teaches one to learn effectively, but if the content is bad, users will know bad information.\footnote{See Chris Nickson, Learning by Spaced Repetition, LIFE IN THE FASTLANE (last visited Jan. 25, 2017), archived at https://perma.cc/9AKN-TZDU (recognizing the risk of learning incorrect material if using inaccurate decks compiled by other users).}

Junk goes in, junk comes out.\footnote{See id. (emphasizing the need to have correct answers in order to learn correct information).} Instead, one can imagine that a professor could review a draft of cards made by a TA, confirm their accuracy, and then encourage the class to use them as a whole.\footnote{See id. (discussing the general process of creating and sharing flashcards for spaced repetition learning); see also Welcome to SeRiouS, supra note 147 (stating that professors can also create cards for students to use).}

The benefit would be that students would all be studying correct, vetted information, without the need to buy canned supplements.\footnote{See Welcome to SeRiouS, supra note 147 (explaining the importance of understanding the information before beginning to use spaced repetition).}

It would also promote creative collaboration between all students in a given course using SR; or smaller study groups that want to collaborate.\footnote{See Welcome to SeRiouS, supra note 147 (describing the ways law students can create spaced repetition flashcards together).}
Editable. Users should be able to easily create and edit content, preferably with others.\(^{164}\) As users study and discover their weaknesses, it is important that they are able to add cards to decks, as well as edit those within it.\(^{165}\) For people studying in groups, it’s vital to allow for feedback to be shared among them.\(^{166}\)

Provide a Third Side Option. Flashcards should be capable of providing an associated “tip” that’s neither on the front nor back of the card.\(^{167}\) This “third side” would allow users to, for example, test their knowledge of a piece of black letter law, then give them a tip about the context in which it is most likely tested.\(^{168}\)

Users choose to share (or not). The optimal SR system will allow users to make content public, private or share with limited others.\(^{169}\) People creating study materials should have the autonomy to share with others, or not.\(^{170}\) There are immediate benefits to sharing (like the ability to have others provide feedback and edits, as well as to divide up the work), but disadvantages, too (in a competitive

\(^{164}\) See Olle Linge, Why manually adding and editing flashcards is good for you, HACKING CHINESE (Aug. 23, 2013), archived at https://perma.cc/33DF-EMY7 (recognizing the importance of creating and editing flashcards in conjunction with spaced repetition programs).

\(^{165}\) See id. (acknowledging the benefit of adding information to flashcards as time passes).

\(^{166}\) See What are the benefits of group work?, CARNEGIE MELLON UNIV. (2015), archived at https://perma.cc/R4VH-WW24 (highlighting the importance of feedback in study group success).

\(^{167}\) See Todd Scacewater, Keep Your Greek: Don’t Lose Your Vocabulary, EXEGETICAL TOOLS (Aug. 5, 2015), archived at https://perma.cc/69SL-L4F3 (providing an example of flashcards with a “third side” containing a mnemonic device).

\(^{168}\) See id. (showing an example of a real flashcard application that utilizes the “third side”).

\(^{169}\) See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (detailing one flashcard program’s ability to specify privacy settings, allowing them to add, edit, or delete cards in the stack).

\(^{170}\) See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (illustrating some students have different preferences in how they share information).
course, helping others achieve more makes the curve harder to surmount). So, users should simply be given the option of making their content private, sharing only with designated others (like a study group), or making them totally open for all. Hybrid approaches could work, too, such as agreeing with users to keep content private for the academic year, but then making it public. Creating a high quality, deep database of content factors into the next feature (crowdsourcing).

- **Crowdsource.** Curate a crowdsourced database of SR public cards, sortable by relevant grouping. This would allow users to share cards by school, professor and course (or by bar topic and state of testing). Subsequent users would then be able to access this content customized to their own specific needs and improve it based on their own understanding of the law.

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171 See Using Study Groups, EDUCATION CORNER (last visited Jan. 25, 2017), archived at https://perma.cc/K3B4-C63H (listing the numerous benefits of studying in groups such as improving notes, providing insight, and dividing up material); Evan Jones, How Do Law School Grades Work?, LAW SCHOOLI (last visited Feb. 14, 2017), archived at https://perma.cc/C2XQ-W6QA (describing a typical law school’s grading curve where students’ performance is compared to that of everyone in the class).

172 See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (highlighting that based on the various advantages and disadvantages of group study, students should be able to pick and choose who they share their content with).

173 See Joe Mornin, Fixing The Law School Grading Curve, JOE MORNIN (Mar. 31, 2013), archived at https://perma.cc/YP8K-HGDA (acknowledging the law school grading curve discourages collaboration). Mornin argues that by eliminating the need for competition, however, students will be more likely to share their knowledge, content, materials, and so forth. Id.

174 See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (reaffirming the program’s ability to create a collection of quality information).

175 See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (indicating the goal of creating groups of cards specific to courses, professors, or subjects).

176 See New Feature: Invite Others to Co-Own or View Sets, supra note 142 (explaining the options that can be used for creating flashcards).

177 See How Cutting Edge #LegalTech Can Help Law Students Perform Better on Course Exams and the Bar, SERTIOUS (last visited Jan. 26, 2017), archived at https://perma.cc/XX9V-JTS4 (highlighting the ability of card decks to be used for a variety of different test subjects).
• **Easy Upload.** For users to create lots of content, it is vital that it is easy for them to move from platform to platform.\(^\text{175}\) Designing a system that could accept, for example, bulk uploads from .csv files (the generic version of an Excel Spreadsheet), would increase ease of use and promote participation.\(^\text{179}\)

• **Reports for Designated Administrators.** If SR is to be used by a group of students, giving their professor the ability to confirm that users are doing their daily work would be beneficial to promote compliance, as well as to help the professor flag students having difficulty.\(^\text{180}\) A simple system to create weekly class reports would be a useful way of doing so.\(^\text{181}\) This report should include the name of the user, the last time logged on, the number of cards reviewed, and whether the user has met their daily quota during the reporting period.\(^\text{182}\)

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178 See *Moving data across platforms – file format considerations*, IBM KNOWLEDGE CENTER (last visited Jan. 26, 2017), archived at https://perma.cc/ACZ2-6HFU (stating the importance of being able to transfer data between different platforms).

179 See *The World’s Smartest Flashcards*, BRAINSCAPE (last visited Jan. 26, 2017), archived at https://perma.cc/BDP7-GJAB (using an example of one spaced repetition program’s use of bulk import to facilitate the user’s interaction with the program).

180 See Shellenbarger, supra note 8 (offering an example of a spaced repetition program that can be used in classrooms to customize lessons based on students’ comprehension); see also Tanagrabeast, *A Year of Spaced Repetition Software in the Classroom, LESSWRONG* (Jul. 4, 2015), archived at https://perma.cc/TA9T-LCUL (illustrating that classroom use is only beneficial if done by a group effort as opposed to individual use). Of course, this would only be in situations where an entire community subscribed at the school’s expense. *Id.* Individual users, creating their own accounts, should not be subject to oversight from their professors and deans unless they opt to have that oversight. *Id.*

181 See Will Thalheimer, *Spacing Learning Over Time, WORK-LEARNING RESEARCH, INC.* (Mar. 2006), archived at https://perma.cc/AHM9-L4B7 (noting that by providing feedback to the learners’ manager, it is easier to implement different strategies to promote learning).

182 See *Formative Assessment System: User’s Guide for Law Professors*, BARBRI 8 (last visited Feb. 15, 2017), archived at https://perma.cc/5HF7-VBNR (listing the important information to be included in the results report). The report, though, should probably not include the score the student gave themselves for their
• **Support it.** Like all good web-based tools, the system must also have good support, too.\(^{183}\) That means it would include educational materials to give users a perspective on why what they are doing matters.\(^{184}\) Taking a metacognitive approach to explain the science behind the system would likely motivate users in a way that just thinking of the system as web-based flashcards would not.\(^{185}\) Further, to encourage things like effective collaborative card-creation for a class, the system should provide information and instructions on how to do so.\(^{186}\)

• **Improve it.** Finally, as technologies improve and users give feedback, the project should work to give users the best possible learning experience.\(^{187}\) To do so requires an open flow of feedback between user and designer, as well as use of tools, like online surveys, to determine what is, and is

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\(^{184}\) See id. (demonstrating the importance of making product documentation available for customers upfront).

\(^{185}\) See Kanesa D. Seraphin et al., *Metacognition as Means to Increase the Effectiveness of Inquiry-based Science Education*, 23 SCI. EDUC. INT’L 366, 368 (2012) (noting how applying metacognitive principles can enhance a student’s self-learning ability).

\(^{186}\) See id. (discussing the benefits of metacognitive skills and how they improve student understanding of the science or technology). Best practices might include, for example, making sure that students work in groups and that multiple users help edit cards. Id. at 376. It might also include creating a clear method for dividing up responsibilities for which users are to cover various parts of the syllabus. Id.

\(^{187}\) See Guay, supra note 183 (recommending creation of a forum for users to provide ideas and tips to improve the platform).
not working for users. Additionally, collecting data (with appropriate permissions from users) would allow for seeing what variables improve outcomes for users – the ultimate test of the SR platform is, of course, whether or not it helps users learn and remember the desired material.

V. SR’s Place in Legal Education and Law Practice

The notion that spaced repetition could be used for improving classroom learning was first proposed in the book Psychology of Study by Prof. C. A. Mace in 1932. To date, more than 80 years later, no effort has been made to apply the methodology to better learning for law students. This should change, because SR is a nearly perfect match with the study of law. To be a successful lawyer (or law student), one must know thousands of bits of information: fine points of statutes, rules of procedure and evidence, important cases’ holdings and their broader implications. To commit
this to long-term memory requires reinforcement of the information.\textsuperscript{194} This is not just a challenge for students, either: legal professionals are \textit{constant} learners, from the first day of 1L, to the day they retire, they are always learning and while sometimes the options exist to simply look up the missing facts, there are many situations where the efficacy of expert practice depends on the ability hold this body of substantive knowledge available for recall at will.\textsuperscript{195}

SR is particularly well adapted to law students because of shortcomings in traditional legal education.\textsuperscript{196} Modern law students are largely left on their own to retain information that they have read and briefly touched on in class.\textsuperscript{197} Some of the common methods, like encouraging outlining throughout the semester, might function to improve memorization.\textsuperscript{198} However, there’s no “smart” technology mechanism in place to help students do this learning.\textsuperscript{199} The opportunity available by using SR becomes even more significant because of the quirk in legal education: the core, bar-tested content (courses like Constitutional Law, Contracts, Civil Procedure, Criminal Law/Procedure, Evidence, Real Property and Torts) typically take place in the first year, but then are not tested during the second or

\textsuperscript{194} See Jon Simons, \textit{How to maximise your memory}, GUARDIAN (Jan. 13, 2012), archived at https://perma.cc/L4JR-QGYJ (explaining how students rehearse information to retain it in their short-term memory and transfer it into long-term memory).


\textsuperscript{196} See \textit{id.} at 34-35 (highlighting the potential shortcomings in traditional legal education and how law school classrooms are being adapted to meet every learning style).

\textsuperscript{197} See \textit{id.} at 34 (indicating that there is “implicit teaching” in law school leaving students to resort back to mimicking what they have seen in class).

\textsuperscript{198} See \textit{How to Study More Effectively – Top Methods for College}, DISCOVER BUSINESS (last visited Jan. 29, 2017), archived at https://perma.cc/C3H9-5NUP (discussing the benefits and shortcomings of outlining). It is hard to say for certain, simply because so little has been done to empirically test how law students learn best and what methods are most effective to help prepare them for the bar exam and legal careers. \textit{See also Leah M. Christensen, Legal Reading and Success in Law School: An Empirical Study}, 30 SEATTLE U. L. REV. 603, 603 (2007) (pointing out the lack of research about how law students study best).

\textsuperscript{199} See \textit{How to Study More Effectively – Top Methods for College}, supra note 198 (highlighting that current technology can only improve upon a student’s basic study methods).
third. By implementing SR, the work students would do to prepare for 1L exams could prepare them for the bar (the spacing effect dictates that by studying as 1Ls, SR users would barely have to review at all as 2L or 3Ls to have most of the information “banked” for the bar exam).

Yet, there’s been nearly no research or application of technology to aid in memorization techniques to legal education. For example, a search of the Westlaw database reveals only two passing references to spaced repetition. Even with the growth of “law & rhetoric” as a discipline, few of the texts devoted to the topic make mention of memorization as a canon of rhetoric (it was one of the five all ancient Romans learned), let alone application of the ancient skill of memoria using the modern science of spaced repetition learning. To help

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200 See What to Expect in Your First Year of Law School, PRINCETON REVIEW (last visited Jan. 29, 2017), archived at https://perma.cc/XG9N-7D93 (detailing the typical first-year curriculum of law school education).
201 See Delece Smith-Barrow, Use First Year of Law School to Prepare for the Bar, U.S. NEWS (May 23, 2013), archived at https://perma.cc/36B3-NRWU (describing how to effectively use your 1L year as preparation for the bar exam).
202 See Adam Nguyen, What is the Future of Law as it Converges with Technology?, LAW TECHNOLOGY TODAY (Apr. 10, 2015), archived at https://perma.cc/92YL-NL3N (discussing the need to incorporate technology in the legal classroom).
203 See, e.g., Jean M. Holcomb, Maintaining Your Competitive Edge, 101 LAW LIBR. J. 121, 123-24 (2009) (advocating for the use of spaced repetition in order to become a master of your field); Helen H. Kang, Use of Role Play and Interview Modes in Law Clinic Case Rounds to Teach Essential Legal Skills and to Maximize Meaningful Participation, 19 CLINICAL L. REV. 207, 225 n. 58 (2012) (illustrating the use of spaced repetition to prevent students from forgetting important skills).
204 See KRISTEN K. ROBBINS-TISCIONE, RHETORIC FOR LEGAL WRITERS: THE THEORY AND PRACTICE OF ANALYSIS AND PERSUASION 102 (1st ed. 2009) (listing canon terms and their modern definitions). This is the only recent book devoted to the intersection of rhetoric and modern law. Id. It acknowledges that the canon of memorization survives in modern-day speech and communications classes, but does not address it because memoria is more closely related to speaking than the book’s primary focus, writing. Id. See also EDWARD P.J. CORBETT & ROBERT J. CONNORS, CLASSICAL RHETORIC FOR THE MODERN STUDENT 22 (4th ed. 1999) (commenting on the Greek concept of memoria being left out of rhetoric texts until the eighteenth century). Professors Corbett and Connors do not devote discussion to memoria in their excellent treatise because they state that memorization was the area that “received the least attention in the rhetoric books.” Id. They (incorrectly) posit that this neglect resulted from the fact that “not much can be said, in a theoretical way, about the process of memorizing . . . .” Id. See also Carroll C. Arnold, Oral Rhetoric, Rhetoric and Literature, 40 PHILOSOPHY & RHETORIC 191, 198 n.
close that gap, this section sketches out a few ways SR could be used by learners at various stages of legal learning, from law school, to the bar, through practice.  

A. For Bar Preppers

A prerequisite to success on the bar exam is memorization. The shortcomings of how it is tested is specifically the gap that SR does best in filling. As one scholar said, the bar exam “simply tests whether the applicant has memorized the…rules and can apply them to a multiple-choice question.” Without wading into the wisdom of how regulators choose to test law school graduates, the fact remains that they are required to memorize vast amounts of information. Simply put, there is no better tool for teaching people to memorize rules than SR.

The bar exam is also a perfect place for applying SR because the topics covered are clearly defined, particularly with the multi-state bar exam (“MBE”). The MBE covers seven topics, and the exam’s creators, the National Conference of Bar Examiners

17 (2007) (describing how memoria disappeared from the “language and considerations” of rhetoric). Other scholars suggest that memoria has been forgotten not because there is not much to be said about it in a theoretical way, but because the study of rhetoric has shifted away from oral rhetoric to focus on written rhetoric. Id.

205 See infra Part V (elaborating further on the ways law students and the legal profession could benefit from spaced repetition).


207 See id. (stating different methods to use spaced repetition for memorization).


209 See id. at 364 (arguing that lawyers need more skills than what is tested on the Bar).

210 See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (explaining the benefits of spaced repetition as being the best way to memorize legal theories and principles).

(“NCBEX”), publishes an MBE subject matter outline with the precise coverage within those topics. Even more helpfully, the NCBEX over-tests some subtopics, and under-tests others, and the outline lays out the relative frequency of questions. For example, Torts has four categories of questions (Intentional Torts, Negligence, Strict Liability, and Other Torts). Yet, the NCBEX outline discloses that even though Negligence is only one of four Torts categories, it makes up approximately half the questions. What this means for the astute bar prepper is that by focusing on those over-tested areas, they can play “moneyball” by covering 50% of the points in Torts by studying only 25% of the material.

Applying this to creating a SR tool for bar preppers, the goal would be to use experts to create content that corresponds to the most-test MBE topics. Of course, there is also value in helping students memorize less-tested topic areas, but maximum value is gained for them with minimum effort by starting with most-tested concepts. Students can also use SR to collaborate to create state-specific flashcards that correspond to essay topics in their own jurisdiction.

212 See id. at 1-8 (listing the sub-topics tested within each subject area).
213 See id. (highlighting the frequency of subtopics tested).
214 See id. at 8 (providing specific examples which are tested and how frequently). Each of these four topics has several sub-topics delineated as well. Id.
215 See id. (stating that half of the questions in Tort section will be based on negligence).
216 See MICHAEL LEWIS, MONEYBALL xiv (W.W. Norton & Company, 2004) (illustrating a term using an analogy to baseball which focused on using data-driven analytics to find value in situations where the conventional wisdom did not always find it).
217 See 2017 MBE Subject Matter Outline, supra note 211, at 8 (calculating the most efficient way to study Tort material).
218 See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (highlighting use of spaced repetition for Bar Exam preparation).
219 See Brian Hahn, 5 Things I Did Differently the Second Time to Pass the Bar Exam, BAR EXAM TOOLBOX (Nov. 4, 2014), archived at https://perma.cc/3Q5Y-ZINS (noting that practicing issues that are statistically more likely to appear on the exam will lead to learning most frequently tested issues first).
B. For Law Students in School

The time now spent in law school classes drilling students on rote memorization could be outsourced to a better teacher of it: SR.\textsuperscript{221} The use of SR could open up law school classes to higher-level discussion and learning because, by using it, students would arrive to class knowing all of the relevant black letter law.\textsuperscript{222} That would allow the professor to spend her time helping the students to think about analyzing and applying that information.\textsuperscript{223}

For every course, students would simply create a deck of flashcards and load them onto their SR.\textsuperscript{224} Over the course of the semester, the students could both study, and add, to the decks.\textsuperscript{225} When exam time came, there would be no cramming to do.\textsuperscript{226} Instead, students would have time free to practice the skill of exam-taking.\textsuperscript{227}

This method could also build community among students.\textsuperscript{228} If they were all able to collaborate on content creation for their class-

\textsuperscript{221} See Josette Akresh-Gonzales, Spaced Repetition: The Most Effective Way to Learn, NEJM KNOWLEDGE (Nov. 19, 2015), archived at https://perma.cc/G9SC-B57L (illustrating the benefits of using SR over mechanical and habitual memorization for law students).

\textsuperscript{222} See Doretta McGinnis, Can Spaced Repetition Help you Learn the Law?, BAR EXAM TOOLBOX (Oct. 5, 2016), archived at https://perma.cc/UKQ4-HMGD (providing an example of how the SR method can benefit class discussion in law school).

\textsuperscript{223} See Shellenbarger, supra note 8 (highlighting how SR programs allow teachers to alter traditional teaching methods).


\textsuperscript{225} See Tanagrabeast, A Year of Spaced Repetition Software in the Classroom, LESSWRONG (July 4, 2015), archived at https://perma.cc/A7T6-48RT (describing the process of adding flashcards to the deck over the course of a semester).

\textsuperscript{226} See Akresh-Gonzales, supra note 221 (explaining the benefits of using spaced repetition to study for exams).

\textsuperscript{227} See Akresh-Gonzales, supra note 221 (acknowledging the benefits of spaced repetition for exam preparation).

\textsuperscript{228} See Welcome to SeRious, supra note 147 (describing how using spaced repetition can foster collaboration among students).
wide flashcard deck, they would work together in ways that law students do not now. If the class’s professor was willing to review the content with students (and why wouldn’t she, this is an easy tool for helping make her own job easier and more interesting), student buy-in would be high.

Also, because the first-year courses are the core of the multi-state portion of the bar exam, by using spaced repetition during the first year of law school, the students could simply continue reviewing their 1L content during law school. Because the times between study sessions expands exponentially, it would be reasonable to expect a student to only have to look at first year flashcards a few times over the student’s final two years of school, and the student would then have “banked” a good deal of knowledge when the bar exam came, allowing for devoting time to other tasks (like state-specific essay topics, or practicing essay writing to wring the maximum points out of the local portions of the exam).

C. For Practitioners

Using SR should not end once a law student graduates and passes the bar. The ability to remember key information is important to many forms of law practice. For example, a new litigator will be expected to cite specific cases and specific propositions of law, day-in-and-day-out, even as a rookie. Imagine: a new DA thrown into arguing bail matters will need to remember the relevant

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229 See Welcome to SeRious, supra note 147 (highlighting new and innovative ways law students can collaborate using spaced repetition).
230 See Welcome to SeRious, supra note 147 (outlining how unprecedented professor engagement is beneficial to flashcard learning).
231 See Welcome to SeRious, supra note 147 (emphasizing the importance for students to use quality flashcards).
232 See Smith-Barrow, supra note 201 (articulating how use of spaced repetition during 1L year is natural Bar preparation).
233 See Gabriel Teninbaum, Spaced Repetition: A tool to help you learn way more in way less time, ABA FOR LAW STUDENTS (Mar. 17, 2016), archived at https://perma.cc/JA7S-5XY3 (addressing the importance to prepare for the Bar exam with Spaced Repetition during 1L year).
234 See id. (discussing how Spaced Repetition should be used at all stages of a lawyer’s career).
235 See id. (focusing on the importance of remembering information after using Spaced Repetition methods).
236 See Gymer, supra note 193 (considering the skills needed as a new lawyer).
standards for determining bail, and should be prepared to cite the cases underlying it.\textsuperscript{237} A new associate in a med-mal firm would need to remember vast stores of medical terminology (not to mention a distinct body of case law).\textsuperscript{238} An attorney prepping for an argument before an appellate court needs to be able to cite a huge array of relevant cases, along with the propositions of law they stand for.\textsuperscript{239} This is precisely where SR shines: it is best at helping people remember quantities of information that they want to learn well, and learn for the long-term.\textsuperscript{240}

Beyond specifically legal facts, attorneys are businesspeople for whom SR can help.\textsuperscript{241} For example, using SR to remember the interests and family members’ names of referring attorneys would seem a smart business move, and one of many ways SR could be used by lawyers-as-businesspeople.\textsuperscript{242}

\textbf{D. Limitations and Caveats}

While SR provides a unique opportunity for lawyers and law students to improve their effectiveness, the technique is not a cure-all.\textsuperscript{243} First, using SR requires more than just looking at flashcards.\textsuperscript{244} Users still must learn the material and context is necessary to be able to make use of it.\textsuperscript{245} Put differently, being able to identify the defini-

\thesuperscript{237} See Niedwiecki, supra note 195, at 41 (recognizing the need for lawyers to constantly learn new topics and apply them to their cases).
\thesuperscript{238} See Niedwiecki, supra note 195, at 41 (articulating why attorneys need strong research skills to support unique areas of litigation).
\thesuperscript{239} See Gymer, supra note 193 (explaining the importance of memory skills when developing arguments).
\thesuperscript{240} See SERIOUS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (demonstrating the usefulness of a spaced repetition program).
\thesuperscript{241} See Welcome to SeRiouS, supra note 147 (noting the diverse benefits to individuals using SeRiouS).
\thesuperscript{242} See Welcome to SeRiouS, supra note 147 (inferring that a lawyer may use SeRiouS in their personal life).
\thesuperscript{243} See Welcome to SeRiouS, supra note 147 (recognizing that students cannot rely on SeRiouS alone for bar preparation as they still must know the material inside and out).
\thesuperscript{244} See Welcome to SeRiouS, supra note 147 (mentioning the process of learning through spaced repetition).
\thesuperscript{245} See Welcome to SeRiouS, supra note 147 (noting that the software cannot do the learning for you and self-motivated learning is necessary for successful use of SeRiouS).
tion of a term or to list the elements of a cause of action is not synonymous with being able to apply the definition to a real client’s case.\textsuperscript{246} The work of lawyering begins with thorough knowledge of black letter law, but is meaningless without training in analyzing, organizing, and expressing it.\textsuperscript{247} SR is useful in supporting these goals in the sense that it allows for flipped classrooms, where professors needn’t drill students on elements (because they’ve learned them on their own using SR!), but can instead spend classroom time digging into application of the law.\textsuperscript{248} Nonetheless, stand-alone use of spaced repetition in a common law legal system\textsuperscript{249} is like having medical students the details of anatomy and steps in a surgical procedure; yet not letting them practice holding the scalpel or making an incision.\textsuperscript{250} Ultimately, SR can be the core building block to success in the actual practice of law, but can never fully replicate the human experience and mentoring needed to excel.\textsuperscript{251}

Second, cramming is not a good technique for long-term learning and memorization.\textsuperscript{252} Crammers trade short-term benefits for very, very weak long-term results.\textsuperscript{253} Nonetheless, cramming does work in the short term.\textsuperscript{254} Adding to the challenge of recognizing that SR is a superior technique, users often believe cramming is

\textsuperscript{246}See Gymer, supra note 193 (stressing the need to not only remember large quantities of information, but to also be able to apply it to real world scenarios).
\textsuperscript{247}See Gymer, supra note 193 (reaffirming the skills required to be an effective lawyer).
\textsuperscript{248}See Welcome to SeRiouS, supra note 147 (advocating change in law student learning where they study with spaced repetition on their own and deepen their understanding in the classroom).
\textsuperscript{249}See SeRiouS SOFTWARE FOR SERIOUS LAW STUDENTS, supra note 30 (encouraging the use of SeRiouS for American law students). Common law is referenced here because it is feasible that deep memorization could play a larger role in civil law systems, where analysis of precedent is of secondary importance to the ability to reference code and commentary that are less in need of analysis. Id.
\textsuperscript{250}See Kerfoot et al., supra note 3 (outlining a study involving the usefulness of spaced repetition to medical school training).
\textsuperscript{251}See Welcome to SeRiouS, supra note 147 (reiterating that the student cannot rely on the computer program alone).
\textsuperscript{252}See Akresh-Gonzales, supra note 221 (contesting the notion that cramming has long term benefits).
\textsuperscript{253}See Akresh-Gonzales, supra note 221 (citing the limited effectiveness of cramming for your short term retention).
\textsuperscript{254}See Akresh-Gonzales, supra note 221 (acknowledging that cramming can be a successful study technique).
more effective.\textsuperscript{255} Built into the cramming vs. spacing decision is that fact that, while spacing is nearly universally more effective than cramming.\textsuperscript{256} This means that educating users on the strength of SR, and its counter-intuitive benefits, will be useful to encouraging users to get maximum benefit from it.\textsuperscript{257}

VI. Conclusion

More than two thousand years ago, a rhetorician arguing in a Roman court had to be prepared to respond to interruptions, change an argument’s direction, omit prepared sections and to improvise.\textsuperscript{258} The advocate also needed to have memorized the complex body of Roman law.\textsuperscript{259} To prepare for this ordeal, the advocate relied on a series of memorization techniques developed and refined by famed orators like Aristotle, Quintilian and Cicero.\textsuperscript{260} To ancient Romans, \textit{memoria} (or \textit{mneme}, to the Greeks) was one of the five canons of rhetoric that every educated citizen had to master.\textsuperscript{261}

For today’s legal professionals, memorization is no less important. Modern trial lawyers face the same challenge as Roman lawyers in terms of preparing for arguments while requiring flexibility to re-order or re-frame to respond to judges' inquiries. Memorization is also vital to students of the law, who face two memory-stretching challenges the Romans never did: issue-spotting exams and the bar.

Yet, modern law students and lawyers take on the challenges of recalling what they have learned without any systematic training in memorization. As a result, more students struggle in law school than

\begin{footnotesize}
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\item See Akresh-Gonzales, \textit{supra} note 221 (discussing the widespread belief that cramming is the preferable method of studying).
\item See Branwen, \textit{supra} note 58 (summarizing participants’ perception of which method is more effective, with results showing that after the first study session, 72% of participants in a recent study believed that cramming had been more effective than spacing).
\item See Akresh-Gonzales, \textit{supra} note 221 (encouraging students to incorporate spaced repetition study habits into their routines).
\item See \textit{ENCYCLOPEDIA OF RHETORIC} 113 (Thomas Sloane ed., 2001) (describing memorization as an element of the canons of rhetoric).
\item See id. (articulating the quantity of information that Greek and Latin students were required to memorize).
\item See ROBBINS-TISCIONE, \textit{supra} note 204, at 101-02 (articulating the memorization techniques used by Greek and Roman scholars).
\item See ROBBINS-TISCIONE, \textit{supra} note 204, at 101-02 (providing examples of Greek and Latin terms that were used to describe different attributes of rhetoric).
\end{itemize}
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need-be, more students fail the bar than should, and more practitioners are ineffective in representing clients than necessary.

There is no Wikipedia available while taking the bar exam and no Google searching allowed during the middle of an oral argument. Law students and legal professionals simply must know certain things – they must memorize them. By leveraging SR, we can help them learn more effectively and efficiently.