Teaching and Assessing Metacognition in Law School

Jennifer A. Gundlach and Jessica R. Santangelo

I. Introduction

Over the past few decades, law schools in the United States have reevaluated the content and teaching methods of legal education. This shift is primarily in response to the changing nature of the practice of law and increased awareness and study of learning theory. Legal educators now emphasize the need to teach students not only the substantive law and analytical skills required for entering the practice of law, but also a broader range of lawyering skills and professional values.[1] That is, they have begun to rethink not only *what* to teach, but *how* to teach it so as to best position students for success in law school, on the bar exam, and in the profession. Concurrently, the American Bar Association (ABA) amended its accreditation standards to require explicit adoption of learning outcomes and methods for assessing those outcomes.[2] With these trends, law faculty are expected to have greater understanding of how students learn so they may facilitate students' engagement in this expanded learning agenda.[3]

1. *See generally, e.g.*, WILLIAM M. SULLIVAN ET AL., EDUCATING LAWYERS: PREPARATION FOR THE PROFESSION OF LAW 179 (2007); ROY STUCKEY ET AL., BEST PRACTICES FOR LEGAL EDUCATION: A VISION AND A ROAD MAP (2007).

2. *See generally* STANDARDS & RULES OF PROCEDURE FOR APPROVAL OF LAW SCHS. 2018-2019, Standards 302, 315 (AM. BAR ASS'N 2018).

3. Renee Nicole Allen & Alicia R. Jackson, *Contemporary Teaching Strategies: Effectively Engaging Millennials Across the Curriculum*, 95 U. DET. MERCY L. REV. 1, 2 (2017).

So too must law students understand themselves as learners and commit to learning as a "necessary professional value for lawyers."[4] In learning, as in professional practice, "content and procedural knowledge alone are insufficient for persistent and self-directed growth" of expertise; "knowledge of *how* one learns content or practices a procedure" is critical.[5] Recently, legal educators have recognized that metacognitive skills, closely related to reflective practice and self-regulated learning, are essential to the repertoire of lawyering skills that enhance the learning process for law students and better position them for practice.[6] Metacognition involves understanding and monitoring what one knows about strategies that impact one's thinking and learning, as well as how one controls and adjusts one's thinking for the purpose of learning.[7] Teaching students to develop metacognitive skills can better prepare them to be self-reflective, self-regulated lifelong learners as they face ill-structured problems in practice.

There is a notable and growing body of empirical research in the legal academy that explores and challenges long-held assumptions about legal education and how law students learn.[8] Indeed, the American Association of

4.   Judith Welch Wegner, *Lawyers, Learning, and Professionalism: Meditations on a Theme,* 43 Clev. St. L. Rev. 191, 192 (1995).

5.   Naomi Silver, *Reflective Pedagogies and the Metacognitive Turn in College Teaching*, *in* Using Reflection and Metacognition to Improve Student Learning: Across the Disciplines, Across the Academy 1 (Matthew Kaplan et al. eds., 2013).

6.   *See, e.g.*, Patti Alleva & Jennifer A. Gundlach, *Learning Intentionally and the Metacognitive Task*, 65 J. Legal Educ. 710 (2016) (discussing why the teaching of metacognitive skills can improve learning for law students generally and, more specifically, within the context of a civil procedure course, and offering suggestions for how to integrate such instruction); Elizabeth M. Bloom, *Creating Desirable Difficulties: Strategies for Reshaping Teaching and Learning in the Law School Classroom*, 95 U. Det. Mercy L. Rev. 115 (2018) (discussing importance of teaching law students effective learning strategies to become self-regulated learners and doing so through use of complex learning activities that promote metacognition in the form of self-assessment and reflection skills); Elizabeth Ruiz Frost, *Feedback Distortion: The Shortcomings of Model Answers as Formative Feedback*, 65 J. Legal Educ. 938, 947-50 (2016) (citing studies from other disciplines, as well as her own anecdotal evidence from legal writing classes, showing that students who perform well on assessments tend to have strong metacognitive skills, whereas poor-performing students are least likely to accurately predict or self-evaluate their performance and thus do not benefit to the same extent from reviewing model answers); Otis Grant, *Teaching Law Effectively with the Socratic Method: The Case for a Psychodynamic Metacognition*, 58 S. Tex. L. Rev. 399 (2017) (discussing the use of the Socratic method with the integration of psychodynamic learning theory and the teaching of metacognition to prepare students to be lifelong learners).

7.   *See generally* John H. Flavell, *Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry,* 34 Am. Psychologist 906 (1979).

8.   For recent work, *see, e.g.*, Jennifer M. Cooper & Regan A.R. Gurung, *Smarter Law Study Habits: An Empirical Analysis of Law Learning Strategies and Relationship with Law GPA*, 62 St. Louis U. L.J. 361 (2018) (reporting on empirical study of law students' study habits that have positive correlation with law school GPA); Jane Bloom Grisé, *Critical Reading Instruction: The Road to Successful Legal Writing Skills*, 18 W. Mich. U. Cooley J. Prac. & Clinical L. 259 (2017) (reporting on study on impact of introducing critical reading instruction in first-year legal writing course); Jonel Newman & Donald Nicolson, *A Tale of Two Clinics: Similarities and Differences in Evidence of the "Clinic Effect" on the Development of Law Students' Ethical and Altruistic Professional Identities*, 35 Buff. Pub. Int.

Law Schools (AALS) granted approval in 2017 for a new Section on Empirical Study of Legal Education and the Legal Profession, which has as its mission, in part, to support such work.[9] Legal scholars have sought to understand how best to teach law students to acquire, retain, and retrieve knowledge by being independent, intentional, and self-directed learners.[10] With respect to metacognition specifically, a few empirical studies have found support for integrating the instruction of metacognitive skills in law school to enhance learning and academic performance.[11] This article builds on that work.

Our primary goal in undertaking this project was to improve students' learning. With this in mind, we explored whether instruction and prompts to engage in metacognition would influence students' selection of learning strategies and their ability to regulate and make appropriate adjustments to their learning during the semester. Our empirical study used a mixed-methods design to collect data and examine the impact of integrating the teaching of metacognitive skills in a doctrinal first-year law class. We further sought to determine whether there was a relationship between law students' metacognitive skills and their academic performance. As a corollary, we assessed the methods for measuring metacognition in the context of a law school class, given the paucity of research in this disciplinary area.

L.J. 1 (2017) (surveying earlier empirical studies on impact of clinics, as well as new study of effect of clinical experiences on professional identity formation); Daniel Schwarcz & Dion Farganis, *The Impact of Individualized Feedback on Law Student Performance*, 67 J. Legal Educ. 139 (2017) (reporting on study of impact of individualized feedback for first-year law students on academic performance); Colleen F. Shanahan et al., *Measuring Law School Clinics*, 92 Tulane L. Rev. 547 (2018) (reporting on mixed-methods empirical study of impact of clinic on learning outcomes of students and in service of clients).

9.   As its stated purpose, the section "promotes communication relating to the empirical study of the full panoply of questions raised by legal education and the legal profession, encourages professional development and fostering of relevant skills and expertise for those interested in engaging in the empirical study of legal education and the legal profession, and fosters exploration of and exchange of information relating to research developments between distinct communities within legal education." *Section on Empirical Study of Legal Education and the Legal Profession*, Am. Assoc. L. Sch. (2020), https://www.aals.org/sections/list/empirical-study-of-legal-education-and-the-legal-profession.

10.   *See* Allen & Jackson, *supra* note 3, at 7-8 (discussing the goal of higher education and law schools in particular to teach students to be lifelong learners); Anthony S. Niedwiecki, *Lawyers and Learning: A Metacognitive Approach to Legal Education*, 13 Widener L. Rev. 33, 41 (2006) (arguing "lawyers never stop learning…Law schools, however, fail to teach lawyers *how* to learn.") (emphasis added).

11.   *See, e.g.*, Andrea A. Curcio et al., *Does Practice Make Perfect? An Empirical Examination of the Impact of Practice Essays on Essay Exam Performance*, 35 Fla. St. U. L. Rev. 271, 313 (2008) (reporting on a study suggesting that "students learn better when given opportunities to practice a skill and receive feedback on that practice" and that combining metacognitive exercises with teaching methods may help to improve all student performances); Cheryl B. Preston et al., *Teaching "Thinking Like a Lawyer": Metacognition and Law Students*, 2014 BYU L. Rev. 1053, 1068-73 (2014) (discussing study of first-year law students who were given the Metacognitive Awareness Inventory and noting weak metacognitive skills of many based on their responses).

As we report more fully herein, we found a correlation between the quantitative and qualitative methods that we used. Moreover, students who demonstrated strong metacognitive skills were more likely to perform well in the class. Adding instructional intervention throughout the semester prompted students to use more active learning strategies that require them to engage with the material they have learned, such as writing out a sample essay response, talking about it or teaching it to peers, or testing their understanding by responding to questions. However, we did not see evidence that instructional intervention increased students' development of metacognitive skills during the semester. We also saw anecdotal evidence the questionnaires we employed were an effective tool for students to engage in metacognitive practice, and that students may be more likely to make changes to their strategies when they are prompted to do so in conjunction with feedback from formative assessments. Finally, our mixed-methods approach provided useful snapshots about student metacognitive knowledge and regulation, but was less effective for assessing changes in metacognitive development over time during a semester of law school.

Part II provides an overview of metacognition, its role in learning, why it can be important for law students and legal practice, and the open research questions we set out to explore with an empirical research study. Part III describes the study in detail, the methodology, analysis and findings, and our reflections on potential changes for future studies. Part IV draws upon a summary of our findings and discusses the implications for legal education and future empirical research in this area.

II. Metacognition, Its Role in Learning, and Its Importance for Law Students

Metacognition, a term first used by developmental psychologist John Flavell, is a higher level of cognition[12] or, as he described it, "one's knowledge concerning one's own cognitive processes and products or anything related to them, e.g., the learning-relevant properties of information or data."[13] Closely aligned with self-regulated learning,[14] metacognition involves actively engaging oneself in

12.   In comparison, cognition involves the actual component skills that constitute the learning process, such as retrieval, comprehension, analysis, and knowledge utilization. *See* John S. Kendall et al., Thinking & Learning Skills: What Do We Expect of Students? 2, 7-9 (2008), http://eric.ed.gov/?id=ED544689.

13.   John Flavell, a developmental psychologist, defined metacognition. John H. Flavell, *Metacognitive Aspects of Problem Solving*, *in* The Nature of Intelligence 231, 232 (Lauren B. Resnick ed., 1976).

14.   Legal scholars have focused on the importance of self-regulated learning for law students. *See, e.g.*, Elizabeth M. Bloom, *Teaching Law Students to Teach Themselves: Using Lessons from Educational Psychology to Shape Self-Regulated Learners*, 59 Wayne L. Rev. 311 (2013); Michael Hunter Schwartz, *Teaching Law Students to be Self-Regulated Learners*, 2003 Mich. State DCL L. Rev. 447 (2003). Some researchers of metacognition now view self-regulated learning, which involves monitoring, controlling, and regulating one's learning, as "the more global and inclusive construct" that "subsumes metacognition and metacognitive knowledge." Paul R. Pintrich et al., *Assessing Metacognition and Self-Regulated Learning*, *in* Issues in the Measurement of Metacognition 45 (Gregory Schraw & James C. Impara eds., 2000).

examining one's learning process to understand what strategies are working or not working, what could be done to improve one's learning, and what adjustments are needed to support learning, all the while showing a willingness and ability to make successful changes.[15]

As originally conceived, metacognition has two interdependent components: (1) metacognitive knowledge, or what one knows about strategies that impact one's thinking and learning, and (2) metacognitive regulation, or how one controls and adjusts one's thinking for the purpose of learning.[16] Metacognitive knowledge includes awareness of different learning strategies that are available, how to use them, and in what contexts they can be useful.[17] That knowledge also encompasses knowledge of oneself as a learner. Metacognitive regulation involves the process of planning and setting goals for learning, making decisions about strategies to use and when to change strategies that are not working, controlling and regulating time, effort, and pace of learning, as well as control of motivation, emotion, and environment.[18] More recently, researchers have suggested that there are other components of metacognition and thus, the term itself lacks a coherent definition among researchers in different fields.[19] However, the core of metacognition is knowledge of a range of learning strategies, understanding their application and effectiveness, and appropriate selection of strategies for a specific learning task.[20]

15.   Anthony Niedwiecki has described metacognition as "the internal voice people hear when they are engaged in the learning process—the voice that will tell them what they have to do to accomplish a task, what they already know, what they do not know, how to match their previous learning to the new situation, when they do not understand what they are reading or learning, and how to evaluate their learning. It is this internal reflection and conscious control of the learning process that goes to the heart of metacognition." Anthony Niedwiecki, *Teaching for Lifelong Learning: Improving the Metacognitive Skills of Law Students Through More Effective Formative Assessment Techniques*, 40 Cap. U. L. Rev. 149, 156-57 (2012).

16.   Flavell, *Metacognition*, *supra* note 7, at 906. Alternatively, some have described metacognition as involving students' "*awareness* of the processes they need to successfully complete a task, and . . . cognitive *monitoring*—the ability to determine if the task is being completed correctly and make corrections as appropriate." Patricia L. Kolencik & Sheila A. Hillwig, Encouraging Metacognition: Supporting Learners Through Metacognitive Teaching Strategies 5 (2011) (emphasis added).

17.   Pintrich et al., *Assessing*, *supra* note 14, at 47 (discussing three components of metacognition: (a) metacognitive knowledge, (b) metacognitive judgments and monitoring, and (c) self-regulation and control of cognition).

18.   *Id*. at 50-53.

19.   Marcel V.J. Veenman et al., *Metacognition and Learning: Conceptual and Methodological Considerations*, 1 Metacognition & Learning 3, 3-4 (2006).

20.   John G. Borkowski et al., *A Process-Oriented Model of Metacognition: Links Between Motivation and Executive Functioning*, *in* Issues in the Measurement of Metacognition 1, 5-9 (Gregory Schraw & James C. Impara, eds., 2000) (discussing components of good information processing as evidence of metacognitive development). *See also* Pintrich et al., *Assessing*, *supra* note 14, at 44 (discussing three components of metacognition: (a) metacognitive knowledge, (b) metacognitive judgments and monitoring, and (c) self-regulation and control of cognition).

Effective lawyering involves constant learning: "Lawyers learn throughout their careers from experience, collaboration, self-study, reflection, and continuing legal education."[21] Clinical legal education has long espoused that effective lawyering depends on the ability to engage in reflective practice, a concept first used by Donald Schön,[22] whereby one examines and critiques one's assumptions and understandings drawn from the repetitive experiences of a specialized practice.[23] Schön noted that the reflective practitioner can be better equipped to face the uncertainty of the "indeterminate zones" of professional work by reflecting on: the tacit norms and appreciations that underlie his judgment, the strategies and theories implicit in a pattern of behavior, the feeling for a situation that has led him to adopt a particular course of action, the way in which he has framed the problem he is trying to solve, or the role he has constructed for himself within a larger institutional context.[24] Indeed, the ABA has concluded that, at a minimum, law students must demonstrate competency in legal analysis and reasoning, problem-solving, and self-evaluation.[25] These fundamental skills required for the practice of law are closely related to the knowledge and regulation components of metacognition.[26] Thus, some legal educators have recognized that the purposeful teaching of learning strategies and metacognitive skills in law school can enhance law students' learning,

21.   *See* STUCKEY ET AL., *supra* note 1, at 11 (2007).

22.   *See* DONALD A. SCHÖN, THE REFLECTIVE PRACTITIONER: HOW PROFESSIONALS THINK IN ACTION 61-62 (1983) (describing generally the process of "reflection-in-action" by a practitioner).

23.   *See, e.g.*, DAVID F. CHAVKIN, CLINICAL LEGAL EDUCATION: A TEXTBOOK FOR LAW SCHOOL CLINICAL PROGRAMS 1 (2002) (describing clinical legal education as consistent with Donald Schön's "reflective practicum" because students learn by doing with the help of faculty "coaches"); Larry O. Natt Gantt II & Benjamin V. Madison III, *Teaching Knowledge, Skills, and Values of Professional Identity Formation, in* BUILDING ON BEST PRACTICES: TRANSFORMING LEGAL EDUCATION IN A CHANGING WORLD 253 (Deborah Maranville et al. eds., 2015) (discussing use of reflective practice as a method for professional identity formation of lawyers and effective lawyering); Elliott S. Milstein, *Clinical Legal Education in the United States: In-House Clinics, Externships, and Simulations*, 51 J. LEGAL EDUC. 375, 378-81 (2001) (identifying goals of legal clinic as including "reflective practice").

24.   DONALD A. SCHÖN, EDUCATING THE REFLECTIVE PRACTITIONER: TOWARD A NEW DESIGN FOR TEACHING AND LEARNING IN THE PROFESSIONS 4-7 (1987).

25.   STANDARDS & RULES OF PROCEDURE FOR APPROVAL OF LAW SCHS. 2018-2019, Standard 302(b), Interpretation 302-1 (AM. BAR ASS'N 2018) (identifying minimum learning outcomes for law schools).

26.   Carlo Magno, *The Role of Metacognitive Skills in Developing Critical Thinking*, 5 METACOGNITION LEARNING 137, 149 (2010) (reporting the results of a study showing that "metacognition helps in developing critical thinking, because it is likely that critical thinking requires a form of meta-level operation") (citation omitted); Preston, *supra* note 11, at 1060, 1073-80 (noting that "metacognition is important for the execution of higher-level thinking skills, such as analysis and synthesis" and describing how metacognition enhances basic lawyering skills, relieves anxiety, and boosts confidence); Ruth Vance & Susan Stuart, *Of Moby Dick and Tartar Sauce: The Academically Underprepared Law Student and the Curse of Overconfidence*, 53 DUQ. L. REV. 133, 148, 160 (2015) (asserting that metacognition is "critical to advancing [the] skills basic to being a lawyer, critical thinking and problem solving" and lawyering requires "accurate self-assessment").

improving their academic performance and better preparing them for practice.[27] Furthermore, metacognitive skills support the transfer of learning or the "ability to use knowledge gained in one setting or situation in another."[28] In particular, the ability to solve ill-structured problems,[29] i.e., those with vague goals and unclear solution pathways, that are so common in the practice of law, demand the performance of metacognitive skills.

There are many areas for which empirical research might contribute to understanding the role that metacognitive skills play for law students and lawyers. A recent study used a quantitative instrument to measure metacognition in first-year law students in two different years, finding that even students in the top quartile of the entering classes (for 2010 and 2013 respectively, the mean Law School Admissions Test (LSAT) score was 167/164 and the mean undergraduate Grade Point Averave (GPA) was 3.86/3.88) did not exhibit well-developed metacognitive skills.[30] It is unclear, however, whether these results would be consistent across all or even most law schools and/or whether they are static over time. In addition, although it makes intuitive sense, there is not yet direct evidence of a correlation between metacognitive skills and academic success in law school. With respect to methodology, further research is needed to establish how best to measure law students' metacognitive skills.

There are also open questions about effective methods for teaching metacognition to law students. In law schools, such instruction is usually provided by academic support faculty through stand-alone, extracurricular programs not tied to content-specific courses.[31] While educators have discussed

27.   *See, e.g.*, Alleva & Gundlach, *supra* note 6, at 723-24 (discussing why the teaching of metacognitive skills can improve learning for law students generally and, more specifically, within the context of a Civil Procedure course, and offering suggestions for how to integrate such instruction); Roy Stuckey et al., *supra* note 1, at 172 (Educating Lawyers: Preparation for the Profession of Law 179 (2007) ("[d]eveloping lifelong learning skills may be the most important goal of legal education.").

28.   Paul R. Pintrich, *The Role of Metacognitive Knowledge in Learning, Teaching, and Assessing*, 41 Theory into Prac. 219, 222 (2002) (citation omitted). *See also* How People Learn: Brain, Mind, Experience, and School: Expanded Edition 12 (M. Suzanne Donovan et al., eds., 2000) (finding that "[t]eaching practices congruent with a metacognitive approach to learning include those that focus on sense-making, self-assessment, and reflection on what worked and what needs improving. These practices have been shown to increase the degree to which students transfer their learning to new settings and events") (citation omitted).

29.   *See, e.g.*, Ian Weinstein, *Lawyering in the State of Nature: Instinct and Automaticity in Legal Problem Solving*, 23 Vt. L. Rev. 1, 13 (1998) (discussing lawyering as an "ill-structured problem").

30.   Preston, *supra* note 11, at 1063-64 (discussing study of first-year law students who were given the Metacognitive Awareness Inventory and noting weak metacognitive skills of many students based on their responses).

31.   *See, e.g.*, Ruta K. Stropus, *Mend It, Bend It, and Extend It: The Fate of Traditional Law School Methodology in the 21st Century*, 27 Loy. U. Chi. L. J. 449, 484-88 (1996) (suggesting that law schools can supplement the theoretical format of Langdellian methodology by offering Academic Support Programs).

the importance of combining the teaching of metacognitive skills with the teaching of substantive content,[32] there has yet to be an examination of the impact on academic performance of explicit instruction of metacognitive skills development into a substantive law course.[33]

It is with these open questions in mind that we designed the study described herein. Our primary goal was to support student learning. As such, we instructed students about metacognition and effective learning strategies for law school, and prompted them to engage in the metacognitive tasks of reflection on and regulation of their learning. Our secondary goal was to collect data to analyze the effectiveness and inform future iterations of the instruction intervention. We assessed the metacognitive knowledge and regulatory skills demonstrated by students, looked for evidence of changes to these skills during the semester, and explored whether there was a correlation between metacognitive skills and academic success. We recognize that empirical research is not the only method for assessing the value and impact of metacognition, particularly given the limitations of existing methods for measuring it. However, our goal is to meaningfully contribute to the literature that explores ways to improve the learning experience for law students.

III. An Empirical Study of First-Year Law Students' Metacognitive Skills

A. Research Questions

Our study of prior empirical work on metacognition inspired us to collect and analyze data from students enrolled in a first-year course in law school. We assessed the students' level of metacognitive knowledge and regulation and determined whether students who were explicitly taught about metacognition and who received metacognitive prompting and modeling within the context

32. *See* Xiaodong Lin & Florence R. Sullivan, *Computer Contexts for Supporting Metacognitive Learning*, *in* International Handbook of Information Technology in Primary and Secondary Education 281, 285-87 (J. Voogt & G. Knezek eds., 2008) (discussing how metacognitive monitoring skills and content learning must "work in concert with one another" to improve the subject understanding resulting in adaptive expertise); Pintrich, *Role*, *supra* note 28, at 223 (noting that although metacognition can be taught in a separate course, to produce more effective learning, "[i]t is more important that metacognitive knowledge is embedded within the usual content-driven lessons in different subject areas" and not be "taught in the abstract"). *See also* Saundra Yancy McGuire & Stephanie McGuire, Teach Students How to Learn: Strategies You Can Incorporate into Any Course to Improve Student Metacognition, Study Skills, and Motivation 13 (2015) (discussing "immediate—and in some cases remarkable—results" when she began teaching her chemistry students about how to improve their learning).

33. *Cf.* Curcio et al., *supra* note 11, at 303-09, 313 (reporting on a study involving administration of multiple practice essays followed by instructor feedback in a Civil Procedure class, concluding that "students learn better when given opportunities to practice a skill and receive feedback on that practice" and discussing the possible influences of metacognitive skills on academic performance).

of a substantive course developed stronger metacognitive skills over the course of one semester relative to students in the same course who did not receive instruction about or modeling of metacognitive behaviors.[34] We also wanted to examine whether there was a correlation between our measures of students' metacognitive skills and their academic performance.

B. Methods

1. Participants

We implemented this study with first-year law students in two sections of a first-semester, five-credit civil procedure course at the Maurice A. Deane School of Law at Hofstra University (Law School). In many ways, civil procedure is the most challenging course in the first year of law school.[35] Knowing how to learn effectively and monitoring and adjusting that learning process is particularly important in this course, and thus we felt there was potential for students to benefit from learning about metacognition. In addition, we hoped to obtain a baseline assessment of incoming law students' metacognitive skills, which is why we chose a first-semester, first-year class.

One section, taught by Professor Gundlach, served as the Intervention Section. As will be discussed in more detail in the next section, the Intervention Section received explicit instruction about metacognition, in-class prompts to engage in metacognitive skills throughout the semester, in-class modeling of learning strategies that promote metacognition, and reinforcement of reflection and learning strategy choices by the instructor and teaching assistants (TAs) outside of class.

To determine if there was an impact from the instructional intervention on students' development of metacognitive skills, we also collected data from students in a separate Control Section taught by a different professor. Other than the additional instruction and prompting on metacognition, we did our best to make the experience of students in both sections as similar as possible.[36]

34. Pintrich et al., *Assessing*, *supra* note 14, at 60 (discussing research methods designed to assess student performance of learning practices).

35. Many students lack direct experience with the civil litigation process, and the course requires some understanding of the nature of the adversarial system, the professional skills and values of lawyers, the roles of judges, jurors, lawyers, and clients, the impact of strategic choice, competing policy interests, the power of the rules of procedure, and the multitude of procedural devices used in the litigation process. Moreover, mastering the procedural rules requires understanding their relationship to the substantive law, which also implicates fundamental notions of our constitutional system and the overlapping state and federal judicial systems. *See* Alleva & Gundlach, *supra* note 6, at 710, 714-19.

36. Studies such as this, which attempt to measure students' cognitive or metacognitive learning processes, face the very real challenge of standardizing variables for interpreting the results. Even if both sections are taught by the same professor and the content and coverage is identical, there may be subtle variations between what is taught and how it is taught. Thus, in an educational setting like this, no Control Section is truly that.

Both sections used the same course materials, including the casebook and syllabus. Both sections were given two midterms (one with an essay prompt and one with multiple-choice questions) and a final exam (which included essays and multiple-choice questions) that were almost identical in content and coverage, although the first midterm in the Control Section did not count toward the students' final grade because of an administrative error.

Our process of data collection for both sections was identical. Students in both sections completed two quantitative instruments and responded to a series of questionnaires that were used to collect information about students' learning strategies and to evaluate each student's metacognitive skills at several points during the semester. The questionnaires asked students to reflect on which strategies they were choosing, and therefore acted as prompts to engage in reflection on and regulation of learning strategies. Thus, while students in the Control Section were not explicitly taught about metacognition, the data collection process itself encouraged students to be metacognitive and may have influenced our findings about the impact of the metacognition instruction in the Intervention Section.

We received approval from the University's Institutional Review Board before beginning the study. Students in both sections were informed about the study and offered the opportunity to consent (or not) to be included. The professors in each section were not privy to the identities of the students who opted to have their questionnaire responses included in the study and those who did not. All students, regardless of whether they consented to be included in the study, were asked to respond to the questionnaires distributed throughout the semester, and a small portion of their overall grade in each section was dependent on satisfactory completion of each questionnaire.

In total, there were 170 students across the two sections, and 129 consented to participate in the study.[37] Both sections were demographically similar, with respect to gender and ethnicity, as well as quantitatively, with respect to their LSAT scores and undergraduate (GPA) (Table A).[38] In addition, those who consented to participate in the study within each section were also demographically and quantitatively similar to those who chose not to participate.

37. The breakdown of the number of students from the two sections was as follows: 77 out of 87 students (88.5% of the class) in the Intervention Section agreed to participate, while 52 out of 83 students (62.7%) in the Control Section agreed to participate.

38. We expected this to be the case, as the Registrar of the Law School employs a program to ensure that each section of the first-year class is balanced with respect to undergraduate degree overall GPA, LSAT score, gender, and ethnicity, with very limited alterations.

Table A
Student Attributes: Mean (Std. Dev.)

Attribute	Intervention Section	Control Section
Percent Female	48.3%	49.4%
Percent Underrepresented Minority	23.0%	21.7%
Undergraduate GPA	3.26 (0.43)	3.42 (0.31)
LSAT Score	151.65 (4.63)	151.96 (4.35)

2. Instrumentation

Much has been written about the challenges of assessing metacognitive skills in students.[39] Methods such as self-report questionnaires, interviews, error-detection problems, think-aloud protocols, firsthand observations, and others, each come with their own advantages and disadvantages.[40] Relying on students' self-reporting has the potential for inaccuracy because, for example, they may have erroneous or incomplete perceptions of their actual study habits or report what they think the instructor wants to hear.[41] Researchers' firsthand observations and think-aloud protocols may be more accurate, particularly for measuring the metacognitive components of knowledge, because they occur in the moment that the learning task is being performed. However, they are resource-intensive, requiring one-on-one involvement between the researcher and the subject, and they intrude on the student's natural study habits because of the presence of outside observers.[42]

Quantitative instruments can be appealing, particularly for use in large classes, because the methods are less labor intensive to administer, score, and analyze. However, their usefulness may be limited to measuring the more static component of metacognitive knowledge rather than metacognitive regulation.[43] Qualitative methods that seek narrative responses from students can also be easy to administer but can be more challenging to score and time-consuming to code and analyze.[44] Accordingly, mixed-method research studies, in which the results of qualitative and quantitative data are compared to obtain triangulated results, may provide a broader and more complete picture for drawing conclusions about what the students are actually doing in their learning processes.[45]

39.   *See, e.g.*, Veenman et al., *supra* note 19, at 8-9 (surveying various forms of assessing metacognition and recognizing the challenge of accuracy with any one method).

40.   *See id.*

41.   *See* Pintrich et al., *Assessing*, *supra* note 14, at 86 (discussing issues with instruments that ask students to self-report); Linda Baker & Lorraine C. Cerro, *Assessing Metacognition in Children and Adults*, *in* Issues in the Measurement of Metacognition 99, 103-04 (Gregory Schraw & James C. Impara, eds., 2000) (discussing concerns with verbal reports).

42.   *See* Pintrich et al., *Assessing*, *supra* note 14, at 60.

43.   *See id.* at 60-61.

44.   *See id.* at 60.

45.   John W. Creswell & Vicki L. Plano Clark, Designing and Conducting Mixed Methods

We chose two quantitative survey instruments designed to measure metacognition, both of which are widely recognized as useful, despite some concerns about the construct validity of these measures. The Metacognitive Awareness Inventory (MAI), developed by Schraw and Dennison in 1994, was designed to measure metacognitive knowledge and regulation of cognition.[46] Students are provided with 52 statements and asked to respond to each statement on a five-point Likert scale ("almost never," "rarely," "sometimes," "often," "almost always").[47] Students' responses are then scored, with higher scores representing stronger metacognitive skills.

The original Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich and De Groot, was designed to measure metacognitive regulation.[48] The original questionnaire prompts students to respond to 56 statements focused on motivation, cognitive strategy use, metacognitive strategy use, and management of effort. It employs a similar five-point Likert scale of responses ("almost never true of me," "rarely true of me," "sometimes true of me," "often true of me," "almost always true of me").

We used the shortened version of the MSLQ, which includes only 44 of the original 56 statements.[49] The MAI and the MSLQ were distributed to students in both sections at the beginning and end of the semester.[50] A brief description of each questionnaire and instrument, together with the distribution dates, can be found in Table B and is also attached hereto in Appendix 1.

We also distributed four questionnaires to students during the semester (Table B and Appendix 1). We developed them after a review of research using similar questionnaires designed to assess metacognition.[51] We adapted them for

RESEARCH 65, 68-69 (2018) (discussing how convergent-design mixed-methods research can be used to provide a more complete understanding of a problem, to validate one set of findings with another, or to determine whether participants respond in different ways to predetermined scales and open-ended prompts).

46. Gregory Schraw & Rayne Sperling Dennison, *Assessing Metacognitive Awareness*, 19 CONTEMP. EDUC. PSYCHOL. 460, 460-75 (1994) (discussing MAI); Pintrich et al., *Assessing*, *supra* note 14, at 62.

47. Some versions of the MAI and the MSLQ use a seven-point Likert scale. While literature suggests that some scale lengths may be preferable to maximize reliability and validity in certain situations, a five-point Likert scale is customary and most often used. Jon A. Krosnick & Stanley Presser*, Question and Questionnaire Design*, *in* HANDBOOK OF SURVEY RESEARCH 263, 268-75 (Peter V. Marsden & James D. Wright eds., 2d ed. 2010) (discussing different studies about scale lengths and use of 5-point Likert scale more specifically).

48. Paul R. Pintrich & Elisabeth V. De Groot, *Motivational and Self-Regulated Learning Components of Classroom Academic Performance*, 82 J. EDUC. PSYCHOL. 33, 34-35 (1990) (discussing MSLQ); Pintrich et al., *Assessing*, *supra* note 14, at 78.

49. Pintrich & De Groot, *supra* note 48, at 40 (shortened version of MSLQ).

50. We recognize that the students' scores on the first MAI/MSLQ are not a true baseline, given that they had already received limited instruction about learning strategies and metacognition during orientation and that Professor Gundlach's students had additional instruction on these topics in their first class.

51. *See, e.g.*, Julia Dangremond Stanton et al., *Differences in Metacognitive Regulation in Introductory Biology*

use in a law school course and tailored them to learning strategies that are widely recognized in legal education. The questionnaires served two purposes: (1) they served as a pedagogical tool to support student learning by prompting them to reflect on their learning strategies, particularly around midterm exams and the final exam; and (2) they allowed us to collect students' narrative responses, which we subsequently analyzed with directed content analysis[52] to assign metacognitive codes.

3. Instruction on Metacognition and Learning Strategies

All first-year students were provided with an introduction to essential study skills and time-management techniques for law school during an orientation session (Table B). Metacognition was not discussed in this session. Students in the Intervention Section received additional instruction in their first class about effective learning strategies, and were provided with a detailed list of active learning strategies that promote success in law school and, more specifically, in civil procedure (Table B; Appendix 2). In addition, the Intervention Section students were taught about metacognitive skills and their importance to learning (Table B; Appendix 2).[53] Both sections received general feedback in class after both midterms, but students in the Intervention Section were reminded about metacognition and effective learning strategies during the in-class, post-midterm feedback. Intervention Section students also met with the professor in one-on-one meetings following the first midterm. In these meetings, students identified what they needed to improve and to consider what changes they might make to their learning strategies to improve their performance on the next midterm. TAs for the Intervention Section further reinforced active learning strategies at nonmandatory review sessions throughout the semester, and engaged students in active learning techniques through the use of four hypothetical fact patterns in which students synthesized a series of legal rules and practiced their approach to essay questions. In class, the Intervention Section students were frequently tested on their understanding of the material through the professor's use of four nongraded hypothetical fact patterns representative of questions on essay exams, as well as nongraded multiple-choice questions using PollEverywhere

---

Students: When Prompts Are Not Enough, 14 CBE Life Sci. Educ. 1, 1-12 (2015).

52.   Hsiu-Fang Hsieh & Sarah E. Shannon, *Three Approaches to Qualitative Content Analysis*, 15 Qual. Health Research 1277, 1281-83 (2005) (describing process of directed content analysis in qualitative research as a method for analyzing text data to classify it into various coding categories).

53.   The learning strategies chosen focused primarily on active learning strategies, such as active reading and reflection on what is being learned, use of visual aids and rubrics to connect concepts, self-testing through multiple-choice questions and hypothetical fact patterns, as well as talking through and teaching concepts with peers. These strategies focus on retrieval, self-testing, and periodic review, which have been shown to correlate positively with long-term learning and strong academic performance. *See, e.g.*, Cooper & Gurung, *supra* note 8, at 367-74 (surveying studies that have shown such links and reporting on consistent findings from law school empirical study).

software.[54] Students in the Control Section were tested on their understanding of the material only twice with nongraded hypothetical fact patterns; they received no instruction or reinforcement about metacognition during the semester, other than what was included in the questionnaires distributed to all students.

Table B
Overview of Instruments and Instruction

Instruction	Instrument	Description	Distribution Date
Orientation Lecture (All Students)		Overview of study strategies and time-management techniques, included case briefing, outlining, self-questioning after reading, study groups, practice questions and hypotheticals, and different supplemental materials	August 17, 2017
In-Class Lecture (Intervention Section) (Appendix 2)		Overview of metacognition; discussion of effective learning strategies for law school	August 21, 2017
	MAI/MSLQ (All Students) (Appendix 1)	Quantitative instrument	August 21, 2017
	Learning Strategies Plan Questionnaire (All Students) (Appendix 1)	Open-ended prompts asked students to list strategies they planned to use in the course and explain why each would be effective	August 23, 2017

54. PollEverywhere software allows an instructor to create different forms of questions for use in surveying participants, who respond in real time using the software's mobile phone application. For more information: https://www.polleverywhere.com. The software was used to anonymously assess students' understanding of the material, often modeling the form of questions that Intervention Section students would see on the second midterm and the final exam. After each question, students were shown the results, and the answers were discussed as a way to review relevant material. All questions and answers were distributed to students to use for further review and self-testing.

	Pre-Midterm Questionnaire (All Students) (Appendix 1)	Students were asked to: (1) with respect to each strategy listed on their LSP, identify whether they were using it, intended to use it, or did not intend to use it, explaining why for each; (2) identify any new strategies that they were using and explain why they thought those were effective; (3) indicate whether they were working with a study group and, if so, to describe what they do as a group; (4) explain their confidence level re: next midterm	September 11, 2017 (one week before first midterm)
	Post-Midterm Questionnaire (All Students) (Appendix 1)	Open-ended prompts asked students to (1) review LSP strategies, identify whether they were using them, intended to use them or not, explaining why with respect to each; (2) identify any new strategies that they were using and explain why they thought those were effective; (3) identify whether their confidence level going into the first midterm had matched their performance; (4) identify what they did well on the first midterm and what they need to work on; and (5) explain what, if any, changes they made and why	October 12, 2017 (one week before second midterm)
	Final Questionnaire (All Students) (Appendix 1)	Open-ended prompts asked students to: (1) describe the impact, if any, of questionnaires on their learning strategies and performance in class; (2) identify most effective learning strategies; (3) explain any changes made and why; and (4) explain advice they would give themselves at start of semester to be more successful in the course	December 12, 2017 (four days after final exam)

	Final MAI/ MSLQ (All Students) (Appendix 1)	Quantitative instrument	December 12, 2017 (four days after the final exam)

C. Coding Questionnaire Responses

1. The Coding Process

We modeled our qualitative methods for analyzing the content of metacognitive reflections completed by students on a similar study of metacognitive skills in undergraduate biology students performed by Professor Julie Dangremond Stanton and her colleagues.[55] Using evidence from students' responses to two questionnaires, they developed the following four codes with accompanying descriptions to make inferences about the level of metacognitive regulation demonstrated by students, specifically focusing on evidence of the level of students' awareness of appropriate learning strategies, recognition of the need to make changes, willingness to make changes, and actual adjustment of learning strategies:

> **(1) Not Engaging**: unwilling to reflect and adjust their approaches to learning, and felt they were capable of learning but didn't necessarily see it as their responsibility;

> **(2) Struggling**: willing to change their study plans, but often used noncommittal language regarding new strategies; did not choose strategies that addressed issues they reported having, but instead selected passive strategies;

> **(3) Emerging**: recognized a need for a change to their study plans and could select appropriate learning strategies; recognized importance of trying to understand the material rather than just retain it; did not always follow their study plans, but seemed to have both agency and self-efficacy;

> **(4) Developing**: recognized the benefit of adjusting their study plans and could select learning strategies that appropriately addressed issues they had; followed their study plans; focused on studying to learn and on understanding concepts rather than to earn high grades; demonstrated agency and self-efficacy.[56]

Their coding process was iterative, in that the researchers reviewed a subset of student responses and then worked together to develop an initial set of codes. They would then review subsequent subsets of student responses, and, if codes or evidence to support the codes needed to be altered, they revised the codebook and recoded all earlier subsets of student responses. This process continued

55. Stanton et al., *supra* note 51, at 1, 7 (discussing coding process).

56. *Id.* at 1, 7-10.

until all student responses had been coded and reviewed using the final version of the codebook.

We followed a similar process, recognizing that the law school context might require slightly different descriptions for each code. We engaged two upper-level law students to work with us in reviewing students' anonymized responses on the four questionnaires distributed to the two civil procedure sections. The students' involvement was invaluable, as they provided insight into students' responses that we lacked as professors. Each of us first worked individually using the Stanton descriptors as a guideline to review ten students' responses at a time, and assigned a code for each student with respect to each questionnaire. The four of us then came together as a group to discuss and arrive at a consensus for each student's codes. We revised the codebook as necessary and, in the event of a revision, we reviewed all previously coded responses and made changes where appropriate. Once we had reviewed all student responses and the final codebook was complete, we reviewed all student responses one last time to ensure consistency. The codebook that we developed, attached in Appendix 3, is similar to that developed by Stanton and her colleagues, but with some important distinctions.

2. Evidence of Metacognition

As noted in Part II, metacognition involves two interdependent components: knowledge and regulation. Students demonstrate metacognitive knowledge when they are aware of a range of learning strategies, understand when, where, and why such strategies are important, and appropriately select and use such strategies.[57] They exhibit metacognitive regulation when they evaluate the effectiveness of their selected learning strategies on their learning, and then make appropriate changes to improve their learning.[58] Thus, our coding descriptions, like Stanton's, centered on analyzing the learning strategies identified and selected by students, their reasons for doing so, and whether they showed willingness to make any appropriate changes and followed through in doing so after receiving feedback about their performance during the course (Appendix 3).

Whereas Stanton and her colleagues used only two questionnaires designed to encourage self-evaluation in connection with two exams,[59] we distributed four questionnaires over the course of the semester because we wanted to document students' metacognitive development through time. We ultimately assigned metacognitive codes to students for two different points in the semester: following the Post-Midterm questionnaire distributed in October and following the Final questionnaire distributed at the end of the semester. In addition, we

57.   Borkowski et al., *supra* note 20, at 4-9 (discussing components of good information processing as evidence of metacognitive development).

58.   Stanton et al., *supra* note 51, at 1, 6 (students who recognize the need to select active learning strategies that involve engagement with the material to improve learning after an exam).

59.   *Id.* at 1, 2.

assigned an overall Global code based on the cumulative responses from all four questionnaires.

a. Knowledge and Selection of Appropriate Learning Strategies

We looked to students' responses on all of the questionnaires to analyze their awareness of learning strategies, which strategies they chose to use in the class, and their reasons for doing so. While passive strategies can be appropriate for some learning tasks, we placed greater value on active strategies, especially those in which students were able to monitor their understanding of the material. Professor Paula Lustbader has defined active learning strategies as those that require a student to "manipulate and process information in his or her own way in order to fully understand it."[60] In recent years, legal educators have focused on active learning methods because they can promote higher-level thinking skills, such as analysis, synthesis, and evaluation, which are critical for law students and lawyers.[61] For example, strategies that many law students might have used in undergraduate programs, such as rereading, highlighting, and cramming review of material at the end of the semester, are passive learning strategies that may be ineffective on their own for long-term learning and retention.[62] On the other hand, active strategies that involve retrieval and application through self-testing, such as writing responses to hypothetical fact patterns and answering multiple-choice questions, can be highly effective for long-term retention and learning.[63] Students' selection and use of active learning strategies could also demonstrate metacognitive regulation to assess what they have learned or not learned.[64]

60. Paula Lustbader, *From Dreams to Reality: The Emerging Role of Law School Academic Support Programs*, 31 U. S.F. L. Rev. 839, 855 (1997).

61. *See, e.g.*, Gerald F. Hess, *Listening to Our Students: Obstructing and Enhancing Learning in Law School*, 31 U.S.F. L. Rev. 941, 943 (1997).

62. *See* James McGrath, *Planning Your Class to Take Advantage of Highly Effective Learning Techniques*, 95 U. Det. Mercy L. Rev. 153, 168-78 (2018) (surveying effective and ineffective learning strategies).

63. *See, e.g.*, Bloom, *Creating*, *supra* note 6, at 135-50 (discussing active strategies to prompt metacognition, such as creating and practicing multiple-choice questions, creating visual organizers, and practicing essay questions); Robin A. Boyle, *Employing Active-Learning Techniques and Metacognition in Law School: Shifting Energy from Professor to Student*, 81 U. Det. Mercy L. Rev. 1, 3-7 (2003) (discussing range of active learning strategies that can be implemented in law school); Cooper & Gurung, *supra* note 8, at 385-89 (discussing survey of law students' study habits and the positive correlation with law school GPA between reported use of practice questions and ability to explain concepts to others).

64. Based on his study of academic and bar preparation support programs at Florida International University Law School, Professor Louis Schulze has discussed the importance of including multiple opportunities to do practice questions as a form of metacognition in connection with bar preparation. Louis N. Schulze, Jr., *Using Science to Build Better Learners: One School's Successful Efforts to Raise Its Bar Passage Rates in an Era of Decline,* 68 J. Legal Educ. 230, 243 (2019). *See also* Jennifer M. Cooper, *Smarter Law Learning: Using Cognitive Science to Maximize Law Learning*, 44 Cap. U. L. Rev. 551, 578 (2016) (noting that metacognition and self-regulation are "intimately related" with student habits and strategies used by students).

In an effort to capture evidence of both metacognitive knowledge and regulation, it was thus critical that we made defensible and consistent determinations for our coding descriptions about what constitutes active and passive learning strategies. Our review of research defining active and passive learning strategies in the realm of legal education informed our creation of a chart cataloging a list of all the learning strategies identified by students, and our delineation of each as passive or active (Table C). As will be described more fully below, we then used the type of learning strategies reportedly used by students to assist us in our coding of each student.

Table C
Learning Strategies Chart

Passive Strategies	Active Strategies
Outline (with no explanation)	Outline (synthesis, prep for exams, conceptualizing, think through)
Brief cases	Review sessions (no hypos mentioned)
Review/reread book, notes; retype notes	Attend exam skills workshops/meet with academic support
Take notes, color code, rewrite, highlight	Go to professor's office hours
Mnemonics, memorization	Study groups & talk/review with peers (no hypos/just review cases)
Repetition	Analogies
Research	Supplements/Secondary sources (no hypos mentioned)
Prioritization	Practicing fact patterns, hypos, problems, practice tests
Read for class, complete assignments on time, study daily	Review session (hypos)
Flashcards	Study groups (hypos, visual aids)
Study scheduling, time management	Self-testing, asking self what was learned, storytelling, quizzing
Listen to class podcast recordings	Create flowcharts, tables, road maps of key concepts, study guides
Create vocab sheet	Create scripts for approaching fact patterns
	"Metacognitive skills," taking stock of what you know/don't know
	Review questions in book
	Teaching to someone

b. Changes to Learning Strategies

We compared responses on the LSP and Pre-Midterm questionnaires to responses on the Post-Midterm and Final questionnaires, assigning codes at the Post-Midterm and Final questionnaire timepoints. The LSP and Pre-Midterm questionnaires were administered before students had received any formal

feedback about their performance in the class. Thus, the first two questionnaires served primarily as an indication of the students' metacognitive knowledge regarding the types of strategies they were selecting. The Post-Midterm and Final questionnaires were administered following formal feedback on exams. They additionally allowed us to assess metacognitive regulation because we could determine if students were willing to make changes, and the types of changes they were making, based on feedback from their midterms. We also assigned a Global, summative code of metacognition that looked holistically at each student's responses across the four questionnaires. In addition, we tracked the number of active learning strategies reported by students on each questionnaire to determine whether these numbers changed over time or differed between the two sections.

Our codebook included five codes: the same four used by Stanton and her colleagues, plus an additional code of Can't Categorize/Not Enough Information (Appendix 3). If a student's questionnaire responses were not informative or incomplete with respect to identification of learning strategies and/or changes, we coded the student as Can't Categorize/Not Enough Information (Appendix 3).[65] If a student did not identify any active strategies and showed no willingness to change despite not performing well on a midterm, which we defined as receiving a grade below the mean, we coded that student as Not Engaging (Appendix 3). If a student continued to rely on passive strategies despite not performing well on a midterm, with no demonstrated knowledge of active learning strategies, we coded that student as Struggling, even if the student was willing to make a change (Appendix 3). If a student demonstrated knowledge of active strategies, was willing to make changes but failed to follow through with using those strategies, we coded that student as Emerging. If a student demonstrated knowledge of active strategies, was willing to make changes and followed through with those changes, we coded that student as Developing (Appendix 3).

Where students' responses were brief or vague, we used their responses to earlier questionnaires or on other questions in the same questionnaire to support our coding decisions. For example, for students who stated that they were not using new strategies but proceeded to report using one or more new strategies in response to another prompt on the same questionnaire, we accepted this as evidence that those students were using one or more new strategies and thus making changes.[66]

More complicated were students who indicated that they were not making changes to their strategies because they believed that their current methods were working. For these students, we had to determine whether or not they

---

65. We ultimately assigned the code of Can't Categorize/Not Enough Information to nine students on the Post-Midterm questionnaire, thirty-three for the Final questionnaire, and four for the Global code.

66. *See* Stanton et al., *supra* note 51, at 1, 3 (noting that they gave students the benefit of the doubt when they were not certain what the answers reflected).

were accurately reflecting, without unintentionally biasing ourselves during the coding process with knowledge of their academic performance. We therefore double-coded these students, coming to consensus on both codes. For example, if we saw evidence that a student identified one or more active learning strategies being used, but the student stated no intention of making any changes on the Post-Midterm questionnaire, we would initially assign that student a code of Not Engaging/Developing. Similarly, if we saw evidence that the student was using only passive strategies but stating no intention of making changes, we would assign a code of Not Engaging/Struggling. Once all students were coded, we aligned the academic performance data with the codes and, for those students with a double code, used performance on the first midterm to resolve double codes. If students had inaccurately reflected–that is, they did not perform well on the midterm (earning a score lower than the mean for the section) –they received the Not Engaging code.[67] If the students had accurately reflected that there was no need for change, that is, they had done well on the exam, they received the other code.

For most students, assigning a Global code was straightforward because we had consistently assigned them the same codes throughout the semester or because the student progressed over the semester from, say, Struggling to Developing. But for those without a clear trajectory in one direction or another, we reviewed their questionnaires holistically to determine if there was evidence of knowledge and regulation. There were only two students who fell into this category; both were assigned a Developing code on the Post-Midterm questionnaire and a Struggling code on the Final questionnaire. We gave both a Global code of Emerging because both indicated on the Final questionnaire that they knew they did not follow through with using strategies they had planned to use.

D. Analysis[68] and Results

We were able to answer some but not all of our research questions. As an initial matter, the results from the two quantitative instruments were strongly correlated. There was a relationship between the quantitative instruments delivered and the qualitative codes assigned at the end of the semester. There was also a relationship between students' metacognitive skills and their academic performance. The instructional intervention increased the number of active strategies students reported using; however, there was no evidence that the instructional intervention impacted students' development of metacognitive

67. Unfortunately, because of an administrative error, students in the Control Section did not receive formal grades on Midterm I, and at the time they completed the Post-Midterm questionnaire, most students had not received individualized feedback yet. Therefore, multiple students reported that they didn't know how they were doing in the class and therefore didn't know whether they needed to make a change. Without this formal feedback, we would expect more students in the Control Section to have "lower" metacognitive codes on the Post-Midterm questionnaire than students in the Intervention Section.

68. For the data analysis, we used SPSS Statistics software. IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

skills during the semester. Students' narrative responses indicated the questionnaires were a useful pedagogical tool for metacognitive practice, and that feedback received from formative assessments prompted metacognitive regulation.

1. The Correlation Between Quantitative and Qualitative Methods for Measuring Metacognition

Given that we had decided to use a mixed-methods approach, we looked for a relationship between the results of the two quantitative instruments (the MAI and MSLQ), and between the quantitative instruments and the qualitative coding of the narrative self-report responses on the questionnaires. As noted earlier, the MAI and the MSLQ are both recognized as accepted independent instruments for assessing individuals' metacognitive skills. Thus, we expected to see a strong positive correlation between students' scores on the two quantitative instruments, and indeed this was the case. We used the Pearson's Product Moment Correlation[69] to assess the relationship between MAI and MSLQ scores at the beginning and end of the semester, and the relationship between the change in MAI and MSLQ scores from the beginning to end of the semester. Students' total scores on both instruments were highly correlated at both beginning and end of the semester (Table D). Similarly, the change in MAI score from beginning to end of the semester was correlated with the change in MSLQ score from the beginning to end of the semester (Table D).

Table D
Correlations Between Variables Using Pearson Product Moment Correlation

	r (sample size)
Beginning-of-semester MAI and MSLQ	0.690** (128)
End-of-semester MAI and MSLQ	0.739** (106)
Change from beginning- to end-of-semester MAI and MSLQ	0.570** (106)
**Correlation is significant at the 0.01 level (two-tailed)	

We also looked for a relationship between the quantitative and qualitative measures of metacognition, our goal being to determine whether the two types of measurement demonstrated parallel information about students' metacognitive skills. We used a nonparametric rank correlation, Kendall's tau-b,[70] to determine

---

69. The Pearson's Product Moment Correlation is a test that compares the distribution of one variable against another variable to determine if there is a relationship between the two. *See* Perry R. Hinton et al., SPSS Explained 298 (2014).

70. Parametric tests make assumptions about the distribution of data (for example, that they are normally distributed, falling along a bell curve) and that the measurements are from an equal-interval scale, while nonparametric tests do not make those assumptions. The qualitative codes assigned to students are ordinal data. They represent categories that have an order from Not Engaging to Developing, but that do not have clear or consistently sized intervals

whether there was a correlation between the quantitative data (i.e., MAI and MSLQ scores) and qualitative coding of the narrative self-report responses on the questionnaires. We found evidence of a relationship between end-of-semester MAI and MSLQ scores and the metacognitive code assigned to students on their Final questionnaire at the end of the semester, indicating that the quantitative and qualitative measures were aligned at that survey point (Table E). This result makes sense given that the Final questionnaire was distributed at the same point in time as the end-of-semester MAI and MSLQ. However, we caution against interpreting this result as evidence that the quantitative measures are sufficient for assessing an individual's metacognitive development. We do not have qualitative data from early in the semester to compare with the beginning-of-semester MAI and MSLQ data, thus we cannot determine whether the two methods were aligned at that point in time. In addition, the relationship between the quantitative and qualitative data is not strong and the qualitative measures provided richer information about students that is not possible to obtain using quantitative instruments alone.

Table E
Correlations Between Variables Using Kendall's Tau-B:
Kendall's Tau-B (sample size)

	Final Code	Global Code
MAI end of semester	0.218* (93)	0.109 (105)
Change in MAI	--	-0.018 (105)
MSLQ end of semester	0.162* (92)	0.121 (105)
Change in MSLQ	--	-0.031 (105)
*Correlation is significant at the 0.05 level (two-tailed)		

2. The Relationship between Students'
Metacognition and Academic Performance

Another and more fundamental goal for our research study was to support students' learning and academic success in the course. Other authors have found correlations between measures of metacognition and academic performance. We were interested in whether we would detect similar patterns with the MAI and MSLQ or with the Global metacognitive codes we assigned.

a. The Relationship Between Academic Performance
and MAI and MSLQ Scores

We used quartile in class and z-scores on midterm and final exams to assess whether there is a relationship between academic performance and MAI and MSLQ scores. Z-scores, also called standard scores, are useful when comparing

---

between them. For example, there is the same interval between 1 and 2 as there is between 3 and 4. That is not the case when comparing Not Engaging to Struggling and Struggling to Emerging. Thus, we used a nonparametric rank correlation, Kendall's tau-b. *See id.* note 69, at 304.

different sets of data, such as exam scores from two different sections, because they "standardize" the raw scores by computing how far away from the mean of the respective section each raw score falls.[71] We found no relationship between MAI and MSLQ scores and academic performance. The scores on both instruments administered at the beginning of the semester did not predict overall exam performance, nor were the scores at the end of the semester associated with exam performance (Table F). Notably, the students' LSAT scores were a much better predictor of exam performance.

Table F
Correlations Between Variables
(Pearson's Product Moment Correlation, except where noted)

	N	Z-score across all exams	Z-score final exam	Quartile in class across all exams
MAI Beginning of Semester	128	-0.038	-0.050	-0.023†
MAI End of Semester	106	0.104	0.099	0.059†
MSLQ Beginning of Semester	128	-0.053	-0.052	-0.018†
MSLQ End of Semester	106	0.121	0.094	0.114†
LSAT	129	0.256†**	0.283†**	0.291†**
Global Code	124	0.159†*	0.165†*	0.177†*
LSAT/Global Code Combined	124	-0.294†**	-0.325†**	-0.325†**

Differences in sample size (N) are due to different numbers of students responding to the quantitative and qualitative data collection instruments
†Kendall's tau-b
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

Accordingly, the MAI and MSLQ may not be appropriate instruments to predict academic performance in law school.

b. Relationship Between Academic Performance and
Global Code of Metacognitive Development

The Global metacognitive code reflects the totality of a student's questionnaire responses throughout the semester. We were interested to see whether patterns

71. Gene Victor Glass & Kenneth D. Hopkins, Statistical Methods in Education and Psychology 83-84 (1996). If two sets of data have different means and/or different amounts of variation around the mean, z-scores allow us to compare between the sections, since they calculate how well students performed relative to the mean of their section. For example, if students in two different sections both have a z-score of 1, they both scored the same amount better than the mean on the exam, even if one section had a mean of 52% and the other a mean of 70%. Z-scores are calculated as (x-u)/sigma where x is the student's exam score, u is the mean score of that section, and sigma is the standard deviation of that section. A z-score of 0 indicates scoring at the mean, a z-score of 1 or -1 indicates a score 1 standard deviation above or below the mean, respectively.

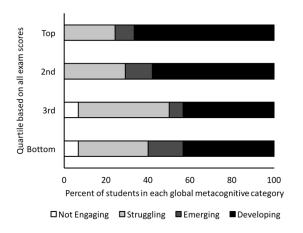existed between students' Global codes and their performance in the class, their performance on the standardized LSAT before law school, and their performance in other first-year courses beyond civil procedure.

Notably, as indicated in Figure A, there is a relationship between students' Global metacognitive codes and their quartile in the class based solely on their midterm and final exam grades. No student with a Global code of Not Engaging was in the top two quartiles. Students in the top two quartiles were more likely to have a Global code of Developing than students in the bottom two quartiles (Figure A). Thus, students who were willing to reflect and make changes to their learning strategies and who selected active strategies that inherently involved regulating their learning were more likely to have greater academic success. However, evidence of strong metacognitive skills does not guarantee that a student will perform well academically; multiple students with a Global code of Developing were in the bottom two quartiles with respect to exam performance (Figure A).

Figure A
Relationship Between Global Code and Quartile Based on Exam Scores

We also looked at students' academic performance by analyzing their z-scores on their midterms and final exams. We calculated z-scores using the total points earned by students in each section on their midterm and final exams. As with the relationship between quartile in the class and Global metacognitive codes, there was a positive relationship between students' total exam z-scores and Global metacognitive codes, and between their total exam z-scores and LSAT scores (Table F). However, students' LSAT scores were a stronger predictor of total exam z-scores than was the Global code. The correlation between LSAT scores and total exam z-scores reflects what has been previously reported by the Law School Admissions Council (LSAC), the organization that administers the

LSAT, about the predictive validity of LSAT scores for academic performance in the first year of law school.[72]

Notably, there was no relationship between students' LSAT scores and the Global metacognitive codes, despite the fact that both correlated with academic performance.[73] This result is not surprising when considering the skills they are each measuring. According to LSAC, the LSAT is designed to measure the skills of reading comprehension, analytical reasoning, and logical reasoning.[74] The Global metacognitive codes we assigned, on the other hand, are based on evidence that the student demonstrates the components of metacognitive knowledge and regulation. Reading comprehension, analytical and logical reasoning skills, in addition to metacognitive skills, can all influence academic performance in different, yet synergistic ways.[75]

The predictive ability of academic success improves when both LSAT scores and Global codes are taken into account (Table F). We combined LSAT scores and Global codes into one variable that considers if LSAT score is high (defined as in the top 25% of the students in the two sections which was a score of at least

---

72. *See:* Nazia Rahman, et al., *The Validity of Law School Admission Test Scores for Repeat Test Takers: 2010 Through 2014 Fall-Entering Law School Classes (TR 18-02) Executive Summary*, https://www.lsac.org/data-research/research/validity-law-school-admission-test-scores-repeat-test-takers-2010-through (last visited 4/17/2020) (reporting on research from 2010-2014, the last published report by LSAC). However, many have begun to question the usefulness of the LSAT as a predictor of law school success, given concerns about access for underrepresented students and other predictive measures of academic performance, such as Graduate Record Examination ("GRE") scores and factors other than standardized test scores. *See, e.g.*, Paula Lustbader, *Painting Beyond the Numbers: The Art of Providing Inclusive Law School Admission to Ensure Full Representation in the Profession*, 40 Cap. U. L. Rev. 71, 92-102 (2012) (explaining why the LSAT is less predictive of academic success for underrepresented students); Alexia Brunet Marks & Scott A. Moss, *What Predicts Law Student Success? A Longitudinal Study Correlating Law Student Applicant Data and Law School Outcomes*, 13 J. Empirical Legal Stud. 205, 208 (2016) (noting that the "LSAT predicts more weakly, and UGPA more powerfully, than commonly assumed"); Jeffrey J. Minneti, *A Comprehensive Approach to Law School Access Admissions*, 18 U. Md. L.J. Race, Religion, Gender & Class 189 (2018) (discussing inclusive approach for admissions standards to allow for greater access for underrepresented students). As a result, a number of schools have recently sought waivers from use of the LSAT pursuant to ABA Standard 503, which requires law schools to demonstrate that such other test is a "valid and reliable test to assist the school in assessing the applicant's capability to satisfactorily complete the school's program of legal education." *See* Standards & Rules of Procedure for Approval of Law Schs. 2018-2019, Standard 503 (Am. Bar Ass'n 2018). *See also* Stephanie Francis Ward, *As More Law Schools Consider Using the GRE as Well as the LSAT, Questions Remain about the Tests' Predictive Value*, 104 ABA J. 68 (Feb. 2018) (noting that as of that date, more than ten schools had accounts that they would accept the GRE in admissions), http://www.abajournal.com/article/law_schools_examine_predictive_value_gre_lsat (last visited 7/9/20).

73. Kendall's tau-b=0.016, N=124 p>0.05.

74. *See What is the LSAT?*, https://www.lsac.org/lsat (last visited 4/16/20).

75. Of course, many other factors can also influence academic performance. *See, e.g.*, Stacy L. Hawkins*, Mismatched or Counted Out: What's Missing from Mismatch Theory and Why It Matters,* 17 U. Pa. J. Con. L. 855, 864-880 (2015) (discussing mismatch theory and range of nonacademic credentials that correlate with professional success); Lustbader, *supra* note 72, at 105-13 (discussing relevance of nonnumerical factors on academic performance).

155) or low (defined as a score of less than 155) and Global codes as high (defined as Developing) or low (defined as Not Engaging, Struggling, or Emerging). There was a relationship between this combined variable and total exam z-scores with the combined variable explaining 29.4% of the variation in the total exam z-scores data. The LSAT score was the primary driver of this relationship.

Further, as can be seen in Table G, there is also a positive relationship between students' grades in civil procedure and almost every other first-year course. Likewise, there is a correlation between students' Global codes and students' fall and spring semester GPAs, as well as their cumulative GPA for the first year.

Table G
Correlation Between Global Codes and All First-Year Courses/GPAs

Fall 2017 Courses

	Civil Procedure	Criminal Law	Legal Analysis and Writing I	Torts	First-Term GPA
Civil Procedure	--				
Criminal Law	0.438** (120)	--			
Legal Analysis and Writing I	0.472** (123)	0.387** (119)	--		
Torts	0.371** (123)	0.380** (119)	0.334** (123)	--	
First-Term GPA	0.698** (125)	0.611** (120)	0.557** (123)	0.627** (123)	--

Kendall's tau-b
**Correlation is significant at the 0.01 level (two-tailed)

Spring 2018 Courses

	Civil Pro.	Const. Law	Contracts	Legal Analysis & Writing II	Property	Second-Term GPA	Cum. 1st-Year GPA
Civil Pro.	--						
Const. Law	0.230** (117)	--					
Contracts	0.472** (118)	0.278** (117)	--				
Legal Analysis & Writing II	0.497** (118)	0.306** (117)	0.501** (118)	--			
Property	0.298** (89)	0.181* (89)	0.395** (89)	0.392** (89)	--		
Second-Term GPA	0.407** (120)	0.493** (116)	0.723** (117)	0.555** (117)	0.610** (88)	--	
Cum. 1st Year GPA	0.618** (120)	0.405** (116)	0.701** (117)	0.649** (117)	0.524** (88)	0.704** (120)	--

Kendall's tau-b
*Correlation is significant at the 0.05 level (two-tailed)
**Correlation is significant at the 0.01 level (two-tailed)

3. The Impact of Instructional Intervention on Students' Development of Metacognitive Skills During the Semester

We also sought to determine whether instructional intervention within the context of a substantive law course could impact students' development of metacognitive skills during the semester. To answer this question, we had to distribute the four questionnaires in both the Intervention and Control Sections. The questionnaires themselves could be interpreted as a form of intervention, in that they prompted all participating students to reflect on their learning strategies, monitor and evaluate the effectiveness of those strategies, and consider alternative strategies throughout the semester. Moreover, since students interact between sections, those in the Intervention Section might well have shared what they learned from the instructional intervention with students in the Control Section. The Control Section professor also modeled the use of active learning strategies during class, albeit to a lesser extent than in the Intervention Section, and all students may have been independently exposed to instruction by academic support faculty about effective strategies and self-regulated learning techniques. Unfortunately, these variables are difficult if not impossible to control in the context of empirical studies conducted in real classroom settings. We are therefore cautious in our interpretation of results relating to the impact

of the intervention on student metacognitive development and focused our analysis on understanding the relationship between metacognitive skills and academic performance, regardless of the section in which students were enrolled.
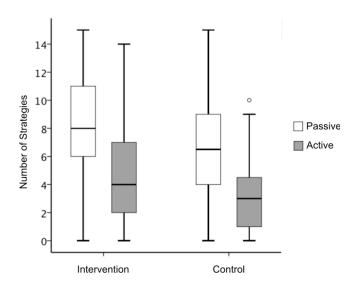
a. Changes in Reported Selection of Active Learning Strategies

Metacognitive knowledge is rooted in the awareness of a range of learning strategies, the ability to select effective learning strategies for a learning task, and an understanding of how the strategies support learning. When students report that they are using active learning strategies, particularly when they make a change to start using active strategies and are able to articulate the reasons for doing so, this can further demonstrate metacognitive regulation. This is not to suggest that more passive learning strategies are ineffective, but merely that the selection of active strategies is indicative of a student's demonstration of monitoring and regulating learning.[76]

As indicated in the boxplot[77] in Figure B below, students in both sections reported using passive and active learning strategies throughout the semester. In fact, the majority of strategies listed by students in both sections across all four questionnaires were passive. This may be a function of students choosing strategies they are accustomed to and/or that support learning the large amount of material, including new vocabulary, encountered in a first-year, five-credit, one-semester civil procedure course. For example, a passive strategy such as use of flashcards to memorize legal terminology can be an effective method for learning vocabulary, particularly when other learning depends on knowledge of those terms.

76. McGuire & McGuire, *supra* note 32, at 43-59 (discussing a range of metacognitive strategies that involve active learning, including creating practice exams, homework problems, teaching material to peer, and group work).

77. Boxplots visualize the range of values in a dataset. Each box delineates the range from the first to the third quartile. The line in the middle of the box indicates the median value. Lines extending above and below the box indicate the total range of values. The circle indicates a data point that is 3x the interquartile range above the third quartile.

Figure B
Total Number of Passive and Active Strategies Individual Students Reported Using Across All Surveys in Both Sections

We used Mann-Whitney U tests[78] with a sequential Bonferroni[79] adjustment to compare the number of passive and active learning strategies selected by students in both sections on the LSP, Pre-Midterm, and Post-Midterm questionnaires. As seen in Figure C, students in the Intervention Section consistently reported using more total strategies relative to students in the Control Section.[80] On the LSP questionnaire, this pattern was driven by Intervention Section students selecting more passive strategies than their

78. Calvin Dytham, Choosing and Using Statistics: A Biologist's Guide, 119-23 (2011) (describing this nonparametric test of the null hypothesis). The Mann-Whitney U test is the nonparametric non-parametric equivalent of a t-test. It does not assume that data are normally distributed and is therefore appropriate for use here given that the number of passive and active strategies in our dataset are not normally distributed.

79. Sture Holm, A Simple Sequentially Rejective Multiple Test Procedure, 6 Scandinavian J. Stat. 65, 66 (1979) (describing statistical method used to counteract the problem of multiple comparisons). We used three separate Mann-Whitney U tests, one for each questionnaire time point. To control for type I error (the rejection of the null hypothesis when in fact the null hypothesis should be retained), we used a sequential Bonferroni adjustment to adjust α. After running the Mann-Whitney U tests, the smallest p-value is compared to with $\alpha/3$ (since we ran three tests). Since $\alpha/3=0.05/3=0.0167$, if the smallest p-value is less than 0.0167, we reject the null hypothesis that there is no difference between the groups and conclude that there is a difference. The next larger p-value is compared to with $\alpha/2=0.05/2=0.025$, and the largest p-value is compared to with $\alpha=0.05$.

80. Results of the Mann-Whitney U tests for each questionnaire with corresponding α using the sequential Bonferroni adjustment: N=129, LSP: U=2689.5, p=0.001, α=0.0167; Pre: U=2426, p=0.038, α=0.05; Post U=2466, p=0.024, α=0.025.

Control Section peers, as there was no difference in the number of active strategies selected by students in the two sections on the LSP questionnaire (Figure C). This is notable, given that Intervention Section students had just had an in-class presentation about effective, primarily active, learning strategies. This suggests that the presentation alone is not enough to influence selection of active strategies without further reinforcement.

Figure C Average Number of Total Strategies Used by Students in Both Sections *Indicates Statistically Significant Difference Between Intervention and Control Sections
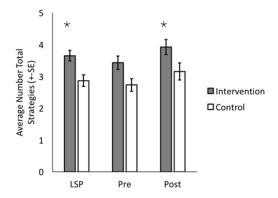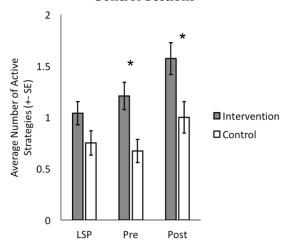

Figure D
Average Number of Active Strategies Used by Students in Both Sections * Indicates Statistically Significant Difference Between Intervention and Control Sections

The results do show a difference later in the semester. The same Mann-Whitney U and sequential Bonferroni procedure revealed that Intervention

Section students used more active strategies on the Pre-Midterm and Post-Midterm questionnaires, relative to their Control Section peers, as seen in Figure D.[81] This suggests that continuous reinforcement of active learning strategies by Professor Gundlach and the TAs, including testing students' understanding of the material through use of several nongraded hypothetical fact patterns representative of those on essay exams, as well as nongraded multiple-choice questions, influenced her students' reported use of these strategies.

Regardless of the section in which a student was enrolled, there was no relationship between the number of active strategies a student reported using and academic performance on the final exam.[82] Nor was there a relationship between the proportion of active strategies relative to the total number of strategies a student reported using and academic performance.[83] This was interesting given that one could predict that students who use more active strategies would perform better than students who do not use as many active strategies. This may be because the questionnaires rely on students' self-reporting about the learning strategies that they are using and those self-reports might not be accurate. Additionally, the questionnaires did not seek detailed information about *how* the students used each strategy, or the frequency with which they used each strategy.

b. Changes in Students' Metacognition Development

One of our goals was to support students' development of metacognitive skills. We predicted that with the additional instructional intervention provided, we would see some evidence of an increase in students' metacognitive skills in the Intervention Section relative to those in the Control Section. We assessed this by comparing the following information from the Intervention and Control Section students: (1) change in score on the MAI and MSLQ instruments from the beginning to the end of the semester, and (2) codes given to students on the questionnaires.
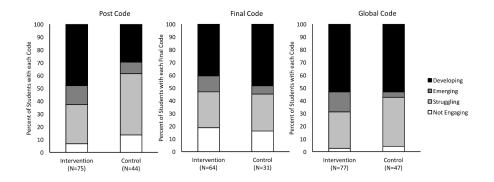
In neither case was there an effect of intervention. There was no difference in the change in MAI or change in MSLQ score between the two sections.[84]

81. Results of the Mann-Whitney U tests for each questionnaire with corresponding using the sequential Bonferroni adjustment: N=129, LSP: U=2329, p=0.094,α=0.05; Pre: U=2519, p=0.009, α=0.0167; Post: U=2499.5, p=0.013, α=0.025.

82. Using the Kendall's tau-b test, we found no evidence of a relationship between the number of active strategies students reported on the Post-Midterm questionnaire and their z-score on the final exam (Kendall's tau-b=-0.039, p (two-tailed) = 0.555, N=129).

83. We binned students into one of four categories based on the proportion of strategies that were active across all the questionnaires: >75% active strategies, 50-74% active strategies, 25-49% active strategies, <25% active strategies. Using the Kendall's tau-b test we found no evidence of a relationship between the proportion of strategies a student reported using that were active and their z-score on the final exam. (Kendall's tau-b=-0.038, p (two-tailed) = 0.588, N=128).

84. We used t-tests to compare the change in MAI score and change in MSLQ score from beginning to end of the semester. While the changes in MSLQ scores were not normally distributed, the results of a nonparametric Mann-Whitney U test paralleled those of the t-test.

We compared the change in students' scores on the MAI and the MSLQ from the beginning to the end of the semester in both sections and there was no difference between the two.

With respect to the qualitative data, assigning codes requires evidence of both metacognitive knowledge and metacognitive regulation. We were unable to assign metacognitive codes for the beginning of the semester since students did not have an opportunity in the first weeks of law school to regulate their learning based on formal feedback. If we assume that the distribution of codes across the two sections was equal at the beginning of the semester, we would predict that, if the instructional intervention had an effect, there would be a difference in the distribution of codes across the two sections at the end of the semester. However, there was no difference in the distribution of codes across the two sections with respect to the codes assigned following the Post-Midterm and the Final questionnaires, nor the Global codes, as can be seen in Figure E.[85]

Figure E
Post, Final, and Global Codes of Students in Both Sections

Thus, we report the t-tests for both the change in MAI and change in MSLQ here. There was no difference in change in MAI score across the two sections (N=106, t=0.47, df=104, p=0.963, assuming equal variances) nor in change in MSLQ score (N=106, t=0.461, df=104, p=0.645, assuming equal variances).

85. We used chi-square tests to determine if there was a difference in the distribution of codes between the two sections. There was no difference in the distribution of metacognitive codes between the two sections when comparing codes assigned at the Post-Midterm (X^2= 6.618, df=3, p=0.085, N=119) and Final questionnaires (X^2=1.104, df=3, p=0.776, N=95), nor the Global code (X^2=4.422, df=3, p=0.219, N=124). Differences in sample size (N) are the result of students either not completing questionnaires or providing incomplete responses to questionnaire prompts resulting in our inability to assign a code.
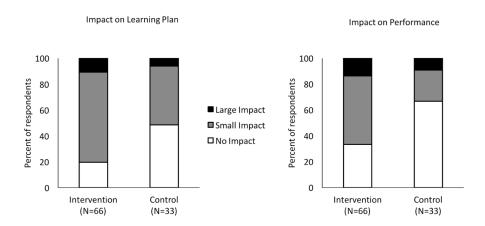
4. The Questionnaires as a Pedagogical Tool for Metacognitive Practice

Separate from the data analysis task, the students' narrative responses on the questionnaires lend anecdotal support for faculty to use these types of questionnaires for the pedagogical purpose of improving student learning through development of metacognitive skills. Using questionnaires that ask students to formally reflect on their strategies and course performance may encourage students to understand if and how strategies are useful. If students also learn about and are asked to model strategies that encourage self-monitoring and regulation within the context of a substantive class, the questionnaires could have an even larger impact.

Although we did not originally set out to examine students' perception about the instructional impact of completing the questionnaires, we did learn some valuable information from their narrative responses to the Final questionnaire. Students were first asked, "To what extent do you believe that the learning surveys you completed during the semester impacted your learning plan and study strategies?" (to which they could respond "They had a big impact," "They had a little impact," or "They had no impact"), and they were then given an opportunity to explain why. Additionally, they were asked, "To what extent do you believe that the learning surveys you completed during the semester impacted your performance in the course" (to which they could respond "They had a big impact," "They had a little impact," or "They had no impact"), and they were again given an opportunity to explain why.

Students overwhelmingly reported that the prompts had an impact on their learning strategies and their performance in the course. Of the students who completed the Final questionnaire, a majority across both sections reported that the questionnaires had at least a small impact on their learning plan and academic performance (Figure F).

Figure F
Percentage of Students Reporting Impact of
Questionnaires on Their Performance and Their Learning Plan

More students in the Intervention Section relative to the Control Section reported that the questionnaires had an impact, likely because the added instructional intervention provided clear context for the questionnaires (Figure F). Because so many students perceived the process of responding to questionnaires as valuable, this suggests if future students are shown the results from this study, they might be more willing to respond to the questionnaires as a learning exercise to prompt metacognition in future courses.

In explaining why the questionnaires had an impact, multiple students' narrative responses indicate that the questionnaires prompted them to engage in metacognition by instilling more awareness of the strategies they were using, and prompted them to reflect on the effectiveness of those strategies. For example, one student stated: "It made me more aware of my study strategies, which made me more conscious of how I am studying and how I can improve my strategy." Another acknowledged: "They forced me to re-examine my study habits throughout the semester when I would not have otherwise," whereas another stated that by responding to the questionnaires "I articulated the ways I used to study and brainstormed new ways . . . discarding some old and implementing some new." Still another said the questionnaires had a big impact because they "provided an opportunity to reflect on exam taking strategies" and "inspired self-evaluation and pushed me to think critically about how best to change or abandon pre-law school study strategies."

However, a number of students complained that the questionnaires were burdensome to complete, that they had trouble following through on what they indicated they would do, and/or that they didn't find them valuable for encouraging metacognition.[86] For example, one student felt the questionnaires were "tedious" and "more nuisance than helpful," while another acknowledged: "It made me think about my study habits a bit more and reflect on what I was doing somewhat, but overall I kind of felt like filling out these surveys was just going through the motions to get the grade," and "as soon as the survey was submitted, I stopped thinking about it." A third student said, "I believe I didn't stick to them the way I wanted to," and a fourth said, "I did not do what I said I was going to do, and did not follow through on the ways that I said I was going to study." These reports suggest that students may have suffered from survey fatigue.[87] More work could be done to determine how questionnaires or similar tools can be useful for practicing metacognition, especially when coupled with instructional intervention about effective learning strategies and methods for engaging in metacognitive regulation, while also balancing concerns about diminishing returns.

5. Feedback on Formative Assessments as an Important Prompt for Metacognitive Regulation

On the Final questionnaire, we sought to identify why students did or did not choose to make changes to their learning strategies during the semester. We asked them the following: "Did you change approaches or strategies during the course? Why or why not?" Overwhelmingly, students tied their decisions to make a change to feedback they received on a midterm, or because of a general desire to do better in the course. For example, one student explained the need for a change because "my old strategies weren't always effective"; another made changes "to do much better on my next midterm to get a good grade in the course." A third student was prompted to make a change because "I need to do better on this midterm and I do not expect my grades to change if I continue to do the same things that led to my previous score." These responses were consistent with findings from studies of metacognition in other disciplines.[88]

86. On the other hand, some students who indicated that the questionnaires did not impact their learning strategies plan and/or their performance expressed confidence about the strategies that they were already accustomed to employing. One student said, for example, "I know what works for me when I am trying to study." For some, it may well be that their strategies have been and continue to be successful, whereas others might inaccurately perceive this to be the case. Justin Kruger & David Dunning, *Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments*, 77 J. Personality & Soc. Psych. 1121, 1121 (1999) (discussing how individuals who lack metacognitive skills not only adopt ineffective study strategies, but often lack the ability to realize it).

87. Respondent fatigue, wherein participants drop out or stop responding over time, is well-documented by researchers who attempt longitudinal studies. *See, e.g.*, Steven R. Porter et al., *Multiple Surveys of Students and Survey Fatigue*, *in* Overcoming Survey Research Problems 63, 63-73 (Steven R. Porter ed., 2004) (discussing review of studies on survey fatigue).

88. *See, e.g.*, Kathryn Morris Dye & Julie Dangremond Stanton, *Metacognition in Upper-Division Biology*

Not surprisingly, external motivations linked to grades are very influential for students' decisions to regulate their learning.[89] But even feedback without grades can offer incentive for change, as well as benefits for academic performance.[90] The students' responses to these questions indicate that formative assessments, graded or not, can provide students with the necessary feedback they need to engage in metacognitive regulation.

E. Metacognitive Reflections for Future Studies

Teachers and scholars are learners, and thus we believe it is important to model metacognitive practice.[91] Accordingly, we offer some reflections about our learning experience in connection with this study and how it has informed our continuing research about the impact of metacognition for law students' learning. Given that our research has continued into a second study with a new dataset, we found it important to consider what we learned and to make appropriate adjustment to our methods.

1. Revision of Prompts and Timing Of Questionnaires

Too often, responses to the questionnaires did not produce enough information for us to draw clear conclusions about the students' study strategies

---

Students: Awareness Does Not Always Lead to Control, 16 CBE Life Sci. Educ. 1, 4-6 (2017) (finding that students who demonstrated stronger metacognitive skills evaluated their approaches to learning because of external indicators, such as unsatisfactory grades, because of internal indicators, such as monitoring their understanding through practice exams, or because of course characteristics, such as facing new challenges, such as how material is presented or how students will be assessed).

89. A number of students reported that they were instead evaluating the effectiveness of their chosen learning strategies and the need to make a change based on intrinsic motivations to better understand the material. For example, one student stated, "I'm making changes to my learning strategies as to understand the material to better apply it," and another student said, "I need to get the big picture understanding of the course" and "how to connect everything together." These reasons were similar to those identified by students in studies performed in other disciplines. *See, e.g.*, *id.* at 6-8 (finding that students who demonstrated stronger metacognitive skills evaluated their study strategies based on ability to retain/recall information, their ability to use information in applying the material to new situations, and the efficiency of the strategy with respect to the time it takes).

90. *See generally* Olympia Duhart, "*It's Not for a Grade": The Rewards and Risks of Low-Risk Assessment in the High-Stakes Law School Classroom*, 7 Elon L. Rev. 491 (2015) (discussing negative impact on students of overreliance on summative assessment, as well as benefits for law students from "low risk" or ungraded formative assessments); Carol Springer Sargent & Andrea A. Curcio, *Empirical Evidence that Formative Assessments Improve Final Exams*, 61 J. Legal Educ. 379 (2012) (discussing empirical study indicating that feedback from multiple ungraded formative assessments, plus one graded midterm, improved performance on summative final exams). *Cf.* Emily Zimmerman, *What Do Law Students Want?: The Missing Piece of the Assessment Puzzle*, 42 Rutgers L. J. 1 (2010) (reporting on empirical study of students' preferences for graded and ungraded assessments, finding that first-year students show higher preference for ungraded assessments at the beginning of the year than at the end of the year).

91. Alleva & Gundlach, *supra* note 6, at 737-38 (describing teaching as a process of learning and discussing role of teacher metacognition).

and metacognitive development and, as noted, for several students we had to assign codes of Can't Categorize/Not Enough Information. In general, narrative response instruments can suffer from the possibility that students' responses will be too vague or not descriptive enough for us to draw a conclusion about how active a strategy was and/or whether the student was truly engaging in metacognitive skills in using it. For example, some students left blank responses for explanations and others' descriptions were vague or inconsistent with prior answers. As another example, some students indicated that they are using a supplemental study guide or treatise, but did not say *how* they were using it; we couldn't determine if the students were just reading it or whether they were more actively using hypothetical problems within it to test their understanding of the substantive material they had learned in class. Accordingly, we have revised some of the prompts in our metacognitive questionnaires for use in a later study. The questionnaires now ask follow-up questions to elicit more details than those previously requested through yes/no questions.

In addition, we learned the importance of consistency across the questionnaires. In some respects we did not include the same prompts, and thus we could not accurately track any potential changes over the semester. For example, we wanted to assess metacognitive regulation throughout the semester, but we did not explicitly ask on each questionnaire if the student was willing to make a change and why/why not. Relatedly, tense changes between some questions left us unsure about students' reports. For example, some of the questions did not clearly ask what changes the student had *already* made relative to changes the student *intended* to make going forward. In our future study, we have repaired these inconsistencies. We have since changed our questionnaires to correct these inconsistencies for use in a later study.

Moreover, to truly assess students' metacognitive skills as they enter law school, we realized that we needed to alter the timing of the first round of questionnaires. In this study, we provided the Intervention Section students with a limited introduction to metacognition and effective learning strategies *before* we distributed the MAI/MSLQ and the LSP questionnaire. As a result, their responses were already influenced by the instructional intervention. In addition, in order to have a better dataset for measuring metacognitive development over the semester, in a future study we hope to include an early assessment at the beginning of the semester so that we may have a baseline metacognitive code, in addition to a baseline MAI/MSLQ score.

2. More Instruction and Practice of Metacognitive Skills

The data suggest that students are more likely to adopt active learning strategies and engage in metacognitive regulation when they receive explicit instruction about effective learning strategies combined with continuous reinforcement of methods for practicing metacognition provided by the professor and TAs. Sharing the results from this study with students may be informative and persuasive to students, particularly if echoed by upper-level students who have seen evidence of connections in their own learning

and academic performance. Further, class time and TA review sessions can specifically focus more deliberately on opportunities for students to practice metacognitive skills through a variety of active learning exercises. Finally, based on students' narrative responses, students need reminders, particularly before and after assessments, to implement those skills and strategies in their individual and group study. Going forward, we have made adjustments to the number of questionnaires distributed, and the instructional reinforcement provided to students both in and out of class.

3. More Formative Assessments and Corresponding Questionnaires

Similarly, given the influence of formative assessments on students' willingness to make a change, students are likely to benefit from more midterms or other forms of formative assessment, particularly when they are given the opportunity to repeat a similar learning task and evaluate the impact of any changes to their learning strategies. For example, a second midterm assessment should be similar in format to the first (i.e., another essay question rather than multiple-choice questions) so that a student can receive more feedback about whether any changes made resulted in improved learning and, consequently, academic performance. Alternatively, a professor might offer a subset of lower-performing students the opportunity to redo their first midterm and then provide those students with feedback (or an actual grade) so they know where they improved and/or where they still need to improve.[92]

Each formative assessment should also be partnered with the instructor's encouragement to engage in metacognitive regulation. This might be done through distribution of additional questionnaires. First, the corresponding questionnaires provide more qualitative data to be analyzed. In addition, questionnaires distributed before and after each formative assessment, what some have termed "exam-wrappers," should encourage metacognition and self-regulated learning more broadly.[93] However, a professor will also need to balance the very real concern of survey fatigue, as discussed earlier. Particularly with respect to the Final questionnaire, we saw the number of student responses drop.

4. Increase Pool of Student Responses for Data Analysis

Although we were able to perform the study with two large sections of civil procedure, the pool size invariably impacted our ability to draw conclusions

92.   We recognize that there may be very real implications for the ability of a law professor to incorporate any, much less all, of these proposals. This may be particularly challenging for classes that have a large number of students in which the professor does not have access to a teaching fellow or research assistant. It may also be hard to incorporate a control group if there is only one section of the course and/or other faculty are not willing or able to do what is necessary to mirror the number and form of midterm and final exams.

93.   *See generally* Marsha C. Lovett, *Make Exams Worth More than the Grade: Using Exam Wrappers to Promote Metacognition, in* Using Reflection and Metacognition to Improve Student Learning Across the Disciplines, Across the Academy 18-41 (Matthew Kaplan et al. eds., 2013) (discussing use of short reflective assignments called exam wrappers that direct students to review their performance and feedback on an exam, to engage metacognition).

from the analysis of the data we collected. In particular, a smaller percentage of students responded to the Final questionnaire, which impacted our ability to analyze the responses. Similarly, because of vague answers, we had to assign codes of Can't Categorize/Not Enough Information for several students, which impacted our findings. In the future, we might seek to broaden the dataset to include all first-year students (one section of approximate equal size was not included in this study). Even better would be to broaden the study to include first-year students at one or more additional law schools.

Relatedly, we must continue to seek ways to incentivize students to fully complete the MAI and MSLQ instruments, as well as respond to each questionnaire. As noted above, we saw diminishing returns, perhaps resulting from survey fatigue, as the semester progressed. While we recognize that this goal might conflict with our other suggestion for increasing the number of questionnaires completed by students, students might be more inclined to embrace the process if they have more understanding about why it is important and, perhaps most influential, if their grades depend on it.

IV. Implications for Legal Education and Future Research

A. Metacognitive Skills Should Be Taught and Assessed in Law School

Our study demonstrates that students are more likely to adopt active learning strategies that support academic success in civil procedure and law school more generally when the professor associated with the course teaches them those strategies and provides them with multiple opportunities to practice metacognition while they are learning. In addition, law students are more likely to be successful in a course if they are engaging in metacognitive knowledge and regulation. Moreover, prompting students to reflect on their performance challenges and encourages them to select learning strategies aligned with those challenges within the context of the course may help more students develop metacognitive skills. Yet even with repeated intervention, too many students acknowledge the challenge of making metacognition a habitual practice for lifelong learning.

Law students can benefit from instruction in *all* of their classes about not just the substantive law, but about *how* to learn the law and about the skills required for success in law school and in practice. Others in the legal academy have suggested the importance of teaching law school-specific active learning strategies that involve retrieval, self-testing, periodic review, and elaborating on one's knowledge to teach concepts and put in one's own words.[94] Too many

---

94. *See, e.g.*, Cooper & Gurung, *supra* note 8, at 367-74 (discussing study of law students' study habits and findings of positive correlation between the reported use of practice questions and ability to explain concepts to others with law school GPA); Curcio et al., *supra* note 11, at 286-302 (finding that students with above-the-mean LSAT and undergraduate GPAs benefited from intervention of five short essay exam questions before taking a final exam); Sargent & Curcio, *supra* note 90, at 385-88, 394-95 (finding that majority of students, including those with below-the-mean LSAT and undergraduate GPAs, benefited from intervention of five ungraded quizzes before taking a final exam).

schools, including ours, continue to outsource instruction about effective learning strategies and metacognition to academic support and bar preparation faculty. To truly have an impact, law faculty across the curriculum should seek to integrate and reinforce this instruction, thus valuing its importance for law students' learning.[95]

To provide students with more structured scaffolding for developing metacognitive skills, faculty should embrace the use of more formative assessments in their courses. In fact, the ABA Standards now require their use in all law schools.[96] Formative assessment can take many forms and need not always be resource-intensive. For example, many professors occasionally present their students with a hypothetical fact pattern or sample exam question and ask them to work through it in class, or use multiple-choice questions to review and assess knowledge of material, or offer collaborative opportunities to create visual aids or rubrics for approaching problems. Each of these existing methods, if intentionally integrated into a course, can create further structured opportunities for students to integrate metacognitive practices.[97] Such activities can also be introduced in separate review sessions or through prerecorded videos so that class time can continue to focus on instruction of substantive content. Upper-level students can also be enlisted to provide instruction outside of class. Such methods are especially important to introduce during the first year of law school, with the hope that students will begin to create their own methods for building knowledge and regulation of their learning even when their professors do not provide such opportunities.

With these benefits in mind, we concur with those legal scholars who have advocated for the explicit instruction of metacognition in law school.[98] Some law schools have already begun to incorporate more instruction and intervention about learning, with particular focus on the development of metacognitive skills and self-regulated learning. The inclusion of this type of programming can have positive results on students' performance on the bar examination.[99]

95. Alleva & Gundlach, *supra* note 6, at 734-36 (Summer 2016) (discussing how law schools should be intentional about teaching students how to learn, including metacognition, throughout the law school curriculum).

96. *See* Standards & Rules of Procedure for Approval of Law Schs. 2018-2019, Standard 314 (Am. Bar Ass'n 2018) (requiring that law schools utilize both formative and summative assessment methods in the curriculum "to measure and improve student learning and provide meaningful feedback to students").

97. *See, e.g.*, Bloom, *Creating, supra* note 6, at 135-150 (discussing various ways to teach students metacognitive skills, including introduction of more formative assessments to build self-assessment and reflection skills, as well as creation of visual organizers).

98. *See generally* Alleva & Gundlach, *supra* note 6. *See, e.g.*, Adam Lamparello, *The Integrated Law School Curriculum*, 8 Elon L. Rev. 407, 414 (2016).

99. *See, e.g.*, Schulze, Jr., *supra* note 64.

Finally, law faculty can benefit from the continued development and use of instructional materials and prompts. Distribution of questionnaires, like the ones that we used and continue to develop, can prompt students to assess their learning and reflect on what changes they should be making and so can be a necessary foundation for students to eventually internalize their own metacognitive practices. As materials are developed by faculty, they should be widely shared to allow for easy introduction and use across law school courses.

B. Further Empirical Study of Metacognition Is Needed in Law School and Legal Practice

One important take-away from the study is that students with strong metacognitive skills—i.e., those who have an awareness of successful learning strategies, who introduce successful strategies, and who are willing to self-evaluate their learning and make adjustments during a semester-long course—performed better in the course. In addition, there is limited evidence that even minimal intervention, with instruction and reminders about successful learning strategies and reminders to consider making a change as needed, can have an impact on the types of strategies used by students and their willingness to make changes and then actually do so when it is called for.

Future research should, at a minimum, seek further evidence as to whether more deliberate instructional intervention can produce more significant results, both with respect to the development of metacognitive skills for students and in their performance in law school. In addition, longitudinal studies are needed to consider the long-term impact of teaching metacognition for performance in other first-year courses, in upper-level law school courses, on the bar exam, and even in practice. Faculty can also test the efficacy of different methods for teaching metacognitive skills. More work needs to be done to examine how metacognitive skills interact with other learning-related factors, such as mindset and motivation, affective variables such as anxiety, and learning disabilities and styles.

If legal educators are to continue to examine the impact of our teaching methods on law students' learning—and given what is at stake, we must—our institutions must encourage and support sound empirical research. While empirical studies are on the rise, some have legitimately questioned the quality of this growing body of work, particularly when most law professors pursue traditional methods of publication in student-edited law reviews and journals.[100] The lack of peer review, coupled with the fact that a number of legal scholars have not been formally trained in empirical research methods (which includes one of our own authors), could result in a body of work that is flawed. Accordingly, law schools should offer to fund professional development opportunities for

---

100.   *See, e.g.*, Kathryn Zeiler, *The Future of Empirical Legal Scholarship: Where Might We Go from Here?*, 66 J. Legal Educ. 78, 78-79 (2016).

empirical scholarship, connect their faculty with outside funding opportunities, and build interdisciplinary connections across universities.

One unexpected benefit of our mixed-methods approach is that the qualitative data, though dense and time-consuming to collect, offered rich insights about students' learning processes. Thus, even when the analysis of the data might not evidence statistical significance, the narrative responses can sometimes reflect the positive impact of the questionnaires for even a small percentage of students. In addition, the narrative responses offered important feedback to inform changes not only for our data collection efforts, but also for our teaching methods. More work is needed to analyze this type of anecdotal evidence.

Metacognition is challenging not only to define, but also to measure, particularly through time. The MAI, MSLQ, and questionnaires may not be the most appropriate instruments for measuring change during a semester-long course. There are challenges in accurately measuring an individual's metacognitive skills at any particular point in time, much less at various points during a first semester in law school. Future research would benefit from continued thinking about how to more effectively measure students' development of metacognitive skills over the course of time, and the length of time appropriate for that measurement. For example, it might be that measurement of metacognitive changes are more significant if studied over the course of a full year, as opposed to one semester. Other studies have attempted to track student metacognitive skills through time, but these studies typically focused on younger students (i.e., students in grades K-12), assessed changes over years, and did not use coding of narrative responses to open-ended prompts to determine location of metacognitive skills along a continuum.[101] To our knowledge, assessing metacognitive development of graduate-level students over the course of one semester using the methods we used has not been previously attempted. We believe that our mixed-methods approach has the potential to yield important insights into changes in metacognitive development of older students. We plan to modify and improve our methods in iterative fashion as we continue our research to better support this process.

101. *See, e.g.*, Tiina Annevirta & Marja Vaurus, *Metacognitive Knowledge in Primary Grades: A Longitudinal Study*, 16 European J. Psych. Educ. 257 (2001) (discussing results of longitudinal study analyzing the development of metacognitive skills in children from pre-school to third grade, finding that metacognitive knowledge developed significantly during first three years of school); Kate E. Snyder et al., *Giftedness and Metacognition: A Short-Term Longitudinal Investigation of Metacognitive Monitoring in the Classroom*, 55 Gifted Child Quart. 181 (2011) (semester-long study of high school gifted and typical biology students to assess metacognitive monitoring skills using self-report questionnaires and confidence judgments, finding that gifted students were better able to make local, item-by-item and post-exam judgment about their performance, but finding no difference in global predictive judgments or calibration bias between the two groups); Manita van der Stel & Marcel V.J. Veenman, *Development of Metacognitive Skillfulness: A Longitudinal Study*, 20 Learning Individual Differences 220 (2009) (discussing results of longitudinal study analyzing development of quantity and quality of metacognitive skills in twelve- to fourteen-year-olds using think-aloud protocols in study of historical texts and mathematical problem-solving domains, finding quantitative and qualitative growth in metacognitive skillfulness that contributed to learning performance).

Given our initial findings that metacognitive skills correlate with academic performance in a first-year course, further research may provide more insight about whether law school admissions departments can or should seek to assess applicants' metacognitive skills as a supplement or even an alternative to the LSAT. For example, it may well be that some students who do not perform well on the LSAT might have strong metacognitive skills that would be predictive of their academic success in law school.

In short, there is much more work to be done to further the research and study of metacognition in legal education.