Suffolk University
Law School

Legal Studies Research Paper Series
Research Paper 13-10
April 5, 2013

Teaching the Smartphone Generation: How Cognitive Science Can Improve Learning in Law School

Shailini Jandial George
Professor of Legal Writing, Suffolk University Law School

This paper can be downloaded without charge from the Social Science Research Network: http://ssrn.com/abstract=2245882

120 Tremont Street
Boston, MA 02108

www.law.suffolk.edu

Electronic copy available at: http://ssrn.com/abstract=2245882

Teaching the Smartphone Generation: How Cognitive Science Can Improve Learning in Law School

Shailini Jandial George[1]

I. INTRODUCTION

Lara Law Student sits down for her first year torts class, opens her laptop, and puts her iPhone on her desk. She quickly checks her email while her professor begins talking about the reading. A friend told her about some pictures posted on Facebook that she HAS to see. She quickly goes to Facebook while the professor is reviewing the facts of a case. She feels confident she can check the pictures out, "untag" herself from any that are unflattering, and check back into class before she misses anything important. Suddenly she realizes that her professor has called on someone in her row, so she logs off Facebook and listens. The professor is discussing the elements of negligence, which reminds Lara that her mother was sued for negligence for a rear-end collision a few months before. She sends her mother an email to find out about the lawsuit. The professor then calls on a classmate next to Lara to discuss the holding of a case, so she switches back to listening. Lara begins typing, but then her phone vibrates signaling a text message from her roommate, confirming their lunch plans. Lara texts back, then returns to note taking. Where was she again? It takes her a moment to orient herself to the lecture and she realizes that she missed something about the element of duty. Lara is not concerned because she knows she can look at her friends' notes, and she has an outline that a 2L gave her, so she's sure she'll figure it out later.

Scenes like this are becoming the norm across law school classrooms nationwide. Today's law student enters law school as a digital native, constantly "plugged in" and accessing information at a moment's notice, often during class time itself. Yet scholars agree that these students are entering law school with weaker reading and reasoning skills than prior generations, due in large part to the way students multitask through life. This article aims to address the problems caused by the intersection of these two issues by applying cognitive learning theory to the law school environment. Part One examines the characteristics of our current students by describing their skills and learning styles upon arriving at law school. Part Two examines cognitive learning theory insofar as it can inform our

[1] Professor of Legal Writing, Suffolk University Law School, Boston, Massachusetts. I would like to thank my research assistant, Christina Mott, for her hard work in helping me complete this article. I am also grateful to have had the assistance of research librarian, Diane D'Angelo. I am also thankful to my colleague, Rosa Kim, for her feedback and with whom I developed and presented on this topic, as well as my colleague Stephanie Roberts Hartung, for her input and unwavering support.

Electronic copy available at: http://ssrn.com/abstract=2245882

teaching andragogy: specifically, how do today's students learn, how can we help our students learn better, and what effect does their multitasking have on learning? The final section suggests ways for students and educators to better translate the information offered in class into knowledge. Ultimately, this article suggests teaching students about metacognition and effective study techniques while also encouraging professors to design and plan their courses by adopting cognitive learning theories and using more visual aids, visual exercises, and assessments to help students better learn the material.

II. TODAY'S LAW STUDENTS

It seems obvious that a good way to prepare to teach would be to learn about the students one is teaching. After all, "[o]ne of the basic tenets of good teaching is that you have to start where students are," yet, most law school professors teach in the same style in which they were taught many years prior.[2] There is little incentive for professors to spend the time to learn about their students' learning styles or abilities, and most law schools do not encourage or have any programmatic efforts directed at improving the teaching abilities of their professors.[3] In fact, the criteria by which law schools hire new law teachers and measure their performance ignore teaching skill or effectiveness.[4] Instead, professor hiring and performance review is based primarily on a record of, or potential for, scholarship, with scholarship serving as a key criterion evaluated in tenure review.[5] This emphasis on scholarship is based on the theory that increased publication will result in a law school's improved reputation within the legal community, and corresponding upward movement of the school in U.S. News & World Report rankings.[6] These rankings, however, do not take

---

[2] David Glenn, *Divided Attention*, THE CHRON. OF HIGHER EDUC., THE CHRON. REV., February 28, 2010; *see* Michael Hunter Schwartz, *Teaching Law By Design: How Learning Theory and Instructional Design Can Inform and Reform Law Teaching*, 38 SAN DIEGO L. REV. 347, 348-49 (Spring 2001). Law school instruction generally is unchanged since Christopher Columbus Langdell's time at Harvard Law School in the 1870's, when he developed what is now characterized as the "Vicarious Learning/Self-Teaching Model." *Id.* at 350, 353; *see generally* ROBERT STEVENS, LAW SCHOOL: LEGAL EDUCATION IN AMERICA FROM THE 1850S TO THE 1980S (1983) (explaining and analyzing historical developments in American legal Education system).

[3] *See* Schwartz, *supra* note 2, at 348-49, 364 & n.25.

[4] *See* Schwartz, *supra* note 2, at 360; *see also* Marin Roger Scordato, *The Dualist Model of Legal Teaching and Scholarship*, 40 AM. U. L. REV. 367, 389-99 (1990) (explaining that between equally qualified candidates, those with stronger publication records likelier to be hired).

[5] *See* Schwartz, *supra* note 2, at 360-61.

[6] *See* Schwartz *supra* note 2, at 361 & n.44; DENISE S. GATER, A REVIEW OF MEASURES USED IN U.S. NEWS & WORLD REPORT'S "AMERICA'S BEST COLLEGES" 8 (Summer 2002) (observing holding terminal degree unconnected to teaching effectiveness, research institutions pay top researchers most).

Electronic copy available at: http://ssrn.com/abstract=2245882

into account teaching skill or effectiveness.[7] "Thus, law professors, like most academics, have an incentive to be minimally competent teachers and excellent scholars."[8]

Incoming law school students vary in their ability, skills, background, self-knowledge and experiences.[9] Many law school professors believe they learned quite well without anyone considering their individual learning styles, and after teaching for many years, are resistant to the idea that there is any change that could or should be made that would help their students learn better.[10] Assuming we should consider the evolving characteristics of our students, understanding those characteristics is the starting point to teaching to the needs of our current students.

A. Millennials

Significant scholarship has been devoted to the characterization and description of the "millennial student" (Millennials).[11] Millennials were born between 1977 and 1998 and started arriving at law schools around the turn of the 21st century.[12] Because Millennials were wanted and planned by their parents, and are closely connected to them, they often feel individually and collectively special.[13] Not surprisingly, Millennials are highly protected and sheltered by their parents.[14] They are used to significant parent involvement, and they want and expect parents and other authority

---

[7] *See* Schwartz, *supra* note 2, at 360.
[8] Schwartz, *supra*, note 2, at 360-61.
[9] *See* Schwartz, *supra* note 2, at 362 & n.49. The author notes that he is unable "to locate a single law review article or text," outside of academic support materials, that would consider this variety, and suggests adapting teaching techniques to these particularities. *Id.*
[10] *See* Schwartz, *supra* note 2, at 364-65. Schwartz opines that most law professors did well themselves in law school and due to their own successes, can justify their unchanged methods. *Id.* at 365.
[11] *See* Timothy W. Floyd, Oren R. Griffin, & and Karen J. Sneddon, *Beyond Chalk and Talk: The Classroom of the Future*, 38 OHIO N.U.L. REV. 257, 273-76 (2011). (characterizing Millennials and highlighting desirable traits for educators to strategically target); Paula Gleason, *Meeting the Needs of Millennial Students*, IN TOUCH WITH STUDENT SERVICES NEWSLETTER (Winter 2008), http://www.csulb.edu/divisions/students2/intouch/archives/2007-08/vol16_no1/01.htm (defining four main generations and distinguishing Millennials).
[12] *See* Diane Thielfoldt & Devon Scheef, *Generation X and the Millennials: What You Need To Know About Mentoring the New Generations*, AM. BAR ASS'N LAW PRACTICE MGMT. SECTION LAW PRACTICE TODAY, (Aug. 2004), http://www.abanet.org/lpm/lpt/articles/mgt08044.html (last visited Jan. 28, 2013).
[13] *See* Thielfoldt, *supra* note 12.
[14] Andrea McAlister, *Teaching the Millennial Generation*, AM. MUSIC TEACHER, Aug. 1, 2009, at 13(3), available at http://www.highbeam.com/doc/1P3-1830682391.html (dubbing parents of Millennials as "helicopter parents"); Kathleen Elliott Vinson, Hovering Too Close: The Ramifications of Helicopter Parenting in Higher Education, GA. ST. U. L. REV. (forthcoming), *available at* http://ssrn.com/abstract=1982763.

figures to protect and nurture them and to resolve their conflicts.[15] Millennials are motivated, goal-oriented, and high achieving.[16] Even in elementary school their parents expected high grades and achievement from them in extracurricular activities.[17] Despite an inherent focus on achievement and feeling pressured to succeed, this generation has received trophies and accolades whether they win or merely participate.[18] Due to Millennials' focus on achievement, rather than personal development, they may not value the benefit of lifelong learning.[19] Millennials want and need instant feedback.[20] This desire often clashes with the typical first year law-school experience, where they may receive little to no feedback before their final exam, which constitutes most or their entire grade.[21]

B. Digital Natives

Most, if not all, of today's law students are "digital natives."[22] Digital

---

[15] *See* Thielfoldt, *supra* note 12; Christy Price, *Why Don't My Students Think I'm Groovy? The New "R's" for Engaging Millennial Learners*, 23 TEACHING PROF. 1, 2 (2009), *available at* http://www.drtomlifvendahl.com/Millennial%20Characturistics.pdf. (asserting helicopter parents of Millennials contribute to delay of students' independence)

[16] *See* Thielfoldt, *supra* note 12; McAlister, *supra* note 14, at 2.

[17] *See* Thielfoldt, *supra* note 12; McAlister, *supra* note 14, at 1.

[18] *See* Thielfoldt, *supra* note 12; McAlister, *supra* note 14, at 2. In fact, McAlister argues that "[t]oday's students are much more lauded than any preceding generation and have come to expect these types of rewards." McAlister, *supra* note 14, at 2; *see also* Joan Catherine Bohl, *Generations X and Y in Law School: Practical Strategies for Teaching the "MTV/Google" Generation*, 54 LOY. L. REV. 775, 790 (2008). Bohl describes the self-esteem movement in public education, noting its downward evolution, resulting less rigorous academic requirements, less vigorous criticism of student work, and fewer low grades for fear they would lower student self-esteem. *See* Bohl, *supra* at 788-89. Not surprisingly, students are more likely to expect good grades and be rewarded for effort rather than achievement. *Id.* at 789-90.

[19] *See* Bohl, *supra* note 18, at 780-81 (explaining Millennials' penchant for linking educational processes to entertainment).

[20] *See* Bohl, *supra* note 18, at 796-98. Millennial students have developed a "just in time" attitude, where they block out information that does not seem immediately necessary. *Id.* at 796. Educators can be more effective by advocating the importance of information to students and transforming classroom time to actively engage full student participation. *Id.* at 796-77; *see also* Robin A. Boyle, *Employing Active-Learning Techniques and Metacognition in Law School*, 81 U. DET. MERCY L. REV. 1, 4 (2003) (describing widely utilized Socratic method as contributing to passive role of students).

[21] *See* Bohl, *supra* note 18, at 796-98. Millennial students learn more effectively from active learning, such as in short-term projects with professor access for input and guidance, because it chunks the information into more manageable quantities and actively engages Millennials' attention to the material. *Id.* at 798.

[22] Bohl, *supra* note 18, at 776. "Digital natives" are masters of technology, simultaneously learning the language of computers with English. *Id.* Samantha Moppett, *Control-Alt-Incomplete? Using Technology to Assess "Digital Natives"*, CHI.-KENT J. INTELL. PROP. (forthcoming 2013) (manuscript at 2-3), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=200455. *See also* Floyd, *supra* note 11, at 274-76 (describing necessity for Millennials to integrate their technological skills into academic pursuits).

natives grew up on the Internet and in a world filled with technology.[23] On average, over 20% of today's law students started using computers at age five.[24] By 2003, at least 86% of American children were competent in using computers.[25] As these children grow, their use of technology and the Internet encompasses music, entertainment, networking, and communication.[26] They may even prefer to text message or use other technology-based communication rather than make a phone call or have a face-to-face conversation.[27]

Digital natives use technology to integrate their work into their lives; they are not constrained by traditional ideas of studying.[28] For these students, learning rarely happens in a library.[29] They are used to scrutinizing everything and being given instant access to information.[30] They want entertainment and play integrated into their work, education, and social life.[31] Digital natives have been called the collaboration and

---

[23] *See generally* DON TAPSCOTT, GROWING UP DIGITAL: THE RISE OF THE NET GENERATION (1998) (explaining Internet's shared rather than hierarchical delivery system central to digital natives' culture of interaction).

[24] *See* Bohl, *supra* note 18, at 779; *see also* STEVE JONES, THE INTERNET GOES TO COLLEGE: HOW STUDENTS ARE LIVING IN THE FUTURE WITH TODAY'S TECHNOLOGY 2, 6 (Sept. 15, 2002), available at http://www.pewInternet.org/Reports/2002/The-Internet-Goes-to-College.aspx (last visited Jan. 29, 2013).

[25] *See* Bohl, *supra* note 18, at 780; JENNIFER C. DAY ET AL., U.S. CENSUS BUREAU, CURRENT POPULATION REPORTS: COMPUTER AND INTERNET USE IN THE UNITED STATES 4 (2007). A decade ago, more than 90% of children in kindergarten through twelfth grade were using computers at school, at home, or in both, while only 64% of adults were using computers at work or at home. DAY, *supra* at 7, 11.

[26] *See* TAPSCOTT, *supra* note 23, at 4-5.

[27] *See* John Palfrey, *Digital Natives Go To Law School*, HARV. L. SCH. FAC. WORKSHOP SPRING 2010 12-13 (Mar. 1, 2010), http://www.law.harvard.edu/faculty/faculty-workshops/john.palfrey.spring.2010.faculty.workshop.pdf (last viewed Jan. 29, 2013) (arguing student multi-tasking gives cause for concern because digital natives exhibit shorter attention spans); *see also* AMANDA LENHART ET AL., THE INTERNET AND EDUCATION: FINDINGS OF THE PEW INTERNET AND AMERICAN LIFE PROJECT 4 (2001), *available at* http://www.pewInternet.org/~/media//Files/Reports/2001/PIP_Schools_Report.pdf.pdf (last visited Jan. 29, 2013) (revealing the Internet has "revolutionized many time-honored short cuts" for today's students).

[28] *See* Moppett, *supra* note 22, at 19; Bohl, *supra* note 18 at 779-82 (revealing effect of education linked to entertainment is students experiencing education from consumer vantage point).

[29] *See* LENHART, *supra* note27, at 4. Not surprisingly, during online surveying for the Pew Internet and American Life Project, a 15-year old boy maintained: "I find the Internet most useful when I need help for school . . . . Without the Internet you need to go to the library and walk around looking for books. In today's world you can just go home and get into the Internet and type in your search term. The results are endless. There is so much information that you have to ignore a lot of it." *Id.*

[30] *See* LENHART, *supra* note 27, at 4-5.

[31] *See* Bohl, *supra* note 18, at 779-82; *see also* Tracy L. McGaugh, *Generation X in Law School: The Dying of the Light or the Dawn of a New Day?*, 9 LEGAL WRITING 119, 124 (2003) (tracking Millennials' need for instant gratification from technology and their learning experience).

relationship generation—they are used to using sites like Facebook, Instagram, Twitter, and Pinterest to instantly share their thoughts and quickly communicate with their peers.[32] This tendency also causes them to expect and desire quick feedback on assignments.[33] They have "a need for speed"—that is, technology has made rapid communication the new norm.[34] Contrasted with the way in which most law professors use technology, the rift in communication norms is wide.[35]

C. The Google Generation: Jet Skiers, not Scuba Divers[36]

Today's law students are also part of what has been called the "Google generation." [37] In his book *The Shallows*, Nicholas Carr writes about the way we read and research for information and the impact that has on the information retained and processed.[38] According to Carr, today's students do not read front to back, rather, they are "skilled hunters" for

---

[32] *See* Bohl, *supra* note 18, at 780; TAPSCOTT, *supra* note23, at 4-5.
[33] *See* Floyd, *supra* note 11, at 274-75 (encouraging faculty "to utilize creative classroom simulations" and give Millennials immediate feedback"); *see also* Eric Hoover, *The Millennial Muddle: How Stereotyping Students Became a Thriving Industry and a Bundle of Contradictions*, THE CHRON. OF HIGHER EDUC., Oct. 11, 2009, http://chronicle.com/article/The-Millennial-Muddle-How/48772; Mano Signham, *More than 'Millennials:' Colleges Must Look Beyond Generational Stereotypes*, THE CHRON. OF HIGHER EDUC., Oct. 11, 2009, http://chronicle.com/article/More-Than-Millennials-/48751/.
[34] *See* Matt Richtel, *Growing Up Digital, Wired for Distraction*, N.Y TIMES (Nov. 21, 2010), http://www.nytimes.com/2010/11/21/technology/21brain.html?pagewanted=all&_r=0.
[35] *See* Floyd, *supra* note 11, at 258, 273-75 (noting need for instructors to incorporate teaching strategies based on Millennials' technology comfort levels).
[36] NICHOLAS CARR, THE SHALLOWS, 7 (2011). Carr writes "[w]hether I'm online or not, my mind now expects to take in information the way the Net distributes it: in a swiftly moving stream of particles. Once I was a scuba diver in the sea of words. Now I zip along the surface like a guy on a Jet Ski." *Id.* at 6-7.
[37] *See* Bohl, *supra* note 18, at 775-76, 791. Improved and increased access to technology broke the link between law professors as transmitters of information and their students. *Id.* at 791. Past generations of students revered their professors as proverbial "gurus" while the current "Google generation" feels that they themselves are experts due to their information gathering skills. *Id.*
[38] *See* CARR, *supra* note 36, at 6-28. Carr opines that the Internet "is chipping away [his] capacity for concentration and contemplation," and he is not alone in his troubles focusing on longer written pieces; one researcher dubbed his thinking as having absorbed a "staccato" form. *Id.* at 6-7. However, some view this "high-speed data processing" ability to quickly scan copious amounts of information as an efficiency tool that is making individuals "smarter." *Id.* at 8, 16. Other researchers have "found the rapid pace of technology can lead to more nimble thinking", but that "trends are leading to a future in which most people are shallow consumers of information" and that "immediate gratification is the default response." Christopher Murther, *The Growing Culture of Impatience Makes Us Crave More and More Instant Gratification*, THE BOSTON GLOBE, (Feb. 1, 2013), http://www.boston.com/lifestyle/specials/2013/02/01/the-growing-culture-impatience-where-instant-gratification-makes-crave-more-instant-gratification/eu5SPWCVTmFp9Nm6dUndhP/story-1.html.

information.[39] Instead of reading a document through once to understand the context of the work, since students often read on a screen, they tend to click hyperlinks and move on to other cross-referenced material, jumping from text to text, sometimes without reading the original document even once all the way through.[40] Reading has become such an issue that an English professor lamented that she could not get her literature students to read books.[41]

The Internet has made so much information available to us, more than we could possibly retain in our brains, that we are more often "handing off the job of remembering" things to technology.[42] Research at Columbia University showed three new realities about how we process information in the digital age.[43] First, where subjects did not know the answer to a question, the study revealed that rather than thinking about the subject matter of the question, they would think about where they could find the nearest Internet connection.[44] Second, when subjects expected to be able to find the information later on, they did not remember it as well as when they believed the information would no longer be available.[45] Third, the knowledge of where the information can be found leads us to form a memory of how we will locate the information in the future and not of the

---

[39] *See* CARR, *supra* note 36, at 9 (explaining books become "superfluous" after one becomes a "skilled hunter" online).

[40] *See* CARR, *supra* note 36, at 8. In fact, Carr writes, "[f]or some people, the very idea of reading a book has come to seem old-fashioned, maybe even a little silly—like sewing your own shirts or butchering your own meat." *Id.*

[41] *See* CARR, *supra* note 36, at 9.

[42] Annie Murphy Paul, *Your Head is in the Cloud*, TIME 64-65 (Mar. 12, 2012), *available at* http://www.time.com/time/magazine/article/0,9171,2108040,00.html (outlining three main consequences of technology reliance on human cognitive processes). One researcher reported that when faced with a question that they did not know the answer to, they instead thought of where they could log onto the Internet, rather than thinking through the question asked. *Id.* Additionally, the prospect of information being accessible in the future affects how well we remember that information; we remember information better when we believe it might later be unavailable. *Id.* Finally, our brains remember where we can find information rather than remember the fact we found. *Id.*

[43] *See* Paul, *supra* note 42, at 64-65; Betsy Sparrow et al., *Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips*, 333 SCI., 776, 776-78 (Aug. 5, 2011) (reporting results of four studies suggesting brains primed for lower information-recall rates, higher accessibility-location rates).

[44] *See* Sparrow, *supra* note 43, at 776-78. In one study, where subjects were asked "[a]re there any countries with only one color in their flag?", the subjects thought about computers, not flags. *See* Paul, *supra* note 42, at 64.

[45] *See* Sparrow, *supra* note 43, at 776-78. Here, Sparrow's subjects were asked to type facts into a computer. *Id.* Half were told their information would be saved, half were told it would not be saved. *Id.* Those who believed the information would be saved recalled fewer details than those who believed it would be erased. *Id.* "Because search engines are continually available to us, we may often be in a state of not feeling we need to encode the information internally. When we need it, we will look it up." *Id.*

information itself.[46] This delegation comes with a price: "[s]kills like critical thinking and analysis must develop in the context of facts . . . [a]nd these facts can't be Googled as we go; they need to be stored in the original hard drive, our long term memory."[47]

D. Gen M: The Multitasking Generation[48]

Multitasking has monumentally shifted the way students process information.[49] In a 1990 Stanford University survey, a majority of adolescents surveyed said that "the one medium they couldn't live without was a radio/CD player . . . [i]n a 2004 follow-up the computer won hands down."[50] Interestingly, the amount of time children spend with electronic media has not changed significantly over time—it has remained at six and one-half hours per day—but what they are doing with that time has changed.[51] Now, kids are often "media multitasking," that is, listening to music, doing homework, and texting friends, all at the same time.[52] This level of multiprocessing seems commonplace now, but only fifteen years ago, most home computers were not linked to the Internet.[53] This generation does not often just sit down to watch a television show with their family; more often than not, while sitting and watching television, they also listen to music, play games, use the computer, text message friends, or even read.[54]

This multitasking is going on in law school classrooms as well. Professors have noted that in lecture halls with wireless Internet access—more than forty percent of classrooms nationwide—the need to multitask can get out of control.[55] One law school professor saw a student in another professor's class surfing the web on her laptop while simultaneously texting a friend.[56] At one time, distracted students might have played solitaire or

---

[46] *See* Sparrow, *supra* note 43, at 778. Sparrow and her colleagues concluded that we are learning what the computer knows and therefore "becoming symbiotic with our computer tools." *Id.*

[47] Paul, *supra* note 42, at 65.

[48] Claudia Wallis, *genM: The Multitasking Generation*, TIME (Mar. 27, 2006), *available at* http://www.time.com/time/printout/0,8816,1174696,00.html. Wallis writes that "[h]uman beings have always had a capacity to attend to several things at once." *Id.* However, the current age of "multiprocessing and interpersonal connectivity" came about fairly recently. *Id.*

[49] *See* Wallis, *supra* note 48; Thielfoldt, *supra* note 12, at 3.

[50] *See* Wallis, *supra* note 48.

[51] *See* Wallis, *supra* note 48.

[52] *See* Wallis, *supra* note 48.

[53] *See* Wallis, *supra* note 48.

[54] *See* Wallis, *supra* note 48.

[55] *See* Glenn, *supra* note 2, at 2; Palfrey, *supra* note 27, at 4-6; Wallis, *supra* note 48.

[56] Jeff Sovern, *Laptops in Class: How Distracting are They?*, CHRISTIAN SCIENCE MONITOR (June 6, 2011), http://www.csmonitor.com/Commentary/Opinion/2011/0606/Laptops-in-class-How-distracting-are-they .

doodled during class, but Internet access opens up a new world of distraction: Facebook and Twitter for the social-media addicts, ESPN for sports fans, eBay, YouTube and all varieties of blogs, just to name a few.[57] Some universities have blocked, or are considering blocking, Internet access during class.[58]

All of this multitasking comes with a price: the habit of attending to many things has implications for the way students learn and process information and cognitive scientists are concerned by the trend.[59] While students believe they are able to simultaneously attend to many things at once, research indicates this is not true; rather than simultaneously processing all the information, the brain is actually toggling among tasks, "leaking a little mental efficiency with every switch."[60] This is where cognitive learning theory helps us understand why students may not be developing the ability to deeply focus.

III. COGNITIVE LEARNING THEORY

To understand why the characteristics of today's law students may impact their reading and reasoning skills, a basic understanding of cognitive learning theory is helpful. Cognitive learning theory uses cognitive science to explain how we learn. While not a new theory, many teachers do not explore or apply cognitive learning psychology to their teaching preparation.[61] Cognitive learning theory is an information processing

---

[57] Laura Mortkowitz, *More Colleges, Professors Shutting Down Laptops and Other Digital Distractions*, WASHINGTON POST (Apr. 25, 2010), http://www.washingtonpost.com/wp-dyn/content/article/2010/04/24/AR2010042402830.html.

[58] *See* Mortkowitz, *supra* note 57; Wallis, *supra* note 48; Eric Moskowitz, *At Harvard, Elizabeth Warren Has Warm Reputation*, THE BOSTON GLOBE (Oct. 14, 2012), http://www.bostonglobe.com/metro/2012/10/13/elizabeth-warren-known-harvard-law-school-tough-but-fair/9adfuU4jXPPSEfO8XyturM/story.html. For example, Senator Elizabeth Warren banned laptop use in all the classes she taught at Harvard Law. Her ban was aimed at both preventing students from robotically typing every word iterated in class, and encouraging students' engagement in a "rapid-fire, room wide conversation." *Id.* Regarding the general effect of Warren's laptop ban, one of her recent students said in an interview: "[e]ven though I wasn't completely aware of it at the time, in taking the exam I knew the bankruptcy code like the back of my hand," *Id.*

[59] *See* Glenn, *supra* note *2*, at 2-4.

[60] *See* Sam Anderson, *In Defense of Distraction*, N. Y. MAGAZINE (May 25, 2009) (describing how the brain processes different information types on separate "channels"); Wallis, *supra* note 48, at 4-6 (cautioning multitasking causes increases in errors and longer task completion times).

[61] *See* Diane F. Halpern, *Teaching Critical Thinking for Transfer Across Domains: Dispositions, Skills, Structure Training, and Metacognitive Monitoring*, 53 AM. PSYCHOL. 449, 449-52 (1998) (positing traditional teaching methods not ideal for teaching critical thinking); James M. Lang, *Teaching and Human Memory, Part I*, THE CHRON. OF HIGHER EDUC., DO YOUR JOB BETTER, Nov. 15, 2011. Lang posits that most faculty members teach without knowing much about how students learn, arguing that "[w]e devote at least part of our careers to making lasting impressions on the minds of our students, yet the vast majority of us have little or no knowledge of how those minds actually work." *Id. See also*

theory, which seeks to understand how the brain processes information and translates that information into knowledge.[62] Cognitive learning theory emphasizes learning of deeper skills, such as reasoning and solving of complex problems, and seeks to understand and explain this process.[63] As law school is undoubtedly a deep-thinking experience, it would seem prudent to apply these principles to its teaching.[64] Specifically, this article aims to apply these principles to today's Google-generation, net-savvy, media-multitasker ,who is used to non-linear, shallow thinking, in a way that will allow for development of deep thinking and reasoning skills.

A. The Science of Learning

Cognitive psychologists define learning, in scientific terms, as "a relatively permanent change in a neuron."[65] So what is a neuron? Early in the 1900's, scientists believed that the brain was made of "a single, continuous fabric of nerve fibers."[66] However, scientists later discovered that the brain is made up of cells, called neurons.[67] These neurons, while similar to other cells in our bodies, are also different because they have two appendages—axons and dendrites—that can send and receive electrical

---

Michelle D. Miller, *What College Teachers Should Know About Memory: A Perspective From Cognitive Psychology*, 59 C. TEACHING 117, 117 (2011). Miller reveals that while "there is no shortage of theoretical research detailing the inner working of memory, when this theoretical research is translated into specific suggestions for pedagogical practice, it is too often misinterpreted, oversimplified, or substantially out of date." *Id.* at 117.

[62] *See* Schwartz, *supra* note 2, at 371-72 (classifying cognitive learning's goal to store information long-term in "organized, meaningful, and useable manner").

[63] *See* Schwartz, *supra* note 2, at 372; Halpern, *supra* note 61, at 450. Halpern suggests a four-part pedagogical model for teaching these deeper skills consisting of: "(a) a dispositional or attitudinal component, (b) instruction in and practice with critical thinking skills, (c) structure-training activities designed to facilitate transfer across contexts, and (d) a metacognitive component used to direct and assess thinking." Halpern, *supra* note 61, at 451.

[64] *See* Schwartz, *supra* note 2, at 372. Schwartz suggests that many law professors believe they learned well with the current model of teaching (Socratic Method and one final exam). *Id.* at 365. These professors often find the current model is "intellectually defensible and easy to use" since they receive very little, if any, instruction in teaching, and know "little, if any, learning theory and nothing about instructional design." *Id.* at 364-65. Adding to the issue is that cognitive theory remains a relatively new field and has evolved rapidly over the last 20-30 years, in a way that "[i]f you did happen to pick up some ideas 10 or 15 years ago about learning and cognition . . . what you learned . . . might have been superseded or even overturned since then by new information and theories." Lang, *supra* note 61.

[65] DUANE F. SHELL ET AL., THE UNIFIED LEARNING MODEL 10 (2010). When neurons strengthen and weaken, they affect neural patterns in ways that correspond to learning different skills, altering the "micro-architecture" of our brains until knowledge forms. *Id.* at 10.

[66] CARR, *supra* note 36, at 19. Neurons operate by sending and receiving electrical signals to other neurons. *See* SHELL, *supra* note 65, at 8. When the "firing threshold" or amount of input a neuron receives changes, learning occurs. *Id.*

[67] *See* CARR, *supra* note 36, at 19.

signals.[68] When the neuron is active, it releases neurotransmitters, which flow across neurons and attach themselves to other neurons, either triggering or suppressing the neighboring neuron.[69] The movement between neurons is called a synapse, which is a connection between the neurons.[70] Many complex processes in our brains, such as thoughts, memories and emotions, come from these electrochemical interactions.[71] However, even until the middle of this century, scientists believed that the neurons and circuits developed in childhood, when the brain was thought to be malleable, were fixed and formed before adulthood and that these synapses and connections no longer occurred in adulthood.[72] However, we have since learned that "[v]irtually all of our neural circuits—whether they're involved in feeling, seeing, hearing, moving, thinking, learning, perceiving, or remembering—are subject to change."[73]

B. Attention and Learning

At the heart of learning is attention.[74] To put it simply, adults learn by paying attention, processing information, and using it.[75] But that process is anything but simple.[76] Learning involves a complicated mental process

---

[68] *See* CARR, *supra* note 36, at 19-20. Neurons' central cores are called somas and carry out those functions common to all cells. *Id.*
[69] *See* CARR, *supra* note 36, at 20.
[70] *See* CARR, *supra* note 36, at 20.
[71] *See* CARR, *supra* note 36, at 20.
[72] *See* CARR, *supra* note 36, at 20-21.
[73] CARR, *supra* note 36, at 26 (revealing all areas impacted by brain's plasticity and explaining brain reprogramming ability).
[74] *See* Hillary Burgess, *Deepening the Discourse Using the Legal Mind's Eye: Lessons from Neuroscience and Psychology that Optimize Law School Learning*, 29 QUINNIPIAC L. REV. 1, 23 (2011) (suggesting students must filter environmental stimuli to better pay attention); M.H. Sam Jacobson, *Paying Attention or Fatally Distracted? Concentration, Memory, and Multi-Tasking in a Multi-Media World*, 16 J. OF THE LEGAL WRITING INST. 419, 421 (2010) (defining attention as "ability to attend to [only those] desired or necessary stimuli"); Miller, *supra* note 61, at 121 ("Without attention, there is no memory.").
[75] *See* Burgess, *supra* note 74, at 23. The many environmental stimuli adults experience exist in different forms, classifiable as auditory, visual, tactile, olfactory, and gustatory, all of which are involuntarily stored in sensory memory. *Id.* For students, sensory memory enables a student who is not paying attention to answer a professor's question: even though the question is not stored into their short- or long-term memory, the brain involuntarily stores the question and any information into sensory memory for about a half of a second. *Id.* at 23-24. Moreover, if the professor uses the student's name at the end of a question that is less than half of a second long, the student can move the question from sensory memory to working memory; but, if the question is more than a second long, the student will have no memory of the question. *Id.* Similarly, short-term, working memory, comprised of verbal memory, visual memory, and thinking, also has a thirty second life, and disappears after one stops focusing on an information item for thirty seconds. *Id.* at 25.
[76] *See* Burgess, *supra* note 74, at 23; Miller, *supra* note 61, at 118. Memory consists of "three components—sensory memory, short-term memory, and long-term memory—[that] work together much like an assembly line, with information making stops at each "station"

whereby information is received by the senses and is briefly registered by the brain.[77] That information can be absorbed through any of our senses: touch, smell, taste, sight, and sound.[78] The brain attends to only a few pieces of the information contained in the register.[79] This is known as "selective attention".[80] The brain is continuously assaulted by so many stimuli that some can and must be ignored.[81]

The brain processes stimuli to which it attends or pays attention.[82] The information that is selectively attended to by the brain passes into short-term or working memory.[83] Only small amounts of information can be stored in the working memory before it is lost or transferred to long term memory.[84] Historically, psychologists believed that the working memory could hold no more than about seven pieces of information.[85] Depending upon the attention paid to those bits of information, they will either be forgotten or moved toward long term memory through a process known as encoding.[86] "Encoding" refers to how information is stored and is the process whereby information travels from short-term to long-term memory.[87] Encoding can happen through rehearsal, such as learning a musical instrument, or by memorization, such as learning the provisions of the Uniform Commercial Code.[88] Once rehearsed sufficiently, that information is retrieved from long term memory by a process called

---

before being passed along. Of course, not every bit of information makes it all the way into long-term memory." Miller, *supra* note 61, at 118.

[77] *See* Floyd, *supra* note 11, at 265-66; *see also* Burgess, *supra* note 74, at 23.

[78] *See* Burgess, *supra* note 74, at 23; Jacobson, *supra* note 74, at 421.

[79] *See* Jacobson, *supra* note 74, at 421.

[80] Jacobson, *supra* note 74, at 421.

[81] *See* Jacobson, *supra* note 74, at 421. For example, students studying in the library must consciously ignore nearby conversations, people walking by, and dogs barking outside. *Id.*

[82] *See* Jacobson, *supra* note 74, at 421. Certain automatic or highly routine tasks do not require being attended to before the brain can processes them. *Id.* These types of tasks are those that do not require conscious control, such as walking, breathing, or chewing, or other highly practiced activities, as long as they are within the same context as in they were practiced. *Id.* at 421-22.

[83] *See* Burgess, *supra* note 74, at 23-26 (detailing processes within sensory memory and attention focusing and short-term, working memory).

[84] *See* Burgess, *supra* note 74, at 24-25 (commenting that typically this information is kept in sensory memory for only about 30 seconds).

[85] *See* Jacobson, *supra* note 74, at 423; George A. Miller, *The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity For Processing Information*, 63 THE PSYCHOL. REV. 81, 90 (1956) (classifying immediate memory as "absolute judgment" and explaining ability to maintain judgment for seven stimuli); *but see* CARR, *supra* note 36, at 124 (highlighting new evidence suggesting ability to process only 2-4 elements at once).

[86] *See* Miller, *supra* note 61, at 119 (explaining encoding information involves linking pieces of information together for future easy retrieval).

[87] *See* Burgess, *supra* note 74, at 29-30; Miller, *supra* note 61, at 119; Schwartz, *supra* note 2, at 373.

[88] *See* Jacobson, *supra* note 74, at 421-23; Lang, *supra* note 61 (explaining challenges of encoding information to facilitate easy transfer from short-term to long-term memory).

"automaticity."[89] Other information is encoded by the brain's use of schemata or chunking, the process whereby new information is attached to prior knowledge through an understanding of its connection to something already known.[90] "Chunking" involves associating similar pieces of information so that the information collectively becomes one slot in the working memory instead of many.[91] The more easily the information can be connected to an already existing framework of knowledge, the more easily new information will be learned and retained.[92] "Schema" similarly refers to making connections between new information and information previously learned.[93]

The short-term working memory is both the key to and bottleneck of learning because it must be used both to convert sensory input to memory, and to later access that information when needed.[94] That information, though stored now in the long-term memory, must work its way back to short-term memory in order to be accessed for additional learning or attention.[95] In this way, short-term memory and long-term memory work in a "continuous exchange program in which learning passes back and forth between them."[96] While short-term memory is limited, long-term memory

---

[89] *See* Schwartz, *supra* note 2, at 373 & n.61 (using "automaticity" to refer to information whose recall requires minimal mental energy).
[90] *See* Schwartz, *supra* note 2, at 373; Burgess, *supra* note 74, at 27- 32.
[91] *See* Jacobson, *supra* note 74, at 424. Jacobson provides the example of "chunking" phone numbers and social security numbers into units of two, three, or four digits, and credit cards into four digit segments to enable working memory to retain the information. *Id.* Additionally, he references an experiment where people were asked to remember the letters fbicbsibmirs. *Id.* Participants were unsuccessful at recalling the letters "sequentially and accurately" until they "chunked" them into fbi cbs ibm irs. *Id.* For students, "chunking" allows them to group complex knowledge into categories or schemas, such as when presented with twelve verbal stimuli containing intentional torts, defenses, and negligence; using chunking reduces the twelve stimuli into three categories, occupying three verbal slots in working memory instead of twelve. *See* Burgess, *supra* note 74, at 28. Chunking significantly expands the capacity of our working memory. *See* SHELL, *supra* note 65, at 28. However, Jacobson notes that the larger the chunks, the fewer number of chunks can be processed by working memory. *See* Jacobson, *supra*, at 424.
[92] *See* Burgess, *supra* note 74, at 30. This reasoning may help explain why the first year of law school can be so overwhelming—it is quite likely that most, if not all, of the material students seek to learn will have no connection to any existing schema in their memories, creating a higher "cognitive load." *Id.* at 30-31.
[93] *See* Floyd, *supra* note 11, at 265-66 (defining schema as "existing [hierarchical] cognitive structures that "may be combined, extended, or altered"); Schwartz, *supra* note 2, at 374 (highlighting many functions of schema).
[94] *See* Floyd, *supra* note 11, at 265-66; Christine Rosen, *The Myth of Multitasking*, THE NEW ATLANTIS, 105 - 07 (2008), http://www.thenewatlantis.com/docLib/20080605_TNA20Rosen.pdf (classifying multitasking as undesirable learning due to "response selection bottleneck" consequence).
[95] *See* Floyd, *supra* note 11, at 265-66.
[96] Schwartz, *supra* note 2, at 374.

has a much greater storage capacity.[97] Therefore, in long-term memory, "the limiting factor is not storage capacity, but rather the ability to find what you need when you need it."[98] Without attention, though, there can be no memory; therefore, holding students' attention in class is the key to learning.[99]

C. The Limits on Attention

The key, then, to the ability to attend to the vast array of sensory information hitting the short-term memory is attention.[100] So, for example, when students sit in class and simultaneously (they think) listen to the lecture, take notes, check their email, text a friend, look at the scores from last night's games, and listen to the sounds of their fellow students taking notes, how well can they pay attention to the information being conveyed to them? Or, when students study for an exam while also texting, chatting with their study group about how easy or hard the exam will be, email their resume to job prospects, and watch a game on their phone, how well will they retain the answer? While we could easily guess, neuroscientists give us the definitive answer: not that well.

Relatively recently, scientists have used brain scanning to shed new light on the mechanics of the brain and learning.[101] Attention is not something that can easily be studied as it is "a complex process that shows up all over the brain, mingling inextricably with other quasi-mystical processes like emotion, memory, identity, will, motivation, and mood."[102] Earlier, attention was measured through easily measurable senses, like vision and hearing.[103] From there, scientists began using PET scans, EEG's, and electrodes to measure electrical activity in the brain.[104] However, these types of studies would not show which part of the brain would "fire up" while conducting the tasks, only that the brain, in general,

---

[97] *See* Floyd, *supra* note 11, at 265 (opining long-term memory to have "unlimited capacity"); Miller, *supra* note 61, at 119 (revealing timely retrieval as limiting factor of long-term memory, not storage capacity).

[98] *See* Miller, *supra* note 61, at 119. Miller analogizes that "[l]ong term memory is rather like having a vast amount of closet space—it is easy to store many items, but it is difficult to retrieve the needed item in a timely fashion." *Id.*

[99] *See* Burgess, *supra* note 74, at 24-25; Miller, *supra* note 61, at 121.

[100] *See* Burgess, *supra* note 74, at 24-25; Miller, *supra* note 61, at 120-21.

[101] *See* Sam Anderson, *In Defense of Distraction*, N. Y. MAGAZINE (May 17, 2009), http://nymag.com/news/features/56793/. Means of tracking attention have evolved considerably to yield insights into the shifts the brain must make in its processes when individuals are forced to multitask. *Id.*

[102] Anderson, *supra* note 101.

[103] Anderson, *supra* note 101. Though often described as "an organ system," attention is not analogous to an organ "you can pull out and study like a spleen." *Id.* *See* Glenn, *supra* note 2. One early researcher testing individuals' multitasking abilities asked her subjects to simultaneously read aloud from a novel and write the letter A, while another asked subjects to sort differently shaped cards while counting by threes aloud. *Id.*

[104] *See* Anderson, *supra* note 101.

was working.[105] In the last ten years, neuroscientists have been able to use functional magnetic resonance imaging (fMRIs) to watch the human brain in action.[106]

These fMRI tests have revealed conclusively that different forms of memory are processed by different systems in the brain.[107] Remembering things like names, dates, or what one did a few days ago uses memory retrieval called "declarative memory".[108] Declarative memory uses the brain's hippocampus, which plays a key role in processing, storing and recalling information.[109] Remembering things like how to ride a bike or play soccer uses procedural memory, which engages the brain's striatum, a portion of the brain primarily functioning when learning new tasks and in rote memory.[110]

This is also known as "top-down" versus "bottom-up" control of attention.[111] Top-down, or controlled, attention is most used when we are deeply focused on a project or a goal and uses the pre-frontal cortex, the brain's manager, located behind the forehead.[112] Law students working in their legal writing class to synthesize a rule from a number of cases are using this kind of attention. Bottom-up attention, or "stimulus-driven" attention, is more instinctual and automatic.[113] It uses the parietal cortex, farther back in the brain, which is always seeking new information and stimuli from the environment.[114] Things that grab our attention, such as

---

[105] *See* Anderson, *supra* note 101.

[106] *See* Anderson, *supra* note 101 (reporting fMRIs show coordinated brain "storms of neural firing, rapid blood surges, and oxygen flows); Russell Poldrack et al, *Multi-Tasking Adversely Affects Brain's Learning, UCLA Psychologists Report*, SCI. DAILY (July 26, 2006); http://www.sciencedaily.com/releases/2006/07/060726083302.htm (revealing fMRIs use magnetic fields to indicate active brain areas, blood oxygen increases). *See also* Rosen, *supra* note 94, at 107-08. Brain scans of multitaskers or distracted individuals show activity in the striatum, the part of the brain involved in learning new skills, while brain scans of focused individuals show activity in their hippocampus, a region dedicated to storing and recalling information. *Id.*

[107] *See* Anderson, *supra* note 101; Poldrack, *supra* note 106; Rosen, *supra* note 94, at 107.

[108] *See* Poldrack, *supra* note 106 (distinguishing "declarative memory" from "procedural memory" based on their use of different brain areas).

[109] *See* Poldrack, *supra* note 106 (articulating hippocampus' vital role in establishing declarative memory).

[110] *See* Anderson, *supra* note 101; Poldrack, *supra* note 106. Nobel prize winner Daniel Kahneman researched and wrote about decision making in his book THINKING FAST AND SLOW. DANIEL KAHNEMAN, THINKING FAST AND SLOW (2011). He calls the systems "System 1" and "System 2". *Id.* at 20-22. System 1, like stimulus driven attention, uses the part of the brain constantly seeking new information and operates automatically and quickly, with little or no effort and no sense of voluntary control. *Id.* System 2 uses the part of the brain used to deeply focus and allocates attention to activities that need it, like agency, choice, and concentration. *Id.*

[111] *See* Timothy J. Buschman & Earl K. Miller, *Top-Down Versus Bottom-Up Control of Attention in the Prefrontal and Posterior Parietal Cortices*, 315 SCI. 1860, 1860 (2007).

[112] *See* Buschman, *supra* note 111, at 1860-62; Jacobson, *supra* note 74, at 429; Jan Brogan, *Hold Everything!*, BOSTON GLOBE, Feb. 27, 2012, at G15.

[113] *See* Jacobson, *supra* note 74, at 429.

[114] *See* Jacobson, *supra* note 74, at 429.

email, texts, etc., attract the same part of the brain used to scan our environment for danger.[115] The brain is wired to attend and respond to these seemingly important stimuli. [116] "Modern brains react the same way to novel or sudden changes as the brains of the Cro-Magnon of 40,000 years ago."[117] The distracted or multitasking legal writing student is accessing this part of the brain. However, each time students respond to a distraction, they use their limited cognitive capacity and lose some of the focus the prefrontal cortex was engaged in.[118] Thus, these distractions interfere with memory and the reasoning process.[119]

Many think of this as multitasking and pride themselves in being able to do it.[120] However, studies show that those identifying themselves as multitaskers did worse on cognitive and memory tasks that involved distraction than those who self-identified as preferring to work on a single task at a time.[121] Moreover, the research has shown that no matter how much information hits the brain at once, there is a limit to what most people's brains can process simultaneously.[122] Many people believe that when they are multitasking, they are simultaneously doing more than one thing at a time.[123] In fact, unless the tasks being performed are automatic and require no cognitive effort or attention, such as chewing gum while walking, most people who think they are multitasking are actually "task switching", where the brain divides its attention between the tasks and attention shifts back and forth between them.[124] This switching from one task to another activates different neural circuits and different parts of the brain.[125] Time and efficiency are lost each time the brain shifts tasks.[126] The time lost varies depending upon the tasks and whether those tasks

---

[115] *See* Jacobson, *supra* note 74, at 429-31(comparing modern brains to Cro-Magnon brains in terms of reactions to environmental stimuli); Brogan, *supra* note 112 (reporting loud or bright things likelier to grab our attention, similar to danger signals).
[116] *See* Jacobson, *supra* note 74, at 429. "Humans' evolutionary survival depended on noticing the flash of bright light, the thudding noise, the movement in the trees, the rush of water, or the unusual smell [because] [n]ovel or sudden changes could indicate an intruder, a food source, or danger". *Id.*
[117] Jacobson, *supra* note 74, at 430.
[118] *See* Jacobson, *supra* note 74, at 430.
[119] *See* Jacobson, *supra* note 74, at 430.
[120] *See* Glenn, *supra* note 2. Quoting Clifford I. Nass, professor of psychology at Stanford University, Glenn reports that "[h]eavy multitaskers are often extremely confident in their abilities . . . [b]ut there's evidence that those people are actually worse at multitasking than most people." *Id.*
[121] *See* Glenn, *supra* note 2 (citing research as further support "for the unwisdom of multitasking").
[122] Anne Enquist, *Multitasking and Legal Writing*, 18 PERSPECTIVES 7, 7-8 (Fall 2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1536242.
[123] *See* Enquist, *supra* note 122, at 8; Jacobson, *supra* note 74, at 435.
[124] *See* Enquist, *supra* note 122, at 8; Jacobson, *supra* note 74, at 437.
[125] Rosen, *supra* note 94, at 107.
[126] *See* Enquist, *supra* note 122, at 7; Rosen, *supra* note 94, at 106.

require the same cognitive resource.[127] Researchers have found evidence that even more time is often lost because of the "restart cost"—the time it takes for the brain to get back to the point it was when it left the first task.[128] These restart costs are even higher when the brain is interrupted from tasks that are more demanding and require more attention.[129] Researchers have also concluded that there is a "response selection bottleneck" that occurs when the brain has to attend to more than one task at a time.[130] Time is lost when the brain has to decide which task to perform.[131]

There are other troubling aspects to multi-tasking in addition to this lost time and efficiency. Multitasking requires a constant shift and switch, "energiz[ing] regions of the brain that specialize in visual processing and physical coordination and simultaneously appear to shortchange some of the higher areas related to memory and learning."[132] Researchers have been concerned with whether there is an increase in errors caused by multitasking.[133] The brain processes different kinds of information using different "channels": "a language channel, a visual channel, an auditory channel . . . each one of which can process only one stream of information at a time."[134] Once a channel becomes overburdened, it will more easily become inefficient and make mistakes.[135] Research has confirmed, for example, that walking while talking on the phone and texting while driving is dangerous.[136] Accuracy can be reduced by as much as 20-40%, with the

---

[127] *See* Jacobson, *supra* note 74, at 438. Jacobson posits that "a good rule of thumb is the time [for shifting attention from one task to another] will be longer when the work gets more complex, when the work moves from familiar to unfamiliar, when the tasks must be done quickly, and when the tasks compete for the same cognitive resource, such as talking and reading." *Id.*

[128] Florian Waszak et al., *Task-switching and Long-Term Priming: Role of Episodic Stimulus-Task Bindings in Task-Shift Costs*, 46 COGNITIVE PSYCHOL. 361, 400, 406 (2003).

[129] *See* Waszak, *supra* note 128, at 400.

[130] *See* Rosen, *supra* note 94, at 107.

[131] *See* Rosen, *supra* note 94, at 107.

[132] Walther Kirn, *The Autumn of the Multitaskers*, THE ATLANTIC (Nov. 2007), http://www.theatlantic.com/magazine/archive/2007/11/the-autumn-of-the-multitaskers/306342/.

[133] *See* Enquist, *supra* note 122, at 8, Jacobson, *supra* note 74, at 440.

[134] *See* Anderson, *supra* note 101. For example, steering and dialing are both manual activities, while looking out the windshield and dialing a number are both visual; both examples would overburden their respective channels. *Id.* The only occasion when multitasking can be beneficial is when the tasks are simple and operate on separate channels, such as folding laundry (a visual-manual task) and listening to the radio (a verbal task). *Id.*

[135] *See* Anderson, *supra* note 101.

[136] *See* Enquist, *supra* note 122, at 8; Jacobson, *supra* note 74, at 436; Rosen, *supra* note 94, at 106 (noting some states' bans on multitasking in form of using cell phones and driving). Enquist observes that "[w]hile no one has yet studied lawyers, it is reasonable to assume that lawyers who engage in multitasking might make more errors than lawyers who do not. For example, a lawyer who answers the phone while reading a draft of a contract might be more likely to overlook an important provision than the lawyer who gives the contract his or her undivided attention." Enquist, *supra* note 122, at 8. Even recent news reports warn of the dangers of texting while walking: a woman texting while walking to a

greatest reductions occurring when the task switches involved intellectually demanding work like reading, reasoning, and problem solving.[137]

Even more troubling is the evidence that all of this multitasking is having an effect on our cognitive abilities.[138] In 2005, a study concluded that "[w]orkers distracted by e-mail and phone calls suffer a fall in IQ more than twice that found in marijuana smokers."[139] Lawyers and law students need to be able to engage in in-depth thinking and sophisticated legal work.[140] Yet multitasking may be having a detrimental effect on the area of the brain that engages in this deep thinking, since the part of the brain which is activated by distractions and task switching is the part that is not meant for deep focus.[141] "Developing brains can become more easily habituated than adult brains to constantly switching tasks—and less able to sustain attention."[142] It becomes a vicious cycle, where brains overloaded by distraction are even more subject to distraction.[143] Finally, even if it is possible to learn while multitasking, that learning is less flexible and more specialized and the information is less easily retrieved.[144]

---

shopping center failed to notice she was walking straight toward an icy canal a few feet from a staircase, dropped into the icy waters despite an observant bystander yelling to warn her, and was rescued by that same bystander. *See* Christina Lopez, *UK Woman Falls Into Icy Canal While Texting Boyfriend*, ABC NEWS BLOGS (Jan. 25, 2013), http://abcnews.go.com/blogs/headlines/2013/01/uk-woman-falls-into-icy-canal-while-texting-boyfriend/.

[137] *See* Nash Unsworth & Randall W. Engle, *Speed and Accuracy of Accessing Information in Working Memory: An Individual Differences Investigation of Focus Switching*, 34 J. EXPERIMENTAL PSYCHOL.: LEARNING, MEMORY & COGNITION 616, 628 (2008).

[138] *See* Enquist, *supra* note 122, at 8 (citing confirming research of increased car accidents when driver uses cell phone); Poldrack, *supra* note 106 (reporting study findings of subjects inability to glean "flexible" knowledge when learning with distraction).

[139] Rosen, *supra* note 94, at 106. Rosen writes that "[t]he psychologist who led this study called this new 'info mania' a serious threat to workplace productivity." *Id.*

[140] *See* Enquist, *supra* note 122, at 8.

[141] *See* CARR, *supra* note 36, at 120; Poldrack, *supra* note 106, at 1. Carr writes that "[j]ust as neurons that fire together wire together, neurons that don't fire together don't wire together. As the time we spend scanning Web pages crowds out the time we spend reading books, as the time we spend exchanging bite-sized text messages crowds out the time we spend composing sentences and paragraphs, as the time we spend hopping across links crowds out the time we devote to quiet reflection and contemplation, the circuits that support those old intellectual functions and pursuits weaken and begin to break apart. The brain recycles the disused neurons and synapses for other, more pressing work." *Id.* A study specific to instant messaging while reading found that IMing might interfere with reading in three ways: "(a) displacement of time available for study, (b) direct interference while studying, and (c) development of a cognitive style of short and shifting attention." Laura E. Levine et al., *Electronic Media Use, Reading, and Academic Distractibility in College Youth*, 10 CYBERPSYCHOLOGY & BEHAV. 560, 565 (2007).

[142] *See* Richtel, *supra* note 34 (worrying today's new generation of kids will be wired differently).

[143] *See* Jacobson, *supra* note 74, at 441; Richtel, *supra* note 34. Adding stress and fatigue, a salient effect of the law school experience, to multitasking has even worse effects on memory and accuracy. *See* Jacobson, *supra* note 74, at 441-42.

[144] *See* Poldrack, *supra* note 106. Tasks requiring higher attention levels are especially adversely affected by multitasking. *Id.*

IV. COGNITIVE LEARNING THEORY CAN MAXIMIZE LEARNING IN LAW SCHOOL

Understanding both the characteristics of today's law students and the process of learning should enable law professors to adjust their teaching to maximize student learning. However, "although law teachers generally have salutary educational goals and some individual law teachers have . . . developed insightful experimental instruction, law school instruction as a whole, remains locked in an instructional methodology of dubious merit."[145] Although the MacCrate Report,[146] the Clinical Legal Education Association's Best Practices[147], and the Carnegie Report[148], together with initiatives by the American Bar Association[149] have led to discussions on how best to teach students, unfortunately not enough has changed in law school teaching, which includes mostly Socratic method, combined with lecture and discussion, and culminates in one exam at the end of the course, on which students often receive little or no feedback.[150] Moreover, as discussed above, there is little, if any, discussion of learning styles or the changing characteristics of today's law students.[151] The next sections have suggestions as to how law schools can enhance the learning of their students.

A. Teaching Students How to Learn

---

[145] Schwartz, *supra* note 2, at 348-49.
[146] *See generally* TASK FORCE ON LAW SCHOOLS AND PROFESSION: NARROWING THE GAP, AM. BAR ASS'N, LEGAL EDUCATION AND PROFESSIONAL DEVELOPMENT: AN EDUCATIONAL CONTINUUM, (1992) [hereinafter MACCRATE REPORT].
[147] *See* ROY STUCKEY ET AL, BEST PRACTICES FOR LEGAL EDUCATION: A VISION AND A ROAD MAP at viii (2007) [hereinafter BEST PRACTICES], *available at* http://law.sc.edu/faculty/stuckey/best_practices/best_practices-cover.pdf.
[148] *See generally* WILLIAM M. SULLIVAN, ANNE COLBY, JUDITH WELCH WEGNER, LLOYD BOND & LEE S. SHULMAN, EDUCATING LAWYERS: PREPARATION FOR THE PROFESSION OF LAW (2007) [hereinafter CARNEGIE REPORT].
[149] Susan Hanley Duncan, *The New Accreditation Standards Are Coming to a Law School Near You—What You Need to Know About Learning Outcomes and Assessment*, 16 LEGAL WRITING: J. LEGAL WRITING INST. 605, 608 (2010).
[150] *See* Floyd, *supra* note 11, at 257-59; Schwartz, *supra* note 2, at 348-351.
[151] Vernellia R. Randall, *Increasing Retention and Improving Performance: Practical Advice on Using Cooperative Learning in Law Schools*, 16 T.M. COOLEY L. REV. 201, 212-14 (2000). "Law Professors must put more of our effort into creating the conditions within which students can construct their own meaning and develop their own skills . . . . Because students not only have different skill levels, but also different cognitive structures, we cannot continue a 'one-size-fits-all' approach to teaching." *Id.*

1. Metacognition[152]

Law school aims to teach higher order thinking skills.[153] Students, however, may have never considered that law school teaching and learning often differs from educational experiences prior to law school, where the focus may have been on lower levels of learning. The focus during law school is on teaching doctrine and theory, and most schools do not devote any time to teaching metacognitive skills.[154] With all the emphasis often on the end of course assessment, students are not encouraged to even consider or test the successfulness of their learning during the semester.[155] Therefore, encouraging or teaching students to learn about their own metacognition would be an excellent addition to the first year curriculum.[156] Law students, like lawyers, need to be self-regulated learners: they must recognize what they do not know and learn it.[157] Educational psychologists have been studying the learning process for at least fifty years, and have created a theoretical framework capturing the types and levels of

---

[152] *See* A TAXONOMY FOR LEARNING, TEACHING, AND ASSESSING: A REVISION OF BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES, at 29 (LORIN W. ANDERSON, DAVID R. KRATHWOHL ET AL., EDS., complete ed. 2001) [hereinafter REVISED TAXONOMY] (defining metacognitive knowledge to include cognitive knowledge and "awareness and knowledge of one's own cognition"); Halpern, *supra* note 61, at 454. Halpern explains that metacognition broadly refers to understanding learning objectives and assessing one's own strengths and weaknesses, or "[w]hat we know about what we know." *Id.*

[153] *See* Burgess, *supra* note 74, at 4, 6. Current, traditional teaching methods leave students to learn the highest-level learning objectives that successful performance on a final exam requires, on their own. *Id.* at 4. Burgess advocates that law schools should instead teach students to "think like a lawyer." *Id.* at 6. *See also* Anthony Niedwiecki, *Lawyers and Learning: A Metacognitive Approach to Legal Education*, 13 WIDENER L. REV. 33, 33-34 (2006) (discussing professors utilizing Socratic method specifically to help students learn to "think like a lawyer").

[154] *See* Boyle, *supra* note 20, at 13 ("Metacognition has received a modicum of attention in law teaching"); 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, 157-59 (2012) (explaining focus on "end product" inhibits students' metacognitive skills development).

[155] *See* Niedwiecki, *supra* note 154, at 158.

[156] *See* BEST PRACTICES**,** *supra* note 147, at 127 (recommending professors to "help students improve their self-directed learning skills"); CARNEGIE REPORT**,** *supra* note 148, at 173 (advising professional students' responsibility to "become 'metacognitive' about their own learning"); Niedwiecki, *supra* note 153, at 34 (arguing "more has to be done to integrate learning theory into the law school curriculum"); Niedwiecki, *supra* note 154, at 155 (positing teaching metacognitive strategies as " most important . . . to make [students] better lifelong learners"); ;.

[157] *See* Niedwiecki, *supra* note 153, at 40-41 (classifying lawyers as constant learners; arguing law school, therefore, should teach law students to learn). Several law schools currently utilize programs to help develop students' learning abilities. *Id.* at n.28.

learning.[158] One of the most well-known frameworks is Bloom's taxonomy, recently revised, which divides learning into six cognitive processes with which all students should be familiar.[159] Introducing beginning law students to this taxonomy of learning may help them to understand that learning is a complex process and not one that should be taken for granted.[160] A visual representation of the taxonomy can help students understand that they must aspire to the top two levels of learning in law school: evaluating and creating.[161]

a. Bloom's Taxonomy (Revised)[162]

What lawyers generally refer to as legal analysis generally falls into the category of evaluating.[163] The highest level, "creating" was called "synthesis" in the original form of the taxonomy, and refers to "mentally reorganizing some elements or parts of a pattern or structure that was not present before."[164] This does not mean that students are creating law;

---

[158] *See* REVISED TAXONOMY, *supra* note **Error! Bookmark not defined.**, at xxvii-xxix; Mary J. Pickard, *The New Bloom's Taxonomy: An Overview for Family and Consumer Sciences*, 25 **J**. FAM. & CONSUMER SCI. EDUC. 45 (2007).

[159] *See* REVISED TAXONOMY, *supra* note **Error! Bookmark not defined.**, at 4, 31; Pickard, *supra* note 158, at 45-46.

[160] *See* Burgess, *supra* note 74, at 9. Traditional law school teaching focuses on the first, or bottom, four levels of the taxonomy despite traditional law school exams requiring use of the top two levels. *Id.* Students often have to learn the material at the top two levels on their own. *Id.*

[161] *See* Rosa Kim, *Lightening the Cognitive Load: Maximizing Learning in the Legal Writing Classroom*, 21 PERSPECTIVES (forthcoming 2013) (referring to original taxonomy). As further discussed below, the visual representation should also help students to appreciate and learn the taxonomy better than if the professor simply relayed the levels of learning to the students via lecture. *See infra* notes 203-206 and accompanying text.

[162] *See* REVISED TAXONOMY**,** *supra* note **Error! Bookmark not defined.**, at 28; Pickard, *supra* note 158, at 47 (illustrating changes to original taxonomy in revised, two-dimensional taxonomy)

[163] *See* Burgess, *supra* note 74, at 19. Burgess explains the evaluating level includes critiquing activities such as reviewing synthesized rules for accuracy, deciding likely case outcomes, and analyzing policy effects of a law or policy, as well as students' own assessment of whether their knowledge meets a professor's learning objectives or whether their learning strategies are successful. *Id.*

[164] *See* REVISED TAXONOMY, *supra* note 152, at 84; Burgess, *supra* note 74, at 19.

rather, they are creating a new understanding of the law based on their own experiences and knowledge.[165] Starting law school with the understanding that the type of learning required will be at a higher level than previously experienced should help students concentrate and pay attention in a way they may not have previously.

Similarly, educating students about cognitive capacity and overload may help them plan and manage their own learning more successfully. They may enter law school with academic success behind them, believing that doing what they've already been doing will be enough to see them through.[166] They likely have never thought about the science of learning or considered how much information their brains can absorb and retain during a class or a study session. Educating students about the limits of their attention and encouraging them to use and access their different learning "channels" will enable them to take more from each class and law school experience.

1. The Perils of Multitasking

Instructing students about the perils of multitasking while learning, either in the classroom or during their own study sessions, would benefit students as they seek to learn in the new law school environment. Students are likely not aware that research shows that multitasking while learning slows the learning process, as compared to learning while concentrating on a single activity.[167] They need to know that studying while confronted with distractions such as texting, messaging, emailing, and surfing the web helps "to create a cognitive style based on quick, superficial multitasking rather than in-depth focus on one task such as reading."[168] As discussed above, each time students attend to something other than their professor during class or the material when they are studying, they are leaking a little mental efficiency with each task *switch*, as well as increasing the likelihood of making errors, decreasing the likelihood of remembering the material, and learning with the area of the brain least conducive to long term remembering.[169] When informed of this research, perhaps students would make better choices during class and study time to reduce their multitasking and commit to directing all of their attention to learning.

---

[165] *See* Burgess, *supra* note 74, at 19-20. Burgess reasons that law school learning requires all levels of learning, as rules cannot be applied to new situations without first being memorized and understood. *Id.*

[166] Ostensibly, students are not alone in this belief, as it is this same mindset that many professors have in retaining their traditional law school teaching methods. *See supra* notes 10, 64 and accompanying text.

[167] *See* McAlister, *supra* note 14, at 3 (stating interruptions of neural pathway creation undermines students' "depth of learning").

[168] Levine, *supra* note 141, at 565.

[169] *See supra* notes 118-144 and accompanying text.

2. Successful learning methods

Another way to help students learn better is to provide them with information on successful learning and studying techniques. While most law schools have some type of Academic Support Program, which helps students with study techniques and exam preparation, often these programs are available only to students in distress.[170] All law students would benefit from learning about which study techniques lead to the most learning. Cognitive psychologists have been researching the effectiveness of various learning techniques on memory.[171]

A recent study revealed that two techniques which students commonly used for studying, highlighting (or underlining) text[172] and rereading text,[173] were not effective techniques for translating information into knowledge.[174] In addition, other strategies commonly used, such as imagery use for text based learning (drawing pictures to represent the content of a reading passage),[175] key word mnemonics,[176] and summarization[177] were not found to improve the effectiveness of learning.[178] Five techniques showed evidence of a correlation to learning: distributing practice on tasks (spreading learning out over time rather than in a massive block or back-to-back sessions--i.e., "cramming") [179], retrieval practice (testing)[180],

---

[170] SUMMARY REPORT OF THE 2011 NATIONAL LAW SCHOOL ASP SURVEY, at 5-16 (2011). The Report suggests that the focus appears to be changing away from offering ASP services to targeted populations, and is rather focused on retention and towards maximizing the academic excellence of all students.

[171] *See* John Dunlosky et al., *Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology*, 14 PSYCHOL. SCI. IN THE PUB. INT. 4, 5 (2013) (exploring efficacy of ten learning techniques to improve students' learning success); Henry L. Roediger, III, *Applying Cognitive Psychology to Education: Translational Educational Science*, 14 PSYCHOL. SCI. IN THE PUB. INT.**,** 1 (2013), *available at* http://psi.sagepub.com/content/14/1/1.full.pdf+html?ijkey=Aq5/rcztL2GbI&keytype=ref&siteid=sppsi. (analogizing cognitive functions to muscles, where "if you use [them] . . . [they] will become stronger").

[172] *See* Dunlosky, *supra* note 171, at 18-21 (noting highlighting "may actually hurt performance on higher-level tasks that require inference making"); Roediger, *supra* note 169, at 2 (reporting troubling ineffectiveness of commonly-used highlighting technique).

[173] *See* Dunlosky, *supra* note 171, at 26-29 (describing low utility of rereading, compared with other learning techniques).

[174] *See* Dunlosky, *supra* note 171, at 7, 21, 29 (discussing effect of techniques on "criterion tasks" for effects on application on knowledge).

[175] *See* Dunlosky, *supra* note 171, at 24-26 (highlighting limitations in efficacy of imagery-friendly materials on memory tests).

[176] *See* Dunlosky, *supra* note 171, at 21-24 (rating mnemonics as low-utility due to inefficiency and lack of consistent "durable learning").

[177] *See* Dunlosky, *supra* note 171, at 14-18 (determining summarization is low-utility technique).

[178] *See* Dunlosky, *supra* note 171, at 6, 14-18, 21-26.

[179] *See* Dunlosky, *supra* note 171, at 35-40 (noting distributed practice widely effective, even for complex materials); James M. Lang, *Teaching and Human Memory, Part 2*, THE CHRON. OF HIGHER EDUC., DO YOUR JOB BETTER, Dec. 14, 2011 (recommending

interleaved practice (study of one topic interleaved with study of another topic, i.e., studying contracts and torts intermittently)[181], elaborative interrogation (students question the information while studying it)[182] and self-explanation (students explain procedures or information to themselves or others).[183] This research shows that students must not only be aware of their own learning ability, but they should also be instructed that techniques they may currently use—or may have used in the past successfully—are not likely to produce learning at the highest levels, required for success in law school.[184]

B. Suggestions for Teachers

It is not up to students only, however, to improve their learning. Professors should play an essential role in helping their students translate information into knowledge. By engaging in careful course design, using visual aids and exercises to increase multimodal learning, and using many more assessments than is usual for a typical law school class, professors can greatly increase their students' learning.

1. Course design and planning

The Carnegie Report, Best Practices, and others have encouraged law schools to change their teaching focus from input measures, focusing on material provided to students, where the professor's role is only to deliver information, to outcome measures, where the professor's role is "to design effective learning experiences so that students achieve the course outcomes and to monitor student learning in order to continuously improve their experiences."[185] To date, law schools have not been required to implement such changes and "as a general rule . . . few, if any, have implemented

---

"breaking study time into shorter sessions promotes retention—a phenomenon called the spacing effect").

[180] *See* Dunlosky, *supra* note 171, at 29-35 (advocating practice testing has high-utility and broad applicability).

[181] *See* Dunlosky, *supra* note 171, at 40-44 (ranking interleaving as moderately viable technique, most applicable for mathematical skills, some cognitive skills).

[182] *See* Dunlosky, *supra* note 171, at 8-11 (hesitantly noting applicability to lengthy or complex information).

[183] *See* Dunlosky, *supra* note 171, at 11-14(noting techniques' utility on "various measures of memory, comprehension, and transfer"); Lang, *supra* note 179 (reporting "reciting and self-testing . . . are study methods that provide great return on investment"); Roediger, *supra* note 171, at 3 (asserting techniques' "generalizability across types of materials, students, learning conditions, and criterion tasks.").

[184] *See* Roediger, *supra* note 171, at 1-3.

[185] Moppett, *supra* note 22, at 7 (quoting Robert B. Barr & John Tagg, *From Teaching to Learning*, CHANGE at 24 (Nov.-Dec. 1995)) (asserting method of one exam at end of course reflects ineffective input-based model); *see also* BEST PRACTICES**,** *supra* note 147; CARNEGIE REPORT, *supra* note 148, MACCRATE REPORT, supra note 146.

[these] changes."[186] Curriculum reform admittedly requires significant time and effort.[187] If the professor's role is to teach students, however, then the work required to maximize the students' learning is simply part of the job.[188] Instructional course design is the first step in making such changes.

"Instructional design is the process of systematically planning teaching and learning" and should include an evaluation of learning objectives, teaching and learning methods, instructional materials, feedback, and assessment.[189] Professors should clearly articulate learning objectives both for the class in general and for each class session.[190] These objectives should then drive all the other decisions and planning in methods, materials and assessment.[191] In the law school context, learning objectives should include "doctrine, theory, thinking skills, performance skills, and values" that the professor has determined should be learned in the course.[192] Course planning should begin with assessing what the outcome should be at the end of the semester, then working backwards to ensure the ability to learn that material.[193]

Keeping in mind that "the mind isn't a sponge that absorbs whatever disjointed information we happen to pick up through our senses," teachers should start by asking themselves how they will capture the students' attention, and then frame the information in a "meaningful, interpretable way."[194] One theory is to not offer students "answers until the question itself is intriguing." [195] Once the students' attention is captured, they can better chunk the material to be learned to their own, preexisting memory

---

[186] Moppett, *supra* note 22, at 10 & nn.51-55; (listing reasons why professors resistant to such changes). Some of these reasons include wanting to preserve academic freedom, fear that professors will be unfairly blamed for poor results, fear of changing the status quo, reluctance to changes that will require additional work, and a belief that student learning may be affected by factors out of the professor's control. *Id.*; *see* Niedwiecki, *supra* note 151, at 36. Niedwiecki suggests that lack of knowledge and experience in learning theory "forces teachers to teach like they were taught, or to make teaching decisions based on intuition instead of well-accepted learning theory." *Id.*

[187] *See* Schwartz, *supra* note 2, at 386. "One of the easiest errors to make as an instructor or designer is egocentrism which . . . involves assuming that the learners are like the instructor [such that] explanations [are] closely tailored to how the instructor likes things explained, in examples with which the instructor is familiar and comfortable, and in instructional techniques that work well for the instructor." *Id.*

[188] *See* Niedwiecki, *supra* note 151, at 39. Many professors, however, believe schools can increase learning by raising admission standards, and that deficiencies in learning can be fixed if students would simply work harder. *Id.*

[189] *See* Gerald F. Hess, *Value of Variety: An Organizing Principle to Enhance Teaching and Learning*, 3 ELON L. REV. 65, 70-71 (2011), *available at* http://www.elon.edu/docs/e-web/law/law_review/Issues/Elon_Law_Review_V3_No1_Hess.pdf.

[190] *See* Hess, *supra* note 189, at 71.

[191] *See* Hess, *supra* note 189, at 71.

[192] Hess, *supra* note 189, at 71.

[193] *See* Lang, *supra* note 179 (suggesting frequency of assignments more important than format of assignments for students).

[194] *See* Lang, *supra* note 179 (quoting Miller, *supra* note 61.)

[195] Lang , supra note 179.

and knowledge, thereby helping them to remember it.[196] When planning courses and individual classes, there are many methods to choose from: "[s]ocratic dialogue, large group discussion, small group discussion, problem and hypothetical analysis, lecture, simulation, writing, experiential exercises, student presentations, and electronic exercises and discussions."[197] As discussed below, use of these different methods increases students' ability to retain and learn the information.

2. Use of Visual Aids and Visual Exercises Increases Learning

Multimodal learning refers to learning material in different ways, such as "reading, listening, writing, practicing, and viewing images."[198] This suggests consideration of learning styles, an educational theory that has been discussed and debated by psychologists for years.[199] These styles or modes include: verbal (learning through written text), visual (learning through pictures, diagrams, models), oral (learning through talking out ideas), aural (learning through listening to lectures, discussions, or recordings), tactile (learning through touching and manipulating material) and kinesthetic (learning through moving and doing).[200] The theory has been that "[w]hen you teach to accommodate diverse learning styles, all learners are included in the learning process, not just those whose learning is similar [to the professors]."[201] Cognitive psychologists suggest, that multimodal teaching can increase learning for all students, regardless of learning styles or preferences, because using different methods of teaching has a greater likelihood of preventing cognitive overload by making use of different channels, rather than conveying all the material through one channel only, such as the verbal channel during a lecture.[202] While learning

---

[196] *See supra* notes 90-92 and accompanying text; Burgess, *supra* note 74, at 43-44; Lang, *supra* note 179.

[197] Hess, *supra* note 189, at 71 (proposing that variety increases learning potential); *see* Burgess, *supra* note 74, at 47-51 (discussing myriad visual aids and exercises, positive effects on learning); Moppett, *supra* note 22, at 28-53 (discussing myriad digital assessment techniques); Schwartz, *supra* note 2, at 387-88 (analyzing factors to be taken into account in assessment design).

[198] *See* Burgess, *supra* note 74, at 42.

[199] *See* M.H. Sam Jacobson, *Learning Styles and Lawyering: Using Learning Theory to Organize Thinking and Writing*, 2 J. ASS'N OF LEGAL WRITING DIRECTORS 27, 29 (2004).

[200] *See* Jacobson, *supra* note 199, at 34-37.

[201] Jacobson, *supra* note 199, at 29.

[202] *See* Burgess, *supra* note 74, at 42-43. Burgess explains how new, unautomated information triggers a higher extrinsic cognitive load, and the need to inversely match the extrinsic cognitive load with the intrinsic cognitive load to "create [a] challenging, but not overwhelming, learning" environment. *Id.* Multimodal learning means one learns new information through a variety of means; research strongly indicates that students learn better through a multimodal approach, as it increases initial learning and retention for

styles might be debated, research shows that use of multimodal learning, including visual aids and exercises, increases learning.[203]

Instead of conveying all the class information via reading, lecture, and discussion, which can overtax the verbal channel in working memory, "visual aids can decrease extrinsic cognitive load while increasing the number of topics and details."[204] Research has shown that people remember visual representations "more accurately, more quickly, and for a longer period of time" than words alone.[205] Visuals and graphics are particularly helpful in developing higher-order thinking skills, and law students can greatly benefit from using visuals to remember rules, apply rules to slightly modified hypothetical situations , and apply rules to completely novel situations in exam situations.[206] However, all material should not be presented visually, such as animation and text on a PowerPoint, as that can overtax the visual channel of students' brains.[207] Instead, when information is presented as animation and narration rather than animation and on-screen text, students are better able to learn the material as it spreads the intake of information between the verbal and visual channels.[208]

Visual exercises can help with the learning process even more than static visual aids.[209] Exercises such as having students create a graphic organizer or flow chart of information, rather than providing it to them, have been proven to be particularly helpful in the learning process as they engage students' higher order thinking skills, help them to make connections to the material (schema), and keep them actively engaged in the process.[210] Exercises that are not as successful include providing flowcharts or outlines to students, as students will not be able to create their own meaning and therefore not encode the material to learn it.[211] To make

---

higher-order thinking tasks. *Id.* at 45-46. *See also* Anderson, *supra* note 101; *supra* notes 134-135 and accompanying text.

[203] *See* Burgess, *supra* note 74, at 44 (noting visual aids can aid professors in teaching smaller, more discrete units at a time).

[204] *See* Burgess, *supra* note 74, at 44; Kim, supra note 161.

[205] Burgess, *supra* note 74, at 47-48 (internal citations omitted). Further research has shown that students remembered information better when they studied it from graphic organizers rather than from outlines, indicating that students would greatly benefit from professors augmenting their outlines with visual aids. *Id.*

[206] *See* Burgess, *supra* note 74, at 48.

[207] *See* Anderson, *supra* note 103; Richard E. Mayer and Roxana Moreno, *Nine Ways to Reduce Cognitive Load in Multimedia Learning*, 38 EDUC. PSYCHOLOGIST 43**,** 45-46 (2003) (distinguishing cognitive overload types and presenting ways to reduce cognitive overload).

[208] *See* Anderson, *supra* note 101; Mayer, *supra* note 207, at 46; Roxana Moreno & Alfred Valdez, *Cognitive Load and Learning Effects of Having Students Organize Pictures and Words in Multimedia Environments: The Role of Student Interactivity and Feedback*, 53 EDUC. TECH. RES. DEV. 35, 36 (2005).

[209] *See* Burgess, *supra* note 74, at 51.

[210] *See* Burgess, *supra* note 74, at 51 (discussing research proving students encode information better when they "create meaning rather than take meaning").

[211] *See* Burgess, *supra* note 74, at 51.

these exercises even more valuable as learning tools, students should do an exercise, engage in the metacognitive process of evaluating their own work, and then receive feedback from their professor.[212]

3. Use of More Assessments

As discussed above, retrieval practice, or testing, is a proven method for successful learning.[213] "The *testing effect* is an effect whereby the mere act of taking a test on to-be-remembered material produces a powerful positive effect on memory for that material."[214] Moreover, this testing effect holds true across different formats and types of questions, suggesting that professors should be quizzing and testing as much as is feasible, because "[a] course with a dozen low-stakes exams or quizzes, and plenty of homework, will do a much better job of promoting retention of course material than a class with only two or three high-stakes exams."[215] In addition, making class more interactive and requiring students to "respond, and respond frequently" will greatly enable students to use their cognitive skills and retain the material.[216] These classroom exercises should mimic what students will be asked to do in assignments and exams.[217] Students should be practicing the same memory retrieval or other skills they will be asked to perform on their tests or assignments: "[s]tudents who have to produce essays should be writing in class; students who have to take multiple-choice exams should be responding to questions with clickers."[218]

As similarly explained above, many law school classes have only a midterm and final, or even just a final exam which constitutes the entire grade, an assessment system which directly conflicts with learning theory.[219] "Assessment plays an important role in fostering learning, measuring student achievement, and evaluating the effectiveness of instruction."[220] Law professors must act to add more assessment into their

---

[212] *See* Burgess, *supra* note 74, at 53; Moreno, *supra* note 208, at 43. As discussed below, the author acknowledges that providing individual feedback in large classes can be a daunting, if not impossible, task. In large classes, professors can use peer review, small group discussion, and giving sample answers that are discussed in detail on an overhead camera or Powerpoint to provide such feedback and allow students to determine how well they are learning.

[213] *See supra* note 180 and accompanying text.

[214] Miller, *supra* note 61, at 121.

[215] Lang, *supra* note 179 (explaining practicing memory retrieval through testing improves learning).

[216] Lang, *supra* note 179.

[217] *See* Lang, *supra* note 179.

[218] Lang, *supra* note 179.

[219] *See* Hess, *supra* note 189, at 88 (noting final exam's primary purpose to weed out students and rank students for future employers); Moppett, *supra* note 22, at 3 (arguing more frequent feedback necessary for improving academic achievement).

[220] Hess, *supra* note 189, at 86 (citing BEST PRACTICES, *supra* note 147, at 235) (illustrating several justifications and requirements for diverse assessment methods).

classes to allow both professor and student to know what has been taught.[221] This will also foster students' metacognitive assessment of their own skills.[222] These assessments can take many forms and need not be overly burdensome to professors. Some easily incorporated assessments include: group feedback on practice exams, comments on drafts of papers, computer feedback, audience response systems, conferences with students, posting of quizzes or papers on a class website, podcasts discussing a problem or issue from class or going over a sample answer, one minute papers, student surveys and many, many more.[223] Nevertheless, it is critical that students receive some feedback on the assessment in order for it to further their learning.[224]

Self-assessment also plays an important role in the learning process.[225] Self-assessment requires students to be aware of their learning and monitor it to make adjustments.[226] It also forces students to consider metacognition as it applies to a particular class and learning process, rather than on a general level as discussed above. Self-assessments can occur at the beginning of a course, "where students articulate what they bring to the class, including their past learning experiences, their own skill set, their cognitive abilities and preferences and which skills the course requires."[227] Self-assessment is also a useful tool for students to perform after they have completed an assignment, where students would be asked to identify the strengths and weaknesses of their work.[228] Assessing after a grade or critique is received requires students to internalize the feedback and identify gaps in their learning which they should address before the next task is completed.[229] Finally, self-assessment can be used at the end of the course,

---

[221] *See* Niedwiecki, *supra* note 153, at 62-63.
[222] *See* Hess, *supra* note 189, at 90; David J. Nicol & Debra Macfarlane-Dick, *Formative Assessment and Self-Regulated Learning: A Model and Seven Principles of Good Feedback Practice*, 31 STUD. IN HIGHER EDUC. 199, 208 (April 2006), *available at* http://www.tandfonline.com/doi/abs/10.1080/03075070600572090 (discussing important role professor feedback plays in students' learning and self-assessment).
[223] *See* Hess, *supra* note 189, at 90-91; Moppett, *supra* note 22, at 28-49; Niedwiecki, *supra* note 153, at 65-70.
[224] *See* Nicol, *supra* note 222, at 205. Assessment and feedback processes help foster higher self-regulating learners who, research shows, are more effective learners. *Id.* The authors advance seven principles of good feedback practice, such that the feedback: "1) helps clarify what good performance is (goals, criteria, expected standards); 2) facilitates the development of self-assessment (reflection) in learning; 3) delivers high quality information to students about their learning; 4) encourages teacher and peer dialogue around learning; 5) encourages positive motivational beliefs and self-esteem; 6) provides opportunities to close the gap between current and desired performance; and 7) provides information to teachers that can be used to shape teaching." *Id.*
[225] *See* Niedwiecki, *supra* note 154, at 181-93 & n.220 (citing self-assessment tools used in other areas of education).
[226] *See* Nicol, *supra* note 222, at 205; Niedwiecki, *supra* note 154, at 184. (implying self-assessment implicates metacognition).
[227] Niedwiecki, *supra* note 154, at. 186.
[228] *See* Niedwiecki, *supra* note 154, at 188.
[229] *See* Niedwiecki, *supra* note 154, at 189-91.

focusing on "the student's growth, areas of concern, and areas of improvement."[230] All of these assessment measures will produce a powerful memory effect for students.

V. CONCLUSION

Widespread criticism of the legal education system, together with the evolving characteristics of law students, has created a situation where students are not maximizing their ability to learn. Lawyers must be expert learners to address the demands of lawyering where the law is always evolving and no two cases are alike. Using the knowledge gained from cognitive science, psychology, and education can strengthen students' ability to be the kind of self-directed learners the practice of law requires. While change is never easy, educators can themselves reap rich rewards by employing the techniques discussed, as both students and teachers become more engaged in the learning process.

Lara Law Student sits down for torts class, puts away her phone, and takes out the chart she did for her homework. Her professor asked the class to create a chart, identifying the similarities and differences in the cases' discussion of the duty element of negligence. Lara and her study group had worked on the chart individually and then met to compare and discuss their work, so Lara had already made some changes to the chart before class and felt she knew the material well. When the professor asked for a volunteer to discuss the cases, Lara confidently raised her hand and answered. After eliciting discussion from the class, the professor put a copy of her own chart on the overhead projector, and the students were able to compare their own analysis to what the professor had intended. Lara saw that she had done a good job of identifying the key differences in the cases, but that she had not sufficiently identified the reasoning. The professor then described a hypothetical situation and asked the students to predict what a court would do, using the reasoning from the cases to justify the prediction. After discussion of the predictions, Lara realized class was nearly over. She was so engaged in the class that the time passed quickly, and she did not even think of texting, emailing, or surfing the web.

---

[230] Niedwiecki, *supra* note 154, at 192.