

Banning Laptops in the Classroom: Is it Worth the Hassles?

Kevin Yamamoto

Introduction

“Can you repeat the question please?” This phrase is uttered by more and more law students around the country.¹ Why is this happening? Is it a new phrase like the lingo used in an Instant Message? I and others believe its pervasiveness is due primarily to the proliferation of laptops in the classroom. The use of laptops is linked not only to poor classroom discussion but also to decreased bar passage rates across the country.²

If laptops are causing new problems, or exacerbating old ones, a simple answer is to ban laptops from the classroom. I tried this solution for the first time in my Federal Income Tax class in 2006. This article describes my experience and provides scientific studies to support my decision. Federal Income Taxation is a required second-year course at South Texas College of Law. I banned laptop use in the classroom to see the effects on classroom discussion, students’ performance when called upon, and their proficiency with the material on the final. Overall, I was very pleased with the results.

I am writing this paper as a guide for those who are considering banning laptops and to provide additional reasons and encouragement to those who have already done so. For those who are considering it, I offer my experiences in implementing the ban, which for the most part went very well. I give my impressions of the class in general and how teaching was different with no laptops in the room. I refer to significant cognitive learning research studies that support, at the minimum, heavy restrictions on students’ laptop use in class or even an outright ban. Many professors intuitively believe that laptop use should be restricted, and I hope to provide them with evidence that will encourage them to restrict laptop use in their classrooms.

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1. See, e.g., David Cole, *Laptops vs. Learning*, Wash. Post, Apr. 7, 2007, at A13 (a Georgetown University law professor reporting that this is “the most common response” to his questions.).
2. See Lorenzo A. Trujillo, *The Relationship between Law School and the Bar Exam: A Look at Assessment and Student Success*, 78 U. Colo. L. Rev. 69, 73 (2007) (noting that “the introduction of laptops in the classroom coincides with the national decline in bar passage rates”).

This article is divided into five parts. The first part gives background: my course load, the reasons I decided to ban laptops, and a brief overview of the benefits others have found in permitting laptops in class. The second part looks at the scientific basis for banning laptops. I look at the cognitive science of learning and memory and then report on studies on the effect of laptops in higher-education classrooms. Research papers on note-taking are discussed as applied to students' verbatim note-taking. In the third part I present my decision for, and implementation of, the laptop ban, the changes in class discussion and atmosphere, exam results, and my subsequent student evaluations. I then address what I will change in the future based on my experience. The final part outlines my conclusions.

Background

My Basic Course Load

I teach exclusively in the area of federal taxation. My basic course package includes Federal Income Taxation (Tax I) (3 units), Advanced Federal Income Taxation (2 units), Corporate Taxation (3 units), and Estate and Gift Taxation (3 units). Because Tax I is a required class, typically I teach it once per semester and often in the summer. I have taught this basic class at least twenty-seven times to more than 1,300 students. For reasons I give later, I banned all student laptops only in my Tax I class.³

I teach tax using the problem method.⁴ I start class by asking questions on the assigned Internal Revenue Code sections and Regulations before discussing the assigned problems. I do this because I believe the only way to learn to read the Code and Regulations is to read them. Nobody can absorb the skill by instruction alone; one must struggle with the substantive tax law's verbiage and make sense of it on one's own.⁵ Students try to avoid reading the Code; they typically treat it as if it is something contagious that will give them the plague (I can happily report it does not—at least not yet). If an instructor does not force students to read the Code and Regulations, they will read the assigned

3. See *infra* text accompanying note 152.

4. Even though I teach book problems, I still use the Socratic Method since the students provide the analysis and answers to the problems with my questions being the guide. See, e.g., Douglas L. Leslie, *How Not to Teach Contracts, and Any Other Course: PowerPoint, Laptops, and the CaseFile Method*, 44 St. Louis U. L.J. 1289, 1297 (2000). The Socratic Method has been criticized, with at least one article calling into question the ethics of using it as a teaching method in law school. See Debra Moss Curtis, *Everything I Wanted to Know About Teaching Law School I Learned From Being a Kindergarten Teacher: Ethics in the Law School Classroom*, 2006 BYU Educ. & L.J. 455, 481–82 (Socratic Method is unethical if it hampers learning and does not demonstrate skills needed when students actually begin their practice of law).

5. See David M. Becker, *Some Concerns about the Future of Legal Education*, 51 J. Legal Educ. 469, 474 (2001) (commenting that "anyone who has ever struggled with this knows that real learning of skills is accomplished experientially: one acquires problem-solving skills only by attempting to perform them").

material in the text, every commercial law outline present in the bookstore, hornbooks, a friend-of-a-friend's outline, but never the assigned material in the Code and Regulations. The only way to get them to read the Code is by asking them pointed and specific questions on the Code and Regulation material in class.

I am no Luddite.⁶ For most of my teaching career I have used the internet and computers to assist my teaching and communication with students.⁷ I post my syllabus and other course content on TWEN,⁸ use e-mail to communicate with my students, record non-regularly scheduled classes and post them to the school's web server so students can watch them over the Internet, and allow

6. The Luddites were a group of early nineteenth century workers who protested new textile techniques by destroying the machinery because they thought it would cost them jobs. Merriam Webster's Collegiate Dictionary (10th ed., Springfield, Mass., 1998). Banning laptops may be considered by some a similar rage against the machine.
7. Others who have looked at the adoption of technology place individuals in one of five groups depending on how quickly they adopt new technology: (1) innovators (the first 3 percent of those who adopt new technology), (2) early adopters (the next 10 percent), (3) early majority (the next 35 percent who adopt after the technology shows a benefit to teaching and student learning), (4) late majority (the next 35 percent, most of whom were skeptical of the new technology), and (5) laggards (the final 17 percent and those who may oppose the technology's initial implementation). Mark Hall and Kevin M. Elliott, Diffusion of Technology into the Teaching Process: Strategies to Encourage Faculty Members to Embrace the Laptop Environment, 78 J. Educ. Bus. 301, 302 (2003). Except for the use of PowerPoint, I would consider myself an "early adopter." See *infra* note 10 discussing PowerPoint.
8. In 1996 Westlaw started TWEN ("The Westlaw Education Network"). An instructor can post the course syllabus, have a discussion board, keep a course calendar, provide quizzes, and create a class e-mail list on TWEN. Lexis/Nexis has a similar system called "Web Courses."

TWEN allows for the creation of e-mail lists to communicate with a class. The only difficulty is that students must sign-up and correctly input their e-mail address. Typically in any given semester that I use TWEN, several students do not sign-up and many put in an incorrect e-mail address. In the spring 2007 semester, South Texas College of Law switched to its own portal called "STANLEY" which creates a class e-mail list. Since STANLEY creates the e-mail list TWEN is no longer necessary to do the same task.

One author stated that e-mail's impersonal nature poses the "greatest threat to teaching law" since it removes the motivation of face-to-face contact between teacher and student. Robert H. Thomas, "Hey, Did You Get My E-Mail?" Reflections of a Retro-Grouch in the Computer Age of Legal Education, 44 J. Legal Educ. 233, 242 (1994). See also Becker, Some Concerns about the Future of Legal Education, *supra* note 5, at 483 (the loss of face-to-face communication with students means professors miss an opportunity to be a part of one of the primary joys of teaching, watching students learn). However, one study looking at undergraduate students found that laptops fostered a sense of community because faculty and students communicated using the internet (e-mail, IMs). Ada Demb, Darlene Erickson, and Shane Hawkins-Wilding, The Laptop Alternative: Student Reactions and Strategic Implications, 43 Computers & Educ. 383, 384 (2004).

students to type their exams.⁹ However, I do not use a computer in class to display PowerPoint slides or other audio-visual aids.¹⁰

Why Professors Allow Computers

At South Texas College of Law computers entered the classroom without discussion or debate. Computers are not required for students at South Texas.¹¹ In fact, electrical outlets were only installed in all classrooms within the past two years. I have noticed laptops *en masse* within only the past three to five years.¹²

9. Students at South Texas College of Law have had the ability to type their exams with their laptops using Examsoft© since approximately 2000. Before that time students could bring their own typewriters to type their exams, but few took the opportunity. One empirical study done at Brigham Young University's J. Reuben Clark Law School found students who typed their exams had a 0.1 advantage over those who wrote out their exams by hand. Kif Augustine-Adams, Suzanne B. Hendrix, and James R. Rasband, *Pen or Printer: Can Students Afford to Handwrite Their Exams?*, 51 J. Legal Educ. 118, 122, 128 (2001). A University of Michigan Law School student filed a lawsuit alleging that he was unfairly disadvantaged on exams since he was not a skilled touch typist. See Ashby Jones, *Slow Typist Sues His Law School*, Wall St. J., available at <http://blogs.wsj.com/law/2007/01/26/slow-typist-sues-his-law-school/> (last visited Jan. 1, 2008).
10. I do not see how PowerPoint slides enhance student learning unless done perfectly. On the other hand, I see many negatives to their use in class. Primary among these are the students' over-reliance on the slides, and unless they are perfectly timed in the lecture, the slides cause more of a distraction as students struggle to incorporate the slide information with the class discussion. See Leslie, *How Not to Teach Contracts*, *supra* note 4, at 1304 (observing that in any class using the Power Point slides the students are totally focused on PowerPoint slide "like a first-grader focuses on Barney"). See also Clifford Stoll, *High-Tech Heretic: Why Computers Don't Belong in the Classroom and Other Reflections by a Computer Contrarian* 12 (New York, 1999) (commenting, "Imagine a boring slide show. Now add lots of generic, irrelevant, and pyrotechnic graphics. What have you got? A boring slide show, complete with irrelevant whiz-bang graphics."). I concede that done correctly, PowerPoint slides can be helpful.
11. This has been done at law schools where the institution does not have a computer lab or so the laptop cost can be included into the student's total educational costs for determining financial aid. See Vanderbilt University Frequently Asked Questions, available at http://frontweb.vuse.vanderbilt.edu/vuse_web/transit/transITFAQ.htm (last visited Jan. 1, 2008) (stating that in the engineering program the cost of a laptop will be counted into financial need since the school requires its purchase).
12. The University of Richmond School of Law started requiring laptops for all students in 1994 and reports it was the first law school with such a requirement. Law and Information Technology, available at <http://law.richmond.edu/librarytech/lawtech.php> (last visited Jan. 1, 2008). Of the 195 ABA approved law schools, twenty-seven require students to own laptops. See Appendix 1. Another fifteen law schools "strongly recommend" that students own laptops. See Appendix 2. See also Joan MacLeod Heminway, *Caught In (Or On) the Web: A Review Of Course Management Systems For Legal Education*, 16 Alb. L.J. Sci. & Tech. 265, 277 n.46 (2006) (listing additional law schools that require students purchase laptop computers).
12. The numbers of laptops in classrooms may be directly linked to access to the Internet. In 2003 South Texas College of Law installed wireless transmitters in the new library, and with the advent of better wireless cards the signal can be picked up in the classroom. Our

Some professors encourage the use of laptops in the classroom and feel they aid in the educational process.¹³ Of those who want students to use laptops, a smaller subset encourages internet use during class. These professors believe that web access allows students to look up supplementary material during class to explain words or concepts they do not understand.¹⁴ Yet, this ability to look at other material during class may hinder students from learning the assigned material (and for 1Ls especially, the process of legal analysis) even though the web search is on point with the lecture.¹⁵

Other reasons besides the ability to supplement lectures exist to promote or support laptop use in the classroom. One reason is that laptops motivate some professors to keep lectures interesting.¹⁶ In the Internet Age, the laptop competes for the students' attention, to be vanquished, if possible, by the entertainment value of the professor's lecture.¹⁷

Instant Messaging ("IM") by students during class is also seen as positive. Some professors believe it keeps the room quieter because students can IM

classrooms are not Wi-Fi enabled.

^{13.} Several articles have reviewed the benefits of having computers, both in legal and non-legal education. Those individuals looking at computers in legal education have focused on the computer's "efficiency and flexibility" to support their use in teaching law. See generally Paul F. Teich, *How Effective Is Computer-Assisted Instruction? An Evaluation for Legal Educators*, 41 *J. Legal Educ.* 489 (1991) (reviewing studies on the efficacy of computer-aided instruction and suggesting their use is beneficial in law school instruction). Other articles have stressed the positive effects of e-mail, newsgroups, and the like in aiding student-professor communication. See generally Iain Murray, *Student Power?*, *Am. Enterp.*, Oct.-Dec. 2005, at 57. But see Becker, *Some Concerns about the Future of Legal Education*, *supra* note 5, at 483 (giving the opinion that the lack of face-to-face communication with students means you cannot watch students learn, which is part of the true joy of teaching).

^{14.} See, e.g., Hall and Elliott, *Diffusion of Technology*, *supra* note 7, at 303 (the classroom environment is enhanced when "students go online and retrieve information"); Astrid Bradley, *Profs See Laptops as Distraction, Useful Tool*, *The Dartmouth.com News*, Feb. 16, 2007, available at <http://thedartmouth.com/2007/02/16/news/profs/> (last visited Jan. 1, 2008) (writing that some professors see laptops as a benefit since "they allow students to quickly look up supplemental information during lectures...[and] complete their understanding of ideas presented by a professor").

^{15.} See *infra* text accompanying notes 104-06.

^{16.} See, e.g., Eric Chen, *Laptops Nixed in Some Law Classes: Profs Split on Whether the Devices are Bane or Boon for Learning*, *Daily Penn.*, Apr. 13, 2006 (quoting University of Pennsylvania law professor Anita Allen as saying, "A professor should be able to compete with a stupid machine. If you are good, people will listen to you."); Victoria Rivkin, *Solitaire, Anyone?, Student Law*, Nov. 2001, at 21, 23 (technology is "driving faculty to be more engaging"); John Schwartz, *Professors Vie with Web for Class's Attention*, *N.Y. Times*, Jan. 2, 2003, at A1 (Professor Jay Mallek of American University Law School sees the Internet as a "challenge to keep lectures interesting and lively.").

^{17.} Personally I have difficulty with the basic premise here that learning should be fun and entertaining. As one author noted when commenting on computers in the classroom, learning takes work, discipline, commitment from both teacher and student, and responsibility. Stoll, *High-Tech Heretic*, *supra* note 10, at 12. The "payoff [in learning] isn't an adrenaline rush, but a deep satisfaction arriving weeks, months, or years later." *Id.*

each other instead of talking.¹⁸ Additionally, some professors suggest that the ability to IM each other makes the class discussion livelier because students can give others the answers, thereby making the discussion a communal effort.¹⁹

The desire to not be paternalistic or authoritarian is another reason professors give for not banning laptops in the classroom.²⁰ As adults, law students should be able to decide for themselves how they use their time during class. Students who choose not to listen and instead shop for shoes may find that choice reflected in their final grades. In this view the students are the consumers. If they pay for the education they can spend their time in class as they choose.²¹

For others it is the sense that laptops have arrived and there is nothing that can be done to stop their intrusion into the classroom.²² The technology is here and professors need to incorporate it into their classrooms or be swept aside. Additionally, banning laptops would be “punishing” everyone for the sins of those who are using their computers in an inappropriate manner. Since the problem is not one of technology *per se*, but one of socialization (or lack thereof), it should be handled on a case-by-case basis.

Another auxiliary benefit to allowing laptops is that students will become more accustomed to using a piece of equipment, the computer, that they most likely will be using for the rest of their careers.²³ Even those in favor of computers understand, though, that basic rules should be followed, such as using a quiet keyboard, turning the sound off during class, and keeping the power cords from tripping other students.²⁴

18. See Rivkin, Solitaire, Anyone?, *supra* note 16, at 24; Ellen Granberg and James Witte, Teaching with Laptops for the First Time: Lessons from a Social Science Classroom, *New Directions for Teaching and Learning*, Spring 2005, at 51, 53 (claiming instant messaging as beneficial since it allowed students to ask questions of others without talking).

19. See Ann Althouse, Let's Encourage Students to IM in the Law School Classroom (Apr. 12, 2005), available at <<http://althouse.blogspot.com/2005/04/lets-encourage-students-to-im-in-law.html>> (last visited Jan. 1, 2008). But see Curtis, Everything I Wanted to Know About Teaching Law School, *supra* note 4, at 485 (Instant Messages used to “feed” the answers to the student on-call).

20. See, e.g., Cole, Laptops vs. Learning, *supra* note 1, at A13 (Cole’s colleagues accused him of being “paternalistic, authoritarian or worse” for thinking of banning laptops).

21. See Tracy McGaugh, Laptops in the Classroom: Pondering the Possibilities, 14 *Perspectives: Teaching Legal Res. & Writing* 163, 165 (2006).

22. See Catherine Ross Dunham, Stretching Toward the Future: A View of Laptop Computers from Both Sides of the Screen, *The Law Teacher* 1, 3 (Spring 2007) (commenting that “[b]anning laptops from the classroom is like holding back the river with a levee of sandbags—it’s just a matter of time”).

23. For example, Chicago-Kent required computers to better prepare its students to practice in a field that is becoming dependent on technology. Richard A. Matasar & Rosemary Shiels, *Electronic Law Students: Repercussions on Legal Education*, 29 *Val. U. L. Rev.* 909 (1995).

24. See Jonathan S. Greene, *Coping, Student Law.*, Mar. 2004, at 14-15.

Other Professors Who Have Banned Laptops

My idea to ban laptops in the classroom is not a new one. Even though laptops have been available for some time, only recently have students brought laptops into STCL classrooms in large numbers. Some professors banned laptops before I decided to. Professors from Georgetown University Law Center,²⁵ Harvard Law School,²⁶ New York University School of Law,²⁷ Rutgers School of Law, Newark,²⁸ University of Memphis Law School,²⁹ University of Pennsylvania Law School,³⁰ and University of Texas School of Law have done so.³¹ Additionally, there are reports of discussion of laptop

25. See Cole, *Laptops vs. Learning*, *supra* note 1, at A13. Cole banned laptops because students with laptops were less engaged, transcribing lectures without processing the information, and distracted. *Id.*
26. Harvard Law School contemplated a complete ban on laptops in the classroom but never did so. See Cristina Silva, *Some Colleges Crack Down on Laptop Use in Classroom*, *Boston Globe*, June 10, 2006, at B1. At least three professors have reported eliminating laptops in their classrooms. Bruce Hay banned laptops because of the distraction they caused and their effects on class discussion. See Marie Szaniszlo, *Harvard Profs Lay Down Law: No Laptops in Class*, *Boston Herald*, June 4, 2006, at News 6. Professor Carol Steiker did so for the same reasons. See Silva, *supra*, at B1. Elizabeth Warren banned laptops because she felt students were not thinking about the class discussion and just transcribing the material. See Paras D. Bhayani, *HLS Debates Laptops in Class*, *Harv. Crimson*, Apr. 11, 2006, available at <<http://www.thecrimson.com/article.aspx?ref=512622>> (last visited Jan. 1, 2008).
27. Visiting Professor Cynthia Estlund banned laptops because of the lack of student engagement and students' use of laptops to take stenographic notes. E-mail from Cynthia Estlund, Professor, New York University School of Law, to Kevin Yamamoto, Professor, South Texas College of Law (Aug. 13, 2007, 8:24 p.m. CST) (on file with the author). The experience went so well, she writes, that she is "not only a convert but an evangelist" of banning laptops in classrooms. *Id.*
28. Rutgers School of Law Professor Sherry Colb banned laptops because of the distraction they caused and their effect on class discussion due to students typing verbatim and not engaging themselves in class. See Sherry F. Colb, *Taking Notes Without a Computer: How Laptops Distract From Classroom Learning*, *FindLaw*, Sept. 6, 2006, available at <<http://writ.news.findlaw.com/colb/20060906.html>> (last visited Jan. 1, 2008).
29. June Entman banned laptops to increase student participation and eye contact. See Brock Read, *A Law Professor Bans Laptops From the Classroom*, *Chron. Higher Educ.*, Apr. 7, 2006, at A43. Her class did not take the ban well. See *infra* text accompanying notes 33-36 discussing the students' response to Entman's laptop ban.
30. Charles W. Mooney, Jr. banned laptops due to the distractions they cause. See Kathy Matheson, *More Professors Ban Laptops in Class*, *Assoc. Press*, May 3, 2006, available at <http://www.boston.com/business/technology/articles/2006/05/03/more_professors_ban_laptops_in_class?mode=PF> (last visited Apr. 7, 2007) (students playing games on their computers led to the ban); MSNBC, *More Professors Ban Laptops in Class*, available at <<http://www.msnbc.msn.com/id/12609580/>> (last visited on Mar. 13, 2007) (reporting on Mooney's "experiment" to ban laptops from class). Jason Johnston is reported to never have allowed laptops in his classroom. See Chen, *Laptops Nixed in Some Law Classes*, *supra* note 16.
31. Calvin Johnson banned laptops, as did other faculty members at the University of Texas School of Law. See E-mail from Calvin Johnson, Professor of Law, University of Texas School of Law, to TaxProf Listserv (Sept. 19, 2006, 9:52:08 CST), available at <<http://>

bans for entire institutions or just individual classes at various other places of higher education.³²

June Entman's experience in her Civil Procedure class at the Cecil C. Humphreys School of Law of the University of Memphis is the most widely reported attempt by a law professor at banning laptops. Entman e-mailed her Civ Pro students after the semester started telling them to not bring their laptops to class.³³ She was prohibiting laptops because students were not "thinking and participating" and were too busy transcribing the lectures. She wanted to increase student interaction and eye contact by removing the laptop barrier.³⁴ The students did not take the ban well. Some filed a complaint with the American Bar Association ("ABA") arguing that lack of laptops put the law school in violation of the ABA's accreditation standard 704.³⁵ The ABA dismissed the complaint, but the story was reported in the national media and by various blogs.³⁶ This type of situation is one every professor wants to avoid when making a change in his or her classroom.³⁷

listserv.uc.edu/archives/taxprof.html > (last visited Nov. 27, 2007).

32. See, e.g., Kaleigh Dumbach, Columbia U. May Ban Laptops in Classroom, *Am. Intell. Wire*, Feb. 28, 2007 (town hall discussion between students and faculty regarding a comprehensive ban on laptops in classrooms); Carrie B. Fried, *In-class Laptop Use and its Effects on Student Learning*, 50 *Computers & Ed.* (forthcoming Jan. 26, 2008) (manuscript at 1, on file with author) (reporting more professors are banning laptops "due to concerns about the negative impact they have on student learning"); Nate McGinnis, *Instructors at U. Kansas Forbid Laptop Use in Classrooms*, *U. Wire*, Aug. 30, 2006 (laptops not allowed in certain classes in the University of Kansas Schools of Journalism, and Architecture, and in the College of Liberal Arts and Sciences).
33. See Read, *A Law Professor Bans Laptops From the Classroom*, *supra* note 29. The full text of Professor Entman's E-mail is posted on the Internet. See *More on Laptops in Class*, available at <http://www.orinkerr.com/2006/03/23/more-on-laptops-in-class/> (last visited Jan. 1, 2008). What is not reported is that the University of Memphis law school installed Wi-Fi in the entire building during Professor Entman's sabbatical. Therefore when she returned to the classroom she found more students were using laptops and surfing the Internet than the year before. See Greg Laughlin, Associate Dean, University of Memphis Cecil C. Humphreys School of Law, *Laptops in the Classroom: Pros and Cons, Comments at CALI Conference* (June 16, 2006), available at http://demo.apreso.com/acmcontent/1a0b551e-936f-4915-b7c5-d6412e0c7567/CALI_002_2006-06-15_04-00-PM_files/flash_index.htm (last visited Jan. 1, 2008).
34. *More on Laptops in Class*, *supra* note 33.
35. See Read, *A Law Professor Bans Laptops From the Classroom*, *supra* note 29. The most current version of ABA Standard 704 reads, "[a] law school shall have the technological capacities that are adequate for both its current program of legal education and for program changes anticipated in the immediate future." ABA Section of Legal Educ. and Admissions to the Bar, 2007-2008 Standards and Rules of Procedure for Approval of Law Schools 48 (Chicago, 2007) (Standard 704).
36. See Jeffrey R. Young, *The Fight for Classroom Attention: Professor vs. Laptop*, *Chron. Higher Educ.*, June 2, 2006, at A27.
37. As discussed *infra* at text accompanying note 155, the only negative response to the ban I instituted was on a student-run internet discussion group. A front-page article ran in our student newspaper, but the article just described the ban and some other background

The few reports on laptop bans have been positive.³⁸ Students are more engaged and talkative in class and show an increased ability to reason.³⁹ One professor who was comparing a class taught with laptops and without laptops allowed in the classroom concluded, “Don’t allow laptops.”⁴⁰

Why I Banned Computers

There are four primary reasons I banned laptops in the classroom. First, laptops can distract the student doing non-class related activities and those around him. Second, laptops interfere with classroom discussion by creating a physical and mental barrier between the professor and students. Third, laptops encourage poor note-taking skills, such as typing the class discussion verbatim. Fourth, and the principal reason I banned computers, was their negative effect on students. More and more of my students were coming to rely on their computers to provide them an answer instead of focusing on the Code and Regulations.

Laptop as a Distraction

The most obvious problem with laptops in the classroom is that they distract students doing some non-class (sometimes even in-class) activities on their computers and distract students seated nearby.

Distracting the Laptop User

Laptops create a distraction since, unlike a notebook, a computer may be used for much more than just taking notes. Today’s laptops have numerous programs, only some of which relate to classroom learning, along with picture and music files. According to my students and anecdotal evidence from other professors, every law school class that permits laptops has students who are doing non-class activities on their computers.⁴¹ Some report up to 85 to 90 percent of students doing non-class activities on their computers during class.⁴² What are the students doing? The list is long and varied. There are

information. Melanie Fordyce, Yamamoto: Leave Your Laptops at Home, Annotations, Oct. 2006, at 1 (on file with the author).

38. See Bhayani, HLS Debates Laptops in Class, *supra* note 26; Colb, Taking Notes Without a Computer, *supra* note 28; Cole, Laptops vs. Learning, *supra* note 1; Matheson, More Professors Ban Laptops in Class, *supra* note 30.
39. See Bhayani, HLS Debates Laptops in Class, *supra* note 26 (Professor Warren at Harvard reported that students are more engaged in class); Colb, Taking Notes Without a Computer, *supra* note 28 (noticing after only two weeks student improvement in analytical reasoning); Matheson, More Professors Ban Laptops in Class, *supra* note 30.
40. Matheson, More Professors Ban Laptops in Class, *supra* note 30 (statement of University of Pennsylvania law professor Charles Mooney).
41. Professor Catherine Ross Dunham took a JD class and “observed that almost all students were doing some form of mental multi-tasking on their computers during class.” Dunham, Stretching Toward the Future, *supra* note 22, at 1.
42. One of my students reported he has seen his fellow students doing non-class activities on

reports of students e-mailing and IMing individuals both in-class and out of class,⁴³ shopping,⁴⁴ playing games,⁴⁵ watching movies,⁴⁶ or surfing the web.⁴⁷ The use of the web to distract students is somewhat ironic since the ability to use Wi-Fi to connect to the web is many times provided by the school, although students with wireless cards may connect on their own.⁴⁸

their laptops “in every class I have attended.” E-mail from Frank Chelly, former student, South Texas College of Law, to Kevin Yamamoto, Professor of Law, South Texas College of Law (Aug. 10, 2006, 4:04 p.m. CST) (on file with the author). As for the number of students in any given class, Professor Don Herzog of the University of Michigan School of Law stated when he looked at a colleague’s class at “any given moment...literally 85 to 90 percent of the students were online.” Maia Ridberg, Professors Want Their Classes “Unwired,” *Christian Sci. Monitor*, May 4, 2006, at 16; Young, *The Fight for Classroom Attention*, *supra* note 36. Others have reported the number of students doing other activities at some time during class at “only” 40 percent. See Colb, *Taking Notes without a Computer*, *supra* note 28.

43. See Curtis, *Everything I Wanted to Know About Teaching Law School*, *supra* note 4, at 485 (listing the types of distractions laptops bring to the classroom); Eric Finkelstein, *Students, Professors Clash Over Laptops*, *Nat'l L. J.*, June 26, 2006, (one “unauthorized usage of laptops” included students checking e-mail during class); Brian Kladko, *Wireless Classrooms: Tool or Distraction?*, *The Record* (Bergen County, N.J.), Apr. 16, 2005, at A1 (reporting on a visit to Rutgers (Newark) Law School Professor Sherry Colb’s class discussed in note 28).
44. See Finkelstein, *Students, Professors Clash Over Laptops*, *supra* note 43 (part of the “unauthorized usage of laptops” included shopping); Kladko, *Wireless Classrooms*, *supra* note 43, at A1 (watched in class as students shopped on the Internet for clothes and other gifts); Ridberg, *Professors Want Their Classes “Unwired,”* *supra* note 42, at 16 (students shopping for clothes at Eddie Bauer).
45. See Leslie, *How Not to Teach Contracts*, *supra* note 4, at 1305 (commenting that if you look from the back of any law classroom you will see a “non-trivial number of students are playing solitaire”); Finkelstein, *Students, Professors Clash Over Laptops*, *supra* note 43 (the “unauthorized usage of laptops” included playing games); Kladko, *Wireless Classrooms*, *supra* note 43, at A1 (watched in class as students played solitaire); David Marquez, *Letter to the Editor*, *In Class, but Virtually Anywhere*, *N.Y. Times*, Mar. 21, 2001, at A22 (law student commenting that laptop users play video games during class). In my evaluations, one student who commented positively about the laptop ban stated he/she did miss playing solitaire. Student Evaluations for Professor Kevin Yamamoto’s Fall Semester 2006 Federal Income Taxation Class (on file with the author)
46. See Leslie, *How Not to Teach Contracts*, *supra* note 4, at 1305 (students watching closed captioned movies on DVD).
47. See Peter Barnes, *Classroom Disconnect*, G4 (Jan. 28, 2003), <http://www.g4tv.com/techtvault/features/41498/Classroom_Disconnect.html> (last visited Jan. 10, 2008) (student using the web during class to learn how to build a motorcycle); Kladko, *Wireless Classrooms*, *supra* note 43, at A1 (watched in class as students looked at various web sites); Ridberg, *Professors Want Their Classes “Unwired,”* *supra* note 42, at 16 (students looking at New York Times and apartment hunting during class).
48. Harvard, Michigan, Stanford, UCLA, and Virginia Law Schools all have technology which allows instructors to turn off either the classroom Wi-Fi or block student access to the internet. See Ridberg, *Professors Want Their Classes “Unwired,”* *supra* note 42, at 16 (ability to deny web access at Michigan, UCLA, and Virginia law schools); Rivkin, *Solitaire, Anyone?*, *supra* note 16, at 22 (instructors at Harvard and Stanford law schools can turn off Wi-Fi). The switch back to “dumb” classrooms is also occurring in business schools. See Katherine S.

While some professors use the fact that computers distract students as motivation to make their lectures more “interesting,” personally I concede that my lectures on the intricacies of 26 U.S.C. § 1231 (or any matter in the Code really) can never rival the entertainment value of the web. Other professors have come to that same conclusion.⁴⁹

Computers are not at the heart of the problem; doodling, a crossword puzzle, or a window and a sunny day can distract students. If all students had the maturity and discipline to do no more than take notes on their laptops, laptops would cease to be a distraction.⁵⁰ Looking around any classroom one can see that this is not the case.⁵¹ Some say that if the students do not want to learn, then let them do what they want, and it will be reflected in their final grades. The problem with this argument is two-fold. First, as discussed in detail below, a game or a picture on a laptop distracts not only the student using the computer, but also those students nearby. Second, distracted students cannot answer questions in class since they are no longer paying attention. The student who is doing non-class related activities on his or her computer is not only hurting his or her own education, but possibly the educational experience of many others in the class.

Distraction to Students around Them

Here is the point missed by some faculty while debating laptops in the classroom, especially those that say students who paid for their tuition have the right to do what they choose in class: A student doing *any* non-class activity will distract those who can see the screen.⁵² Since laptop

Mangan, Business Schools, Fed Up with Internet Use During Classes, Force Students to Log Off, Chron. Higher Educ. (Wash., D.C.), Sept. 7, 2001, at A43.

49. University of Michigan law professor Don Herzog conceded this point. Herzog jokes he is “willing to compete with Minesweeper, but not with the entire Internet.” University of Michigan Law School has since created a way to eliminate the use of the university’s Wi-Fi network during class. Jodi S. Cohen, E-Slacking: It’s Laptop over Lecture, Chi. Trib., July 18, 2006, at News 1. Georgetown University law professor David Cole points to the amount of competition on the Web for students’ attention as the reason why he banned laptops. Cole, Laptops vs. Learning, *supra* note 1, at A13.
50. But see *infra* text accompanying notes 125-44 (discussing how computers may harm student learning if students take verbatim notes).
51. “We have provided students with a multimedia contraption, a magic lantern and an unspoken challenge: do you have the strength to avoid ‘amusing yourself to death,’ ...and the courage to step around this self destructive aspect of the dark side.” Ken Meierdiercks, The Dark Side of the Laptop University, J. Info. Ethics, Spring 2005, at 9.
52. Fried, In-class Laptop Use, *supra* note 32 (manuscript at 3) (“Because of the vertical orientation of laptops, they also pose more of a distraction to fellow students than traditional notebooks... . Thus, the cognitive interference posed by laptops could spread from users to those seated nearby.”). Many of my student evaluations from the fall 2006 semester when I banned laptops noted this fact. The comments were: [#1] “I thought the lack of computers was a very good thing; less distraction;” [#2] “I enjoyed the absence of computers in the classroom. I personally do not use one in other classes and I find them to be a distraction in class. Someone in sight is always playing games or on the Internet

screens are vertical, students sitting in line-of-sight of the offending screen are distracted.⁵³ One person in the front row can distract almost the entire class if the screen is large, and what he is viewing is provocative.⁵⁴ Don't those students who are distracted have a right to a class environment where they can concentrate on the class discussion without being distracted by nearby computer-dependent classmates? Should they not enjoy the benefits of full discussion by the entire class? Who is making the more reasonable claim—the student who claims a "right" to do anything in class or the student who wishes to concentrate in class?

What makes the problem worse is that a student who is distracted in such a fashion is not at fault, except for choosing the wrong seat at the beginning of the semester. Some say that students have always had distractions in class, from passing notes to doing crossword puzzles and doodling. However, a crossword puzzle and doodling are done on a horizontal surface, not lit and in glowing color, and will not distract (most likely) those behind, or possibly even the person next to them. Note passing can be seen from the front and dealt with in an appropriate manner if deemed a problem. With the use of laptops, however, the distractions are multiplied and go unseen and unchecked by the professor.

What difference does it make if students are distracted? Why is it the professor's responsibility to make students learn? The primary reason is one that I have already discussed. Students doing outside activities on their laptops affect not only themselves but distract others around them. By banning all student laptops, overall learning in the class will increase. It has even

in class;" [#3] "I also liked the no computer rule, it got rid of the distractions of people playing games and distracting me while I am trying to learn;" [#4] "Loved the no laptop because fewer distractions from people playing on the computer;" [#5] "They are a distraction to everyone, even the user;" [#6] "Not having computers overall was very helpful..lack of distraction because of games/email by other students was a blessing;" [#7] "The 'ban' made a nice atmosphere in class." Student Evaluations, *supra* note 45.

A former student put the distraction caused by others this way: "[A laptop] distracts other students as well. While [I] should not be watching someone else's computer screen, if Zidane is showed head butting an Italian, my focus on the intricacies of section 1231 may be a little lost." E-mail from Chelly, *supra* note 42.

53. A new class of computers, Ultra-Mobile PCs (a.k.a. tablet computers) may rectify the problem of the vertical orientation of the screen. These computers are small and work like a notepad with the user inputting information by a stylus. See Walter S. Mossberg, This Time, Samsung Has Made a Tiny PC That's Practical to Use, *Wall St. J.*, May 17, 2007, at B1 (discussing Samsung Q1 Ultra tablet computer).
54. One student commented that laptops are "one of those things where one student can ruin it for everyone." McGinnis, Instructors at U. Kansas Forbid Laptop Use in Classrooms, *supra* note 32. At a CALI (Computer-Assisted Legal Instruction) conference presentation on laptops in the classroom, Professor Michael Richmond told of a situation at Nova Southeastern University law school where several students looked at pornography during class for the primary purpose of upsetting a female classmate who had "emotional problems." See Laughlin, Laptops in the Classroom, *supra* note 33.

been suggested that ignoring the classroom distractions caused by laptops is “unethical behavior” by the law professor.⁵⁵

In law school we teach a method of thinking, often called “thinking like a lawyer” or critical thinking, that involves looking at a set of facts and applying the law to those facts, putting the rule into a broader construct, and analyzing a problem from start to finish. Most feel these skills are developed when the student discusses a problem with the professor or listens when another student is being questioned. If a student is not listening, or is causing other students not to listen, the students may miss the broader and more important skill they need to learn to practice law.⁵⁶

Another problem with student distraction is that the entire class, or at least an overwhelming majority, needs to be engaged to move class discussion along.⁵⁷ At its best, law school classroom teaching is like an orchestra with the law professor as the conductor. When a group of students is not engaged, they cannot be called upon to benefit others by moving the class discussion forward, not unlike having the violin section taking a break during a concert. The question many law professors dread coming from students, and one that occurs with greater frequency is, “Can you repeat the question please?” I understand if every so often a student needs extra time to formulate an answer to a difficult question. Perhaps he or she was writing something down when I was asking the question and then called his name. But, when the query comes from many laptop addicts each time they are called on, this kills the flow of the class analysis and wastes everyone’s time.

Effect on Class Discussion

The effect that the distraction has on the classroom leads me to the second primary reason I banned laptops: Laptops interfere with classroom discussion. Since laptop screens are vertical and often very large, they block eye contact with the professor, especially if a student tries to hide behind them. The problem of lack of eye contact is two-fold. First, the lack of eye contact itself

55. Curtis, Everything I Wanted to Know About Teaching Law School, *supra* note 4, at 485 (“Ignoring the proliferation of distractions is equivalent to not managing the classroom, and thus constitutes unethical behavior.”). However, Professor Curtis may not agree with banning computers from the classroom since she writes that reprimanding all students for the behavior of some is “mismanagement of the classroom and thus unethical.” *Id.*

56. “Unless law students are fully engaged in the class...they miss out on the give and take of ideas in class discussion and do not develop the critical thinking skills that emerge from ‘deeply tearing apart a case.’” Schwartz, Professor Vie with Web, *supra* note 16, at A1 (quoting Ayres). University of Pennsylvania law professor Jason Johnston agrees, stating, “In law school, everything is Socratic method” and law students “have to listen very carefully. Without laptops, it’s easier to do that.” Chen, Laptops Nixed in Some Law Classes, *supra* note 16.

57. “[S]tudents who surf are not fully present to ask or answer questions themselves.” Ian Ayres, Lectures vs. Laptops, N.Y. Times, Mar. 20, 2001, at A25.

means a key indicator of student engagement and understanding is missing.⁵⁸ Second, a student looking at a laptop screen and concentrating on solitaire looks identical to a student concentrating on the material for the day. This means a professor lacks the capacity to control students' attention level and the flow of the analysis in his or her classroom.⁵⁹ Most, if not all, professors would tell a student to put down a newspaper he or she was reading in class. However, since what is on the screen cannot easily be discerned, that option is not available to those professors allowing laptops in the classroom.

Laptops also interfere with classroom discussion in that they allow students to bring in outlines by former students and commercial firms to class.⁶⁰ For law professors who teach using the problem method this can be problematic when students read the answers from a former student's outline without understanding the reasoning or technical analysis behind the answer. Determining if a student understands the material or is just using someone else's work wastes time and is frustrating to both professor and student. Even if laptops are not allowed it is still possible for a student to print out the materials and bring them into class. However, it is relatively easy to see if the students are reading by rote from something or whether they have assimilated the assigned material for themselves. Also, students who print out former outlines tend to turn pages furiously when you give them a question out of order—a pretty good indication they did not complete the assignment themselves or did not put in enough time grappling through the legal concepts to understand the material and are now in panic mode. If the professor knows that a student is answering from an old outline and has not put in sufficient effort to understand the material before class, the professor can act accordingly.

Poor Note-Taking Skills

In addition, laptops encourage poor note-taking skills. With a laptop some students with good typing skills transcribe classes verbatim. Scientific studies, personal observation, and my student evaluations indicate this is a

58. I did not realize how much information was being lost about the students' body language until I banned laptops and saw their faces, both engaged and bored, again.

59. This is monitoring the "classroom climate." See Genevieve Marie Johnson, Perception of Classroom Climate, Use of WebCT, and Academic Achievement, 17 *J. Comp. High. Educ.* 25, 26 (2006). The classroom climate describes the learning environment a professor creates. *Id.* An instructor can control the classroom climate by "establishing and maintaining the nature of the learning environment in terms of competition, collaboration, and caring." *Id.*

Even if a professor patrolled the classroom it would be difficult to police the use of laptops since students can change what they were looking at in an instant. See Kladko, Wireless Classrooms, *supra* note 43, at A1 (noting that pictures of Britney Spears can be "closed in an instant" by students).

60. This has been reported to me in student e-mails and evaluations. In an e-mail supporting the ban one student wrote, "Computers are often used to read directly from commercial outlines, case brief, etc." E-mail from Chelly, *supra* note 42. One of my evaluations also echoed the same sentiment: "Good idea to disallow laptops, it makes us pay attention and prevents us from cheating by looking at old outlines." Student Evaluations, *supra* note 45.

problem because students who are transcribing are not thinking deeply into the material but are in a mad dash to write down every word. Verbatim transcription eliminates the ability to analyze any given issue, the exact skill most law school classes are trying to develop.⁶¹ Students who are transcribing are not thinking about the material and cannot participate in any analytical discussion.⁶² The dreaded “can you repeat the question?” comes not only from students playing solitaire, but from students who are actually trying to learn, but are doing so by typing every word.

Over-Reliance on Technology

All of the reasons listed above (distraction, the effect on classroom discussion and note-taking), while important in my classes, were not the deciding factor in my decision to ban laptops. The principal reason was the effect laptops were having on students’ ability and desire to read the Code and Regulations. With greater frequency the following scenario occurred in class. First, I would ask a student a question, and then he or she would furiously start hitting the arrow key (or what I assumed was the arrow key since it was only one key they were repeatedly using) on their laptop and look toward their screen. Second, because the student could not formulate any answer I would ask a background question (e.g., “where is ‘dependent’ defined in the Code?”). The response was to keep on looking at the computer screen and keep tapping on the same key. I would then ask, “Do you have the Code downloaded into your computer?” to which the answer was, “No.” Then I would tell him or her I was asking a Code question and not one that could be gleaned from an outline.

This growing dependence by students on their laptops and loss of ability to think and reason the question through with the help of their Codebooks was troubling. In class I am primarily trying to help the students understand how to read the Internal Revenue Code. To do this the students need to be reading and analyzing the Code, not looking at their laptop screens.

This dependence on laptops is also borne out by at least one study that looked at how laptops affected students’ learning. Professor Fay at Carnegie Mellon University found that students were spending more time on their assignments but that the extra time spent was not reflected in the overall quality of their work. She found an “over-reliance” by students on their computers.⁶³

61. One article suggested ways to combat this problem besides banning laptops, such as “emphasiz[ing] Socratic discussion and analysis of hypotheticals over lecturing.” See Richard Warner, Stephen D. Sowle, and Will Sadler, *Teaching Law with Computers*, 24 Rutgers Computer & Tech. L.J. 107, 140 (1998).
62. Colb relates that she prefers students to take notes by hand since she believes they listen more closely in class. After banning laptops she “noticed a higher level of reasoning” by her students. See Colb, *Taking Notes Without a Computer*, *supra* note 28.
63. Anne L. Fay, *Impact of Laptop Computers on Students’ Academic Lives* 11 (Carnegie Mellon University, Eberly Center for Teaching Excellence, and Office of Technology for Education, Draft 2006), available at <<http://www.cmu.edu/teaching/resources/PublicationsArchives/StudiesWhitepapers/LaptopStudyReport-2006.pdf>> (last visited Jan. 10, 2008).

This is similar to what I found in my own class; students would look to their computers for answers instead of attempting to formulate answers on their own.

One possible reason that students looked to their laptops instead of their Codebooks is that there is no space for a laptop, casebook, and Codebook on their desks. Several of my evaluations from the fall 2006 semester made this point.⁶⁴ However, apart from the space problem I believe that some portion of our student body believes computers can provide all the answers, and therefore they look to a computer first and either do not trust their own abilities or they do not want to look at any source other than a computer for the answer.⁶⁵ If this is true, the only way to break students of this habit is to ban laptops from the classroom.

Secondary Reasons

There are other reasons why professors ban laptops in the classroom that I will mention here, although these reasons did not have any impact on my decision to do so. However, after spending the semester without laptops in the classroom I see the rationale behind many of them.

One reason that professors ban laptops or use of the Internet is out of respect for all students in the class. While students should respect each other, it is up to the professor to create and foster this environment in class. In many classes when another student starts to talk or ask a question, the other students start playing solitaire or doing other activities on their computers.⁶⁶ This shows a lack of respect.⁶⁷

Disallowing laptops fosters respect by eliminating students' ability to IM or e-mail derogatory comments about other students' class performance. When a student is on-call and having a difficult time, the knowledge that others are poking fun at him or her during class must be disheartening.

64. "Not having computers overall was very helpful. Professor seemed to be right on top of whether we were following him; lack of distraction because of games/email by other students was a blessing. I had to come up with a plan for note-taking, but overall, once I had that down, I preferred not having the computer. Space is limited anyway. I paid closer attention in class." Student Evaluations, *supra* note 45.

65. The laptop study completed at Carnegie Mellon University found students using laptops relied too much on their computers and found they constrained the students' ability to think independently. See Fay, Impact of Laptop Computers on Students' Academic Lives, *supra* note 63, at 11, 21. See also Brock Read, The Upside and Downside of Laptops in Education, *Chron. Higher Educ.*, Dec. 8, 2006, at 28 (commenting on the Carnegie Mellon study).

66. See Leslie, How Not to Teach Contracts, *supra* note 4, at 1304 (describing a classroom at Virginia Law School where students started to play computer games the moment another student started to talk).

67. "Seeing the person in the next seat playing a video game while you are trying to puzzle out a law question is demoralizing." Ayres, Lectures vs. Laptops, *supra* note 57, at A25.

Another secondary problem is the noise some laptop keyboards make.⁶⁸ This has never been a problem in my classes, but I can see the concern in large first-year classes where 100 students (or more) are typing at the same time. This is only a problem if the noise is loud enough to hinder the communication between instructor and students.

Other Solutions Besides Banning Laptops

There are other solutions to the problems laptops bring into the classroom other than banning laptops completely. Other professors (law and non-law) have tried having laptop students sit in the front of class.⁶⁹ The idea here is that the use of laptops can either be monitored by the rest of the students or more easily by the professor.⁷⁰ Others, such as Yale law professor Ian Ayres, have the opposite approach: allow laptops only in the last row of class so any non-class use does not disturb others.⁷¹

In dealing with the problem of the Internet as a distraction, some have attempted to eliminate Wi-Fi access. This can be done either by disabling the Wi-Fi transmitter for the classroom or by disabling individual student access to the school's internet system.⁷² Undergraduate and business schools have used these approaches.⁷³ However, these methods would not prevent a student with wireless internet access from looking at content on the web.

68. See Eric Finkelstein, No Logoff in Fight over Laptops in Class, *Nat'l L. J.*, June 30, 2006, at 1 (commenting on the "angry typist" student who types loud enough to disrupt both student and professor); see Sara Silver, *Wired Classes Give Lesson in Interest of Students: Access to Web Can Turn Off Attention*, *Chi. Trib.*, Mar. 12, 2001, at D6 (noting that noisy keyboards can disrupt a class); Warner et al., *Teaching Law with Computers*, *supra* note 61, at 140 (raising a concern that the noise from numerous students typing may distract the instructor and other students).
69. See Young, *The Fight for Classroom Attention*, *supra* note 36, at A27; *Laptops Latest Classroom Time Waster*, *UPI News Track*, Oct. 18, 2005, available at <http://www.upi.com/NewsTrack/Quirks/2005/10/18/laptops_latest_classroom_time_waster/8880/> (last visited Jan. 10, 2008).
70. Young, *The Fight for Classroom Attention*, *supra* note 36, at A27 (relating a story of a professor who allows laptops only in the front row so that he can just glance down to monitor what students are doing on their laptops); *Laptops Latest Classroom Time Waster*, *supra* note 69 (other undergraduate students can monitor what is being done by those students using laptops in the front row).
71. See Schwartz, *Professors Vie with Web for Class's Attention*, *supra* note 16, at A1.
72. See Rivkin, *Solitaire, Anyone?*, *supra* note 16, at 22 (stating that Harvard and Stanford law schools have installed technology into the classrooms that allows a professor to turn off the school's internet connection). There is one story about a professor at a "law school in Texas" who took a ladder and disconnected the classroom Wi-Fi transmitter. Schwartz, *Professors Vie with Web for Class's Attention*, *supra* note 16, at A1. Turning off the transmitter for any individual classroom does not stop any signal "bleeding" in from other rooms. No product may ever be able to actively jam the signal because such activity may not be allowed under FCC rules.
73. See Mangan, *Business Schools*, *supra* note 48, at A43 (reporting that various schools have methods to keep students off the Internet during class); Young, *The Fight for Classroom*

One professor suggests monitoring students' activity by moving around in the classroom and avoiding or minimizing pauses or delays in presenting the material.⁷⁴ Avoiding any delays in the presentation is especially important because this generation of students is used to having a lot of information presented to them in a short period of time.

Another method of restricting laptop use is simply telling the students they can only use their computers for note-taking but not for non-class activities such as games or the internet.⁷⁵ Some law professors do this by verbally requesting students not to do so,⁷⁶ putting it in the syllabus,⁷⁷ or, as done at Columbia Law School, placing a prohibition of extra-curricular use of laptops during class in the student integrity code.⁷⁸ If students followed the rule this would reduce the distraction caused by laptops but would do nothing for the problems caused by verbatim note-taking or the students' reliance on computers instead of Codebooks.

Professor Calvin Johnson at the University of Texas School of Law has an interesting method of dealing with laptops. He allows two students to use laptops in the classroom, but only for note-taking. Those students must make their notes available to the other students.⁷⁹ Professor David Cole at the

Attention, *supra* note 36, at A27 (reporting that Bentley College installed switches to allow professors to turn off the Internet in class). One associate dean at a business school analogized the Internet to a "big bowl of candy in front of students" which they would "eat, whether they were hungry or not." Mangan, Business Schools, *supra*.

74. See McGaugh, Laptops in the Classroom, *supra* note 21, at 164.

75. This was my rule in Tax I until I changed it because the students were over-relying on their computers to find "the answer." However, when I used this approach on a visit to the University of Montana School of Law, the experience was a disaster. At least one student totally ignored the no Internet rule and dealing with the infraction proved difficult.

76. See Ayres, Lectures vs. Laptops, *supra* note 57, at A25 (Professor Ayres says his students "went ballistic" after he made this request.). Students gave many reasons why they should be able to do other activities on their laptops in Ayres' class, including that it was their right to multi-task during class. Rivkin, Solitaire, Anyone?, *supra* note 16, at 21.

77. Professor Donald Tobin of the Ohio State University, Moritz College of Law does this and reports that non-class use is reduced, but not eliminated. E-mail from Donald Tobin, Professor of Law, Moritz College of Law, to TaxProf Listserv (Sept. 19, 2006, 11:26:44 CST), available at <<http://listserv.uc.edu/archives/taxprof.html>> (last visited Nov. 26, 2007). Professor Bruce Ottley of DePaul Law School also does the same and dismisses those students who violate the rule for the remainder of the class period. Cohen, E-slacking, *supra* note 49, at News 1. Putting the rule in the syllabus is the "ethical" way to handle the problem according to one law review article, and if students violate the policy treat it in the same manner as the professor would for the student being unprepared for class. See Curtis, Everything I Wanted to Know About Teaching Law School, *supra* note 4, at 485.

78. See Silver, Wired Classes, *supra* note 68, at D6.

79. See e-mail from Johnson, *supra* note 31. But see Kenneth A. Kiewra, Acquiring Effective Notetaking Skills: An Alternative to Professional Notetaking, 27 J. Reading 299, 300 (1984) (citing studies that indicate students recall more from their personal notes versus notes completed by someone else).

Georgetown University Law Center and Professor Cynthia Estlund at New York University School of Law use this approach as well.⁸⁰

Some undergraduate professors fight technology with technology. At some schools professors have the capability to look at what each student is doing on his or her laptop and to project any student's laptop screen onto a screen for the class to view.⁸¹ The thought behind this is that the fear of having e-mails or games brought to the class's attention makes students use their computers only for note-taking. Similar oversight is done in some undergraduate schools by stationing teaching assistants in the back of the room to monitor what students are doing on their computers.⁸² In the same vein, when I asked our Instructional Technology department about the capacity to see what students were doing on their laptops, I was told, "Well, we could install a big mirror at the back of the classroom."

Another high tech method suggested for use in a law school classroom is implementing a "classroom performance system" or "clickers."⁸³ This is a small device containing several buttons and a transmitter that students use to answer the instructor's questions. The student responses are displayed on the instructor's laptop and can be tabulated and recorded for each student. University of Cincinnati College of Law professors Caron and Gely believe the system fosters active learning and other positive aspects of teaching.⁸⁴ However, while this may assist in learning, it does not deal with the negatives created by laptops in the classroom.

Is There a Scientific Basis to Ban Laptops?

There is much conjecture that improper student laptop use in the classroom is detrimental to students' ability to understand, retain, and recall the material presented. In this section the psychological basics of learning, memory, and note-taking are discussed to see if there is any scientific basis for these beliefs.

80. See Cole, Laptops vs. Learning, *supra* note 1, at A13; E-mail from Estlund, *supra* note 27. Professor Estlund made the ban provisional and polled the students after several weeks. More than two-thirds of the students supported the ban after the provisional period was completed. *Id.*
81. See Paul Grondahl, Digital Doodling Students Plus Laptops Can Add Up to Some Serious Goofing off in College Classrooms, *Times Union* (Albany, N.Y.), Oct. 2, 2001, at D1 (classrooms at Rensselaer Polytechnic Institute have the ability to project the contents of students' laptop screens to all students); Mangan, Business Schools, *supra* note 48 (Bentley College professors can look electronically at individual student laptop screens).
82. See Anya Sostek, Laptops Give Students a License to Roam, *Pittsburgh Post-Gazette*, Nov. 6, 2005, at A1 (teaching assistants used to track students in a 200 student class).
83. See Paul L. Caron and Rafael Gely, Taking Back the Law School Classroom: Using Technology to Foster Active Student Learning, 54 *J. Legal Educ.* 551, 560-61 (2004).
84. *Id.* at 560-62.

Psychology of Learning/Memory and Distraction

In psychology, “learning” is any change in an organism’s behavior resulting from experience.⁸⁵ In humans, associations between existing knowledge and new material or stimuli result in learning. Learning can be contrasted to memory, which is the ability to store and retrieve information over a period of time.⁸⁶

Memory and Shallow Encoding

Psychologists look at memory as a process, or continuum, with various levels or stages present to store information.⁸⁷ The classic model has memory divided into three different levels or stages: sensory memory, short-term memory, and long-term memory.⁸⁸ Sensory memory is the storage for various stimuli going on around us, for example, how much light there is, the sounds of people talking or moving, the room temperature, and other sensory input. Sensory memory has a very short time span, a few nano-seconds for eyesight and several seconds for hearing.⁸⁹

After sensory memory, cognitive processes store information for a longer period of time. Some psychologists have separated this into two levels: short-term memory and long-term memory.⁹⁰ Others maintain there is no separate system for short-term memory, only a longer memory trace developed by greater and more involved levels of processing the material.⁹¹ Both theories suggest that the material must be somehow encoded so the brain can store and later retrieve the information.⁹²

Encoding can be shallow, intermediate, or deep. Shallow processing correlates with attending only to such things as physical or sensory characteristics.⁹³ Intermediate levels are associated with labeling or organizing the item. Deeper

85. David G. Myers, *Exploring Psychology* 221 (7th ed., New York, 2007).
86. David G. Myers, *Psychology* 349 (8th ed., New York, 2007).
87. See *id.* at 351 (breaking memory down into sensory, short-term, and long-term); Fergus I.M. Craik and Robert S. Lockhart, *Levels of Processing: A Framework for Memory Research*, 11 *J. Verbal Learning & Verbal Behav.* 671, 675 (1972) (perception involves “a number of levels or stages”) (hereinafter *Framework for Memory Research*).
88. See Myers, *Psychology*, *supra* note 86, at 351.
89. *Id.* at 362.
90. See *id.* at 351–52. But see Fergus I. M. Craik, *On the Transfer of Information from Temporary to Permanent Memory*, 302 *Phil. Transactions Royal Soc'y London* 341, 342 (1983) (stating that the “buffer model has its failing”).
91. Fergus I.M. Craik, *Levels of Processing: Past, Present...and Future?*, 10 *Memory* 305, 306 (2002) (hereinafter *Past, Present...and Future?*).
92. See Helene Hembrooke and Geri Gay, *The Laptop and the Lecture: The Effects of Multitasking in Learning Environments*, 15 *J. Computing Higher Educ.* 46, 50 (2003).
93. See Craik, *Past, Present...and Future?*, *supra* note 91, at 308 (shallow analysis looks only to “surface form, colour, loudness, and brightness”).

levels of encoding come with the ability to associate the information with related material or past experiences. Deeper processing also involves interpreting and understanding the material in a way other than surface characteristics, an analysis of the purpose, and what can be inferred or implied by the information. The deeper the processing the longer the item is retained and with more detail.⁹⁴ This deeper processing allows greater use and handling of the new material with it being applied to new and different areas⁹⁵—ultimately this is what professors attempt to do in the classroom, give the students the ability to apply their knowledge to a novel sets of facts.

Deeper Encoding Leads to Stronger Memory Trace

Deeper encoding takes conscious effort because the cognitive system is limited, and it cannot closely attend to all the various stimuli present at any given time.⁹⁶ This limited ability to process information means that when attention is divided between a primary and secondary task, encoding suffers and so too does the ability to process an item deeply and create a lasting memory.⁹⁷ The more complex the distraction, the worse the decrement to memory.⁹⁸ In general, distractions result in a shallower amount of processing, and individuals suffer in both the amount of information recalled and for how long.⁹⁹ If students use their laptops to do other activities besides just taking notes, this can result in such distraction and impair their ability to recall the material.¹⁰⁰ Extra-curricular computer activity would also impair the ability of those around them that are distracted by visual activities on the offending student's laptop.

94. See *id.* at 306–08.

95. Craik and Lockhart, Framework for Memory Research, *supra* note 87, at 676.

96. See Myers, Psychology, *supra* note 86, at 355; Moshe Naveh-Benjamin, Fergus I.M. Craik, Jonathan Guez, and Halit Dori, Effects of Divided Attention on Encoding and Retrieval Processes in Human Memory: Further Support for an Asymmetry, 24 *J. Experimental Psychol.: Learning, Memory and Cognition* 1091, 1091 (1998); Michael I. Posner, Cumulative Development of Attentional Theory, 37 *Am. Psychol.* 168, 170 (Feb. 1982) (reviewing several studies on attention and surmising “people were limited in their ability to process information”).

97. See C.M.B. Anderson and Fergus I.M. Craik, The Effect of a Concurrent Task on Recall From Primary Memory, 13 *J. Verbal Learning & Verbal Behav.* 107 (1974); Naveh-Benjamin et al., Effects of Divided Attention, *supra* note 96, at 1099; Fergus I.M. Craik, Richard Grevoni, Moshe Naveh-Benjamin and Nicole D. Anderson, The Effects of Divided Attention on Encoding and Retrieval Processes in Human Memory, 125 *J. Exper. Psychol.: Gen.* 159, 160 (1996); B.B. Murdock Jr., Effects of a Subsidiary Task on Short-Term Memory, 56 *Brit. J. Psychol.* 413 (1965).

98. Moshe Naveh-Benjamin, Fergus I.M. Craik, Dana Gavrilescu, and Nicole D. Anderson, Asymmetry between Encoding and Retrieval Processes: Evidence from Divided Attention and a Calibration Analysis, 28 *J. Memory & Cognition* 965, 969, 974 (2000).

99. Craik, Past, Present...and Future?, *supra* note 91, at 309.

100. See Fried, In-class Laptop Use, *supra* note 32 (manuscript at 3).

Studies on Classroom Use of Laptops

Researchers have looked specifically at whether laptops help or hinder students in the classroom. Most of the papers that conclude that student laptop and Wi-Fi use in the classroom is beneficial have either looked at classes specifically designed for laptop use or are just surveys of how the instructor and students felt about using a laptop in the classroom.¹⁰¹ All of the papers that either looked at laptop use in a general classroom or used a control group to see the effects of laptop use on grades and how well students attended to the lecture conclude that classroom laptops should be limited.¹⁰²

One study looked for a correlation between the amount of web browsing students did and their performance in the class, measured by their final grade. Not surprisingly, the researchers found that increased web browsing in class was correlated with lower grades. The authors of the study suggest that grades may be increased if students' ability to use the technology is limited to those items that they need to complete the tasks required by the class.¹⁰³

Another study looked at what, if any, were the effects of laptops on students' recall of the specific material covered during a class period.¹⁰⁴ In this experiment undergraduate students in a communications class were allowed to use laptops during the entire semester. Twice during the semester students were divided into two groups and separated into two rooms. Both groups listened to the same videotaped lecture; one group was told to use laptops, the others told to listen to the lecture without the aid of a laptop computer. A quiz was given at the end of the lecture with both recognition and recall questions. The findings showed that increased internet use during the lecture correlated with poorer scores on the quiz, indicating those students did not recall or remember as much lecture material.¹⁰⁵ The decrement caused by the web did not depend on whether students were browsing related or unrelated material. In fact, browsing related material resulted in a lower test score than viewing unrelated material. The researchers concluded that the "memory decrement in multitasking situations is the result of the proportion of time drawn off task" and not due to how related the task is to what is being discussed in class.¹⁰⁶

101. *Id.* at 2.

102. See *id.* at 7; Michael Grace-Martin and Geri Gay, Web Browsing: Mobile Computing and Academic Performance, 4 *Educ. Tech. & Soc'y* 95, 104 (2001); Hembrooke and Gay, The Laptop and the Lecture, *supra* note 92, at 61.

103. Grace-Martin and Gay, Web Browsing, *supra* note 102, at 99-100, 103-04. There is no indication that the researchers tried to account for other confounding factors such as the students' past GPA or SAT scores.

104. Hembrooke and Gay, The Laptop and the Lecture, *supra* note 92, at 46, 58.

105. *Id.* at 52, 58

106. *Id.* at 58-59. However, the paper notes that the students' overall performance in the class did not suffer, with the average final grade being a B+. *Id.* at 61. They surmise this is because the class structure was "nontraditional, highly interactive and dynamic, and students were

A study published in 2007 looked at the effects of laptops and wireless connections in a large undergraduate lecture course (137 students in two sections).¹⁰⁷ The study found grades were negatively correlated with the amount of time that students used their laptops for tasks other than taking lecture notes. The author suggests that laptop use distracted students and damaged their ability to pay attention and understand the material. In surveys that were also completed, the largest source of distraction for students was the non-class use of laptops by other students.¹⁰⁸

The class examined 2007 study is most like a typical law class—a large lecture-type setting with unstructured use of laptops. As cognitive theory suggests, memory is quite dependent on the amount of attention allocated by the individual. Additionally, if one studies material over a longer period of time the memory trace is stronger than if done all at once. Methods to develop a stronger memory trace are discussed later, but in general the experiments show that distractions hurt student learning, and therefore we should do what we can to eliminate those distractions to maximize the amount of learning that occurs in class.

MRI Study on Learning

A UCLA Department of Psychology and Brain Research Institute study adds additional support for the conclusion that distraction hampers learning.¹⁰⁹ As referred to above, long-term memory includes both declarative memory and habit learning. Declarative memory is that which retrieves past information (as to declare or discuss it) and employs the system by which information is used flexibly in novel situations. This is the type of information processing education seeks primarily to develop. This type of memory is associated with the medial temporal lobe (MTL) of the brain and is the dominant system associated with learning.¹¹⁰

Declarative memory can be contrasted with habit learning, which is associated with behaviors human beings complete without thinking and therefore cannot be easily put into words, like riding a bicycle or touch-typing.¹¹¹ Habit learning is associated with a different, more basal portion of the brain, the striatum.¹¹²

encouraged to use their laptops in class to supplement the course lecture,” while in a more traditional class format grades may have suffered. *Id.* at 60–61.

107. Fried, In-class Laptop Use, *supra* note 32 (manuscript at 3).
108. *Id.* at 5–6. The author suggests that students who are struggling perhaps use their laptops as a diversion.
109. Karin Foerde, Barbara J. Knowlton, and Russell A. Poldrack, Modulation of Competing Memory Systems by Distraction, 103 Proceedings of the National Academy of Sciences of the United States 11778 (2006).
110. *Id.* at 11781.
111. See *id.* at 11778; Kate N. Grossman, Stop Interrupting Yourself, Chi. Sun-Times, Mar. 4, 2007, at B1 (habit learning supports automatic behavior like riding a bicycle).
112. Foerde, Knowlton, and Poldrack, Modulation of Competing Memory Systems by Distraction,

The process of encoding and recalling phone numbers shows the differences in the two types of memory. To use declarative memory a person would sit down, memorize the number, and then recall it when needed. In habit learning, the number would be dialed 1,000 times and then, even if the number could not be consciously recalled, the phone number could be dialed if you went to an appropriate number pad.¹¹³

The UCLA study found a significant difference in a subject's ability to use knowledge depending on whether the subject was distracted during the training phase, even though the amount learned was similar between subjects in the distracted or non-distracted group.¹¹⁴ They found that the distracted group had a significant reduction in the flexible declarative knowledge about the task.¹¹⁵ One of the unique aspects of the study was that subjects were scanned using functional magnetic resonance imaging (fMRI) during the training.¹¹⁶ The researchers found that when subjects were not distracted, the right hippocampus, the area associated with the MTL, was active.¹¹⁷ When subjects were distracted during training, the same area was quiet, and the area involved with habit learning, the striatum, was active.¹¹⁸ The two types of memory, declarative and habit, seem to be in competition with each other for the brain's processing capacity, and if there is a significant distraction, habit learning prevails.¹¹⁹

The authors of the study conclude that even if the amount of knowledge recalled is the same when individuals are distracted as when not distracted, the ability to adapt that knowledge and apply it to new situations is hampered.¹²⁰ Or, as one of the authors stated, "Multitasking adversely affects how you learn."¹²¹

supra note 109, at 11778.

113. See Randolph E. Schmid, *Turning Off the Idiot Tube Can Sharpen Kids' Learning*, *Star-Ledger*, July 25, 2006, at News 2.

114. Foerde, Knowlton, and Poldrack, *Modulation of Competing Memory Systems*, *supra* note 109, at 11781.

115. *Id.* at 11779.

116. *Id.* at 11778. The fMRI tracks brain activity by looking to which portion of the brain blood is flowing. See *Health & Wellness: Multitasking Adversely Affects the Brain's Learning Systems*, Thousand Oaks Acorn, Aug. 3, 2006, available at http://www.toacorn.com/news/2006/0803/health_and_wellness/052.html (last visited Jan. 10, 2008).

117. Foerde, Knowlton, and Poldrack, *Modulation of Competing Memory Systems by Distraction*, *supra* note 109, at 11780.

118. *Id.* See also Lori Aratani, *Teens Can Multitask, But What Are Costs?*, *Wash. Post*, Feb. 26, 2007, at A1 (quoting one of the authors as saying that during multi-tasking the hippocampus was "quiet" while the striatum was active).

119. See Schmid, *Turning Off the Idiot Box*, *supra* note 113.

120. See Foerde, Knowlton, and Poldrack, *Modulation of Competing Memory Systems by Distraction*, *supra* note 109, at 11778, 11782.

121. *Health & Wellness*, *supra* note 116 (quoting Russell Poldrack of UCLA).

In a law school classroom where students are distracted by laptops, one can generalize the conclusions of the UCLA study to predict that students will not be able to as easily transfer the knowledge gained in the classroom to other situations. This transfer is characteristic of thinking skills that are the foundation of strong, creative, lawyerly analysis. If students have a more difficult time encoding the information into declarative memory due to distraction, the amount of distraction should be reduced. This would apply to laptops in the classroom, talking in class, or even possibly the distraction caused by others eating.

Individuals believe they are multi-tasking when checking their e-mails or shopping during class. However, true multi-tasking is giving the same priority to more than one task, such as filing papers while talking on the phone.¹²² That people can effectively multi-task in this manner is supported by cognitive psychology.¹²³ However, a new term was coined for what people are doing now—“continuous partial attention.”¹²⁴ Continuous partial attention is not giving one’s full attention to any one task, but always monitoring stimuli for other opportunities. It is this that most likely leads to learning difficulties.

Science of Note-taking: Verbatim versus Conceptual

One of the most common complaints law professors have about laptops in the classroom is that students transcribe the discussion and do not actively think during class. This lack of active thought hampers class discussion and makes teaching more difficult. While no directly on-point experiment has been completed, the studies on student note-taking support this intuitive conclusion. This portion of the paper discusses the relevant experiments in the area and concludes that, unless students using laptops in class are highly disciplined note-takers, laptops do more harm than good to helping students learn.

What is the purpose behind taking notes in class? How does it help students learn? The literature suggests learning occurs because of “generative processing,” when relations are generated between the presented material and existing knowledge.¹²⁵ Generative processing might be said to correspond to deeper processing—forming more complex relationships with past knowledge. Two explanations exist as to why note-taking helps

¹²². See Linda Stone, Linda Stone’s Thoughts on Attention and Specifically, Continuous Partial Attention, available at <http://continuouspartialattention.jot.com/WikiHome> (last visited Jan. 10, 2008).

¹²³. See Posner, Cumulative Development of Attentional Theory, *supra* note 96, at 170 (commenting that at “high levels of practice, people can time share two tasks as well, or almost as well, as they can perform a single task”).

¹²⁴. See Linda Stone, Thoughts on Attention, *supra* note 122.

¹²⁵. See Kenneth A. Kiewra et al., Note-Taking Functions and Techniques, 83 J. Educ. Psychol. 240, 240 (1991); Richard J. Peper and Richard E. Mayer, Generative Effects of Note-Taking During Science Lectures, 78 J. Educ. Psychol. 34, 34 (1986).

foster generative processing: encoding and external storage (also called “encoding plus storage”).

The encoding hypothesis postulates that taking notes focuses the note-taker’s attention on the content of the material and helps the student to organize and process the material more deeply.¹²⁶ This additional focus and attention strengthens relationships to prior knowledge and fosters more generative processing as compared with those not taking notes.¹²⁷ Experiments test the encoding function of note-taking by comparing test results of two groups listening to a lecture, note-takers and non-note-takers, with neither group reviewing materials before the assessment instrument is given.¹²⁸

The external storage function suggests notes assist learning because they provide a source to review and aid the reader in reconstructing the lecture.¹²⁹ The more complete the set of notes, the better the quality of learning that may occur later. Experiments on the external storage function compare test results between two groups who listen to a lecture and take notes. One group is allowed to review their notes before taking the assessment instrument while the other is not.¹³⁰ Since both groups take notes, external storage has also been called “encoding plus storage.” True external storage is then found in a group who only reviews notes but does not first see or hear the lecture (i.e., borrowed notes).¹³¹

Experiments verify both the encoding and external storage function of note-taking, with the external storage function being the more significant.¹³² One would then be led to believe that taking verbatim notes would be the optimal method of note-taking for law students since they would have a complete and fairly accurate copy of what occurred in class. This however is not the

¹²⁶. See Burke H. Bretzing and Raymond W. Kulhavy, *Notetaking and Depth of Processing*, 4 *Contemp. Educ. Psychol.* 145, 146 (1979) (note-taking focuses attention to content); John P. Rickards and Frank Friedman, *The Encoding Versus the External Storage Hypothesis in Note Taking*, 3 *Contemp. Educ. Psychol.* 136, 136 (1978) (taking notes on written prose encodes and results in a “transformation” to aid learning).

¹²⁷. See Bretzing and Kulhavy, *Notetaking and Depth of Processing*, *supra* note 126, at 146 (as individuals analyze something more thoroughly they encode the material and relate it to prior knowledge).

¹²⁸. See Kenneth A. Kiewra, *Students’ Note-Taking Behaviors and the Efficacy of Providing Instructor’s Notes for Review*, 10 *Contemp. Educ. Psychol.* 378, 378 (1985); Rickards and Friedman, *The Encoding Versus the External Storage Hypothesis*, *supra* note 126, at 136.

¹²⁹. See Kiewra et al., *Note-Taking Functions and Techniques*, *supra* note 125, at 240; Kiewra, *Students’ Note-Taking Behaviors*, *supra* note 128, at 378; Rickards and Friedman, *The Encoding Versus the External Storage Hypothesis*, *supra* note 126, at 136.

¹³⁰. See Kiewra et al., *Note-Taking Functions and Techniques*, *supra* note 125, at 240; Rickards and Friedman, *The Encoding Versus the External Storage Hypothesis*, *supra* note 126, at 136.

¹³¹. See Kiewra et al., *Note-Taking Functions and Techniques*, *supra* note 125, at 240.

¹³². See *id.* (noting that both functions “contribute to learning” but “the external storage function is the more important function”).

case because of the type of learning that is supposed to occur in a law school classroom.

Taking verbatim notes, or even receiving the instructor's lecture notes, may be the best method for recording material of a factual nature.¹³³ But, in a law school class students are required to learn the material at a higher level of abstraction. The material is more conceptual than factual in nature. Verbatim note-taking does not help with the comprehension of the material.¹³⁴ Also, studies have shown subjects "failed to process information" when the instructor's notes were provided to them, learning only factual information, which did not facilitate "higher-order learning."¹³⁵

Support for the supposition that students who take verbatim notes are not thinking about the material comes from anecdotal stories of professors in the classroom. The most common is the observation of students asking, "Can you repeat the question please?" even though they were attending to the lecture and typing what was being said. The process of transcribing, either by typing or the use of short-hand, seems to bypass the areas of critical thinking in the brain. Additionally, it has been suggested that the cognitive process of taking notes by hand is different than that of taking notes on a computer.¹³⁶ While the position that students do not think while transcribing material is intuitively appealing, I could find no studies to support this assumption.

The literature suggests students should take notes in a summary or paraphrased manner, capturing the conceptual highlights.¹³⁷ The difficulty here is that students as a whole are poor note-takers.¹³⁸ Since this is true, instead of learning how to take notes in an appropriate fashion, students are taking the "easy way" and transcribing what the instructor says for later review. Not only is this a poor way of taking notes, because it eliminates the student's ability to encode and understand the material during class, it also

¹³³ See, e.g., Kiewra, Students' Note-Taking Behaviors, *supra* note 128, at 384-85.

¹³⁴ See Bretzing and Kulhavy, Notetaking and Depth of Processing, *supra* note 126, at 151 (study on the comprehension of written materials when subjects were asked to either write portions of the material verbatim, paraphrase portion or write summaries of the material).

¹³⁵ See Kiewra, Students' Note-Taking Behaviors, *supra* note 128, at 384-85.

¹³⁶ See Trujillo, The Relationship between Law School and the Bar Exam, *supra* note 2, at 73 (hypothesizing that the cognitive process of taking notes by hand and computers is different); Raina Kelley, The Writing on the Wall, *Newsweek*, Nov. 12, 2007, at 69 (commenting on recent studies suggesting that good penmanship is linked to better grades).

¹³⁷ See Bretzing and Kulhavy, Notetaking and Depth of Processing, *supra* note 126, at 151 (summary and paraphrased note-taking helps increase comprehension on written material); Kenneth A. Kiewra and Harold J. Fletcher, The Relationship Between Levels of Note-Taking and Achievement, 3 *Human Learn.* 273, 280 (1984) ("students who note more conceptual main points do better than factual note-takers" on learning the material in a conceptual and relational manner).

¹³⁸ See Kiewra, Acquiring Effective Notetaking Skills, *supra* note 79, at 300 (an incoming college freshman records as little as 11 percent of the key lecture ideas, while top students get only 62 percent of the key ideas).

generates reams and reams of notes. The external storage function works only if the notes are reviewed, and one would believe this is especially true of notes taken in a verbatim fashion where no encoding occurs during the process of taking them.¹³⁹ If students are creating more material than can be reviewed in detail at a later time, then writing verbatim notes will do much more damage than taking notes by hand in a summary or paraphrased manner.

In general, instead of taking the cognitively simpler path and taking verbatim notes without thinking or relating the lecture to material a student already knows, students should be encouraged to take better notes.¹⁴⁰ First and foremost, students need to prepare for the day's material and attend class.¹⁴¹ In reading and preparing for class beforehand students can assist their generative processing by forming connections to already known information and form a base of knowledge to relate the lecture material. One should not read the material like a novel, but actively, even aggressively, trying to understand the doctrines and concepts, figuring out what the cases are trying to say, looking at the specific facts, holdings, and rationales. Second, students should take detailed notes, but in a paraphrased or summary fashion.¹⁴² Third, students should revise their notes as soon as possible after class, filling in any gaps.¹⁴³ Typing their notes into their computers to aid in later recall and storage can do this. Fourth, students should complete an outline using their notes as a source along with any additional material they may have present (hornbooks, student aids, or additional notes from other students). It is this final step where the most learning can take place since the student can process the information at a deeper level and generatively process the material.¹⁴⁴

My Experience in Banning Laptops

The Process of Banning Laptops

My decision to ban computers from the classroom came after long consideration over the course of several school years. My primary issue with student computer use in class was not the distraction they caused—although that was a concern—but

^{139.} See Kiewra et al., Note-Taking Functions and Techniques, *supra* note 125, at 240; Kiewra, Students' Note-Taking Behaviors, *supra* note 128, at 384-85; Rickards and Friedman, The Encoding Versus the External Storage Hypothesis, *supra* note 126, at 136.

^{140.} But see Kiewra et al., Note-Taking Functions and Techniques, *supra* note 125, 241 (suggesting that little generative processing can occur since lectures place a great demand on students' cognitive abilities).

^{141.} See Kiewra, Acquiring Effective Notetaking Skills, *supra* note 79, at 300.

^{142.} See *id.* This allows for the lecture to be reconstructed at a later time while not interfering with any encoding that may occur during the lecture itself.

^{143.} *Id.* at 301. I tell my students that if they are going to add in any material to their notes to do so with a different colored pen, pencil, or font. This way they will know what material was delivered during class and what was written from their recollections of class.

^{144.} See Craik and Lockhart, Framework for Memory Research, *supra* note 87, at 676; Kiewra, Acquiring Effective Notetaking Skills, *supra* note 79, at 301.

rather student reliance on computers as opposed to the Code and Regulations we were studying.

I approached the classroom laptop ban cautiously. I believe the professor should be in control of the classroom and set down the rules for what is, and is not, acceptable in class. Yet, banning computers was not the same as telling the class to turn off their cell phones or come to class on time. I was concerned about a student backlash, envisioning such problems as petitions to the dean or the ABA, students flagrantly disregarding the ban or being upset to the point where they were incapable of learning the material.¹⁴⁵

While I was not personally concerned about this, there are reports that some law professors are scared to impose a laptop ban, not because of student comments during the semester, but because of the possibility of negative teaching evaluations.¹⁴⁶ In some law schools, raises and promotions are partially based on student evaluations and this may be of some concern.¹⁴⁷ My evaluations did not suffer and may have increased because of the laptop ban.¹⁴⁸

¹⁴⁵. When Ayres attempted to ban the use of the Internet (but allow laptops) in his classroom at Yale Law School, he stated that he was “surprised at how brazenly my own students resisted my laptop restrictions, both in class discussion and in a virtual chat room.” Ayres, *Lectures vs. Laptops*, *supra* note 57, at A25. The students argued that they were multi-tasking, being productive during slow or poorly taught sections of the class period, and that web surfing helped them to stay awake during class and increased their desire to attend class, provided the ability to research legal questions that came up in class, and provided competition for the professor so he would have increased incentive to teach more effectively. *Id.*

¹⁴⁶. Gary McWilliams, The Laptop Backlash—Wireless Classrooms Promote Messaging and Web Surfing, Not Learning, Professors Say, *Wall St. J.*, Oct 14, 2005, at B1 (student at Chapman Law School saying that professors feared banning laptops since “[t]hey know students will go after them when it comes time for review”).

Another reason why professors may not want to upset students is that the community they live in is small, and upsetting students may have negative social ramifications. A senior administrator from such a school told me that professors tend to cater to students since in a small town everyone is very interconnected. She gave as an example the student health center. A disliked professor they will receive inferior care to one who is liked because “[the health center] is staffed by students, or the friends/spouses of students.” Where the students control the institution, doing anything to upset even a small vocal minority would be difficult for anyone who did not see a critical pedagogical need for making the change in the classroom.

¹⁴⁷. See, e.g., Clark Kauffman, Lawyer Could Be Suspended for Changing Student Surveys, *Des Moines Reg.*, Apr. 1, 2007, at B1. University of Iowa law professor Kenneth Kress resigned after being charged with changing scores on his student evaluations. Student evaluations are one of the factors used by the administration to determine both salaries and appointment of endowed chairs. *Id.*

¹⁴⁸. South Texas College of Law adopted a new student evaluation form in the fall 2006 semester, so a direct comparison to my prior evaluation numbers is impossible. However, the numbers seem similar and are above the school average. Estlund said that the first semester she banned laptops she received her best course evaluations of her career. E-mail from Cynthia Estlund, Professor, New York University School of Law, to Kevin Yamamoto, Professor, South Texas College of Law (Aug. 14, 2007, 9:15 p.m. CST) (on file with the author).

I gave students ample notice about the ban and made sure the law school administration was warned and supportive of my idea. In giving the students notice I was actively trying to avoid the problems that Entman ran into when she decided to ban laptops in the middle of the semester. Also, this allowed students time to process the idea, combat any expectations they may have had of using a computer, and allowed them to make whatever adjustments they required since they would not have a computer in class.¹⁴⁹

My first announcement that I was contemplating banning computers in the fall semester was to my Tax I summer school students. I asked them to e-mail me their thoughts on the matter, especially why students need laptops in class, except for the obvious reason of taking notes. I conceded that taking notes on one's computer may be *easier* than by hand, although after doing the research for this paper I do not believe that it is necessarily *better*. I asked my summer students to make the argument for their fellow students and told them that, without the help of those currently enrolled, I was probably going to ban future classroom laptop use in the basic Income Tax class. I received only two e-mails, both of which supported the laptop ban.¹⁵⁰

After hearing no strong response from my summer Tax I students, I was emboldened to try banning laptops in my Tax I class for the fall 2006 semester. Generally I have between sixty and ninety students in the class in any given fall semester, and between forty and sixty in the Spring semester. Tax I is a required class and taught year-round.

The ban covered the use of any laptops in class, unless the Assistant Dean for Academic Assistance determined a laptop was necessary for any individual student. While I believe that laptops hinder learning, that does not apply to those individuals who need them or for whom the use of a laptop makes them able to attend class and take notes.¹⁵¹

I determined to ban laptops only in my basic Tax I class and not my advanced tax class.¹⁵² This was done for several reasons. First, the lack of

¹⁴⁹ In banning laptops, I found students more malleable and understanding than I originally believed. While I worried about a student uprising, other sources foretold a smooth transition. The first example is from a student in my summer Tax I class. After I told the summer students about my decision to ban computers in the fall semester this student said, "they will complain about it, but after a week they will accept it." He was correct. The second is a reply to Professor Ayres, Op-Ed piece in the New York Times. A chemistry professor at UNC Greensboro wrote, "The students will agree to any such stated policy as long as the expectation is made clear from the get-go. Clear expectations are also an important part of teaching." Paul Kelter, *In Class, but Virtually Anywhere*, N.Y. Times, Mar. 21, 2001, at A22.

¹⁵⁰ See, e.g., e-mail from Chelly, *supra* note 42.

¹⁵¹ See Susan Johanne Adams, *Leveling The Floor: Classroom Accommodations for Law Students with Disabilities*, 48 J. Legal Educ. 273, 280, 283 (1998) (stating that professors should be more involved in making special arrangements for students and that computers may assist students with disabilities).

¹⁵² At South Texas College of Law my typical course package also includes one of the following courses in addition to Tax I: Advanced Federal Income Taxation, Corporate Taxation, or

laptops meant that some student's note-taking habits would be altered, and I did not want to upset any student's study methods without adequate reasons. In my advanced classes I have an enrollment of approximately twenty students, many fewer than in Tax I. The students in my advanced tax classes get called on much more often, normally once or twice during each class period. Since my contact with the students is greater, the possibility for them to be distracted by the computer without my taking notice is greatly diminished. Also, I banned laptops primarily because beginning tax students were putting more emphasis on the computer than their Code-books in class. In an advanced tax class students understand that the focus is on the Code and ordinarily have developed basic code-reading skills. For these reasons I decided not to burden my advanced classes with the laptop ban.

Discussions with Administration and Faculty

After making the decision I talked with our Registrar. To put it mildly, she was apprehensive about my decision. While she did not tell me I could not ban laptops, she asked me to reconsider and told me to speak with the Dean and faculty before doing so. While she did not directly say so, I believe she was concerned about student backlash and the torrent of students who might flood her office complaining about the situation. Even though there were three Tax I classes taught in the fall semester, the other two sections were already closed. She was concerned that any students who did not agree with the ban would have no option but to wait another semester to take the class.¹⁵³

I then spoke with our Associate Dean for Student Affairs. I explained my plan and reason for the ban, and she was fully supportive, stating that I had the freedom to run my class in the manner I felt would help the students to learn. This was encouraging.

Finally, I spoke with the Dean about my decision. The Dean was far more reserved and cautious about the idea, neither supporting nor dismissing it. From his tone I could sense he did not want the problems this might cause, while at the same time wanting to support his faculty. He mentioned that the school encouraged laptops, but it did not require that students purchase them. He wanted me to discuss the matter at our first faculty meeting of the year. While I am not positive, I think this was an effort to dissuade me from banning the laptops. Later during the fall semester, the Dean brought up the question during a class he taught, and the entire class discussed what they thought of the laptop ban. He did not share the results of his discussion with me, and I found out about the discussion from a student taking both our classes that semester.

Estate and Gift Taxation. In addition to Tax I, during the fall 2006 semester I also taught Corporate Taxation.

¹⁵³. E-mail from Lylene Pilkenton, Registrar, South Texas College of Law, to Kevin Yamamoto, Professor, South Texas College of Law (July 3, 2006, 9:02 a.m. CST) (on file with the author).

At the first faculty meeting I let others know that I was going to ban laptops during the fall semester. A few people asked questions, but for the most part the reception was one of caution. One professor noted that students have various learning styles and banning laptops might hinder some students. He also mentioned that a professor should be able to keep students interested enough to freely choose to attend class rather than surf the contents of the World Wide Web.¹⁵⁴ Others pointed out all the ways that they incorporate technology and how their classes had “improved” or how much the students appreciated being able to listen to the class as a Podcast. Overall there was general support for the experiment and a desire to see if it would work in my class. I pointed out that any student who required the use of a laptop computer for medical or other reasons was welcome to bring it into the classroom and that students could type their exams.

Putting Out the Word

Upon deciding to ban laptops I tried to disseminate my decision to those enrolled in my fall Tax I class. I posted my syllabus, which contained the laptop ban, on TWEN about six weeks before the semester started. At about the same time I put the laptop ban on my first class assignment, which was posted on a bulletin board on the first floor of the law school. Finally, I had the students in my summer school class post that I was going to ban laptops in the classroom on the students’ informal internet bulletin boards where our students go to discuss various issues about STCL. This provided the most vigorous responses of all.

The discussion that followed was animated.¹⁵⁵ The most militant comments were one suggesting everyone bring a laptop to class regardless of my rule and another saying he (or she) would argue the point when I made the announcement in class. This may go to an issue of who is in control of the classroom, with these two students believing they should decide classroom policy.

The thought that students would bring their laptops into class regardless of any rule concerned me, as there was very little I could do to correct the situation. If I asked that the laptops be removed and the students refused I

¹⁵⁴. The argument that a professor should be able to keep the students’ attention regardless of other distractions is outrageous. I fully acknowledge that, as opposed to the entire content of the World Wide Web, my Tax I class will fall far short in the area of entertainment. See *supra* text accompanying note 49 for similar sentiments by other law professors. This also raises the point that students are not in class to be entertained, but to learn. Once we decide that a class must be “fun” in order to make our students learn, we are in a battle I believe we cannot win.

¹⁵⁵. Bulletin boards are at times mean-spirited. See e.g., Ellen Nakashima, *Harsh Words Die Hard on the Web; Law Students Feel Lasting Effects of Anonymous Attacks*, Wash. Post, Mar. 7, 2007, at A1 (Yale law student felt she lost job offers due to malicious posts about her on popular law student message board). The discussion of my banning laptops was brought to my attention by my research assistant, and I read the bulletin board for the first time when writing this paper.

contemplated four options: (1) leave the class, (2) ask the offending students to leave the class and hope they would, (3) use my power to reduce the class grade for violators of the ban, or (4) do nothing and deal with the problem at a later date and time. Thankfully I did not have to choose any course of action; no students brought laptops during the first class.

How the Semester Progressed

In my opinion the ban on laptops was a success. Teaching without laptops is different; some differences I expected and some I did not. I believe that as a group the students learned more and processed the information more comprehensively than in previous semesters where laptops were present in large numbers.

The first difference was one that would be expected, more class discussion.¹⁵⁶ This may have been due to several factors: the group of students I had that semester was more talkative, fewer distractions due to no laptops in class, or other reasons. Without additional data it is impossible to determine. However, the bottom line is the students asked more questions in both number and depth than in the immediately previous semester where laptops were present in class.¹⁵⁷

The additional questions meant the class moved more slowly through the material than in past semesters. The delay was not only because students were asking more questions, but because they were also doing slightly worse on the assigned material. Students were answering more questions incorrectly than in previous semesters. In the past, when I questioned some students I was uncertain if they understood what they were saying since their response seemed too rote, or because it was preceded by furious tapping of their keyboard to find the appropriate answer. Eventually I began to look positively instead of negatively on the decline in student performance during recitation. I concluded some students were having a harder time in part because they could no longer look at a previous student's outline during class on their laptops.¹⁵⁸

¹⁵⁶. Other law professors who banned laptops have also observed an increase in class discussion. See Bhayani, HLS Debates Laptops in Class, *supra* note 26; Colb, Taking Notes Without a Computer, *supra* note 28; Schwartz, Professors Vie with Web, *supra* note 16, at A1; E-mail from Estlund, *supra* note 27. Also, several of my student evaluations noted the same increase in class discussion. Student Evaluations, *supra* note 45 ([#1] "I did notice that more students than usual were actively participating in class...."; [#2] not having laptops led to "more participation and discussion"; [#3] "[t]he 'ban' made a nice atmosphere in class").

¹⁵⁷. But see Paul Wangerin, Technology in the Service of Tradition: Electronic Lectures and Live-Class Teaching, 53 J. Legal Educ. 213, 217 n.12 (2003) (commenting that the same group of students ask all the questions (whom his students label "dorks") and the reason this is tolerated is that "dorks, candidly, love other dorks").

Another possible reason for greater participation from the students is the Hawthorne effect—that experimental subjects improve performance just because they are in a study. See, Elton Mayo, *The Human Problems of an Industrial Civilization* (1933). Nevertheless, I was pleased with the result.

¹⁵⁸. In my fall 2006 evaluations, one student wrote the lack of laptops "prevents us from cheating

Without laptops, many students did not have an outline answer to the questions and were truly struggling with the material. I found this very helpful. In past semesters there were times after the class covered material and I would ask, "Are there any questions?" and received only blank stares from the students. When there are no questions I move on to new material, since I am uncertain whether anything but going over the material completely again would do much good. If students answer incorrectly during the discussion instead of just giving me the correct answer from an outline, I can more quickly and accurately assess what they know, or don't know, and where their difficulties lie. Instead of seeing the decline in performance as a detriment I saw it as a positive factor. However, if I had known this I could have programmed reduced coverage into my syllabus. Still, overall the quality of the class discussion and questions asked by the students were vastly improved compared to immediately preceding semesters.

Another aspect of the laptop ban was that I could see student faces again; I had forgotten how much I missed seeing them. This is true even though I first noted the bored or uninterested looks. The professors who claim computers should be allowed in the classroom since their class can be more interesting than the web are missing a central point—if they allow the internet or other laptop distractions in class they will never know if they are being engaging or interesting. There is no way to assess how one is doing during any given class. A student concentrating while playing solitaire or making an eBay[®] purchase on the web has the same basic look as one looking at materials for class. At least I am unable to discern any difference.

The looks and body language of students in the class were a great help for me in determining the pace of the class and whether the students understood the material.¹⁵⁹ Laptop screens are getting larger and this allows students either to hide behind their screens or to concentrate on something on the screen that may be non-class related. Either way, it detracts from the interaction with the professor. Not all the feedback was negative—it was also nice to see the smiles on students' faces when they finally understood a concept they had been struggling with for some time. However, I cannot say this was any different from previous semesters.

The most positive aspect was that the ban on laptops achieved what I hoped it would achieve, and that is that students were more focused on the Code and Regulations. At no time during the semester did I ask a question about the Code or Regulations and see the students look to any place other than their

by looking at old outlines." Student Evaluations, *supra* note 45.

¹⁵⁹. One student commented, "[The] Professor seemed to be right on top of whether we were following him." Student Evaluations, *supra* note 45. I attribute this partially to the ability to see the students' faces.

The lack of body language to aid in communication is something that others have pointed to with using e-mail exclusively to communicate with students. See Becker, Some Concerns, *supra* note 5, at 480. This effect is multiplied when you look out over a class of 80 people; you cannot see the students, and you might as well be teaching over the Internet.

Codebooks. Several students remarked that the laptop ban caused them to focus more on the Code and Regulations and that they felt they learned the material better because of it. Since my primary focus in the course is not necessarily learning the material in the Code, but how to read and understand it, this was especially encouraging.

The examinations also indicated a better understanding of the material. The curve was slightly higher, but there was a significant difference in the upper portion of the curve. More exams were of what I considered a “high quality” and merited a grade of B+ or better. More students had pulled the course together as a whole as compared with recent semesters, and I was overall pleased with the results.

Evaluations

During the semester I asked several times for students to give me their appraisals on how the laptop ban was working. I received two oral comments from students, both positive. Immediately before handing out my evaluation forms I again reiterated that the laptop ban was experimental and I sincerely wanted to know student opinions on the matter. All but two students who turned in an evaluation form made some comment on how the laptop ban affected their studies.

The laptop comments on my evaluations were overwhelmingly positive. Fifty-eight students filled out an evaluation form out of a class of sixty-two (92 percent). Two forms made no comment about the laptops. In my judgment, forty forms had positive comments (71 percent). Ten evaluation forms (18 percent) had “neutral” comments such as “I don’t care about laptops” or “I didn’t miss laptops.” The remaining evaluations, six (11 percent), contained some form of negative comments. The 89 percent of the comments that were either positive or neutral toward the laptop ban was a number much higher than I expected for taking what I felt at the time was a radical course of action.

The six negative comments centered on how the lack of laptops affected the student’s ability to take notes in class. The comments were in two groups. The first centered on the laptop’s ability to help the student take notes. One evaluation form read that since I “talk so fast” in class they could not write everything I said down without their computer. However, this was the only comment of that nature. The primary difficulty was that they were unable to search electronically through notes if they did not take them on laptops. Since a written notebook has no search function, five students commented that they felt more disorganized or that they were not able to find the material as quickly when they were studying. However, I never said students could not later put their notes in some electronic format.

The positive comments were on various aspects of the laptop ban and how it helped the students during the semester. Twenty students (50 percent of all the positive comments, 36 percent overall of those commenting) stated how the lack of laptops helped them take *better* notes because the lack of a

laptop helped them to concentrate on what was being said in class or because numbers and formulas were easier to take down in handwriting. One interesting point made on three evaluation forms was that students were forced to pay attention to the content of the discussion rather than focus on typing every word.¹⁶⁰ While no formal studies have been completed on whether a student just transcribing the class is not processing at an appropriate level what he or she is typing, these comments lend support to those who believe transcription does not help law students learn.

One problem that students may not realize is that transcribing the lecture verbatim produces too much material. Creating a mound of un-prioritized narrative, not linked to its pertinence and material impact on doctrinal analysis, is not helpful in learning. Notes should help one understand the material and be concise and on point.¹⁶¹ Some of the transcribing students would point to the fact that if they do not have the information they cannot learn it. While this is true as an abstract generality, it will be of no use if there is so much material that they will either not have time to review it or will not want to wade and sort it all due to its sheer volume.¹⁶²

The second most frequent type of positive comment was the appreciation for the lack of distractions that laptops bring to the classroom. Twelve evaluation forms (30 percent of the positive comments, 21 percent overall of those commenting) made some remark to this effect. Several students wrote about how pleasant it was not to have others distracting them with games on their laptops (although one student mentioned missing playing solitaire). Others remarked that the class atmosphere was improved without having laptops and with each student concentrating on trying to learn the material.

Other students commented that the lack of laptops helped them prepare for the class and better understand the material because they could not rely on old student outlines and were forced to do the problems themselves.¹⁶³ Also, without laptops they had to rely on their Codebooks in class.¹⁶⁴ Since Tax is a Code course, and the primary reason I banned computers in the first place was

^{160.} Comment #1: "I found I write the most important things and rather than simply typing everything that is said." Comment #2: "I listened and know that I learned more because I was not concerned about typing every line." Comment #3: "It forced you to pay attention rather than just writing down everything said." Student Evaluations, *supra* note 45.

^{161.} See Bretzing and Kulhavy, Notetaking and Depth of Processing, *supra* note 126, at 151 (suggesting summary notes of books for better recall); Kiewra, Acquiring Effective Notetaking Skills, *supra* note 79, at 300 (suggesting students take "paraphrase or summary notes").

^{162.} One student wrote: "[Laptops] only serve a good purpose if someone types really fast, but even then that person takes too many notes. EXCLUDE LAPTOPS." Student Evaluations, *supra* note 45.

^{163.} *Id.*

^{164.} Comment #1—"Overall good to not have computers and good to rely more on code book"; Comment #2—"Without computers helped to the extent that we referred back to our code book more." *Id.*

that I felt students were not relying on their Codebooks, these comments were especially encouraging. Of those students who delved into why they used the Codebook more, most felt it was because they had more room on their desks for the Code and could use it during class. For those professors wanting to keep laptops in the classroom and use both code and casebook, this is a difficulty rectified only by larger desks or smaller computers. However, neither seems to be on the horizon any time soon.

Thoughts for the Future

While I believe the laptop ban was successful, I plan to make changes to make the experience positive for more students. All the negative comments dealt with the students being hampered from taking adequate notes or not being able to search through the material later. I plan to help them with these concerns in future semesters.

Regarding note-taking, I plan to use class time discussing why students should take notes and how to do so. Many students think that, if they write every word that the instructor says, they will have an excellent set of notes. They do not; that is transcription and is best left to court reporters. Notes should be used to help one understand what is going on in class, comprehend the material presented, and refresh one's recollection of class after the class session is completed. Transcription is not the most productive method to achieve these ends. First, students must come to class prepared. They need to read the material and try to understand it for themselves. That will give them a basis of understanding. Next, students need to listen to what is being said and follow the flow of the conversation the professor is having with them or another student. Writing down the major themes or questions and grasping the analysis of a Code section or area is all that is required here. In my class putting down the answer to the question (which typically is some dollar amount) would also be critical to working the problems themselves later. Next, as soon as possible after class the student should look at the notes and attempt to fill in any gaps. Getting together with a group of other students is helpful in completing this task.¹⁶⁵ Finally, they should take their notes and then make some type of outline for the class. Being able to cut and paste from one's class notes would be beneficial here, but not as great a benefit as some of these students imagine. Class outlines, which are not described in detail here, are only to help the students see the overall course structure and help with the analysis of fact patterns they might face in the future (like on a mid-term or final exam). They are not, as many students seem to think, a verbatim record of everything that happened in class.

¹⁶⁵ I tell my students that if they get together and talk about the problems, lecture, Code, and Regulations that is a "study group." However, if they are getting together to complain about how hard the class is, how much material we cover, or that they get called on too many times to recite that is a "support group." Both can be helpful, but only study groups will assist in learning the material.

If students are helped to understand what they are to accomplish and take away from class and the nature of note-taking, I believe that even more students will find the laptop ban an overall benefit to their learning the material. However, even if they cannot be convinced, an overwhelming number of beginning tax students found the laptop ban beneficial and so did I. Accordingly, I plan to continue it in the future.

Conclusion

With this article I attempt to provide evidence to support those who are either thinking about banning or limiting laptop use in the classroom or comfort to those who have already done so. The cognitive psychology of learning and memory supports such a decision—studies show that information received while distracted is either not encoded or is encoded in such a way that the information cannot be used flexibly. My experiences in banning laptops, as well as the accounts of other law professors I have read, are positive. Additionally, a majority of students support a laptop limitation if handled appropriately. When I banned laptops, class recitation, student evaluations, and subsequent test scores indicate that banning laptops aids students in learning tax.

Still: if laptops hinder learning why are more and more students bringing them to class and why are law schools encouraging their use? My short answer is: I don't know. However, the longer answer, at least addressing the increased student use, is that laptops make their classroom experience easier and more entertaining. Note-taking and organizing class information is streamlined with a laptop. Students can type in what the instructor says without thinking, and later manipulate the information by cutting and pasting into their individual (or someone else's) outline. The World Wide Web is there to entertain the student if class gets "boring." However, easier and more entertaining does not mean better learning, retention (memory) of that material, or the ability to use the information in novel situations. Learning is hard work, work that may be made more difficult or impossible if we put obstacles like distractions caused by laptops in the law school classroom.

For law schools, the inclusion of laptops was initially justified as helping the student prepare for a legal career. This is because students will more than likely use technology in their practice, so law school should aid and prepare them for that eventuality. However, the use of technology is secondary to the primary task of law school, teaching the law and, more importantly, teaching how to "think like a lawyer." If we fail in this task we are sending out students more ill-prepared for the analytical rigors of practice than those students who came before them. A possible indication of this failure is the decrease in bar exam passage rates that correlates with laptops in the classroom. We will see in future studies, what, if any, problems laptops cause in student learning.

Will banning or limiting laptop use solve all the problems we face in the classroom? No. Returning to the time before laptops will not solve the problems of students coming to class ill-prepared (or not coming at all), lack of attention, and the like. However, laptops create many problems of their own

with only a moderate, if any, benefit in return. By reducing the problems they create I believe my students will learn more, learn faster, and be able to better utilize the knowledge gained.

The argument seems clear: distractions hurt learning and memory, laptops, if not used properly, create distractions, and therefore improper laptop use should be eliminated. Even proper laptop use may interfere with learning since many students are inclined to type the information presented verbatim and therefore fail to learn as much, learn as deep, or utilize the information flexibly. This paper details the evidence I have found and my experience with banning laptops in the classroom. I trust that this paper will get others to think about the effect laptops in the classroom have on learning. We let these devices into our classrooms without discussion; at the very least each of us should consider if we should allow them to remain.

Appendix I

ABA approved schools that require students to own laptop computers.

1. Brigham Young University J. Reuben Clark Law School. See Brigham Young University J. Reuben Clark Law School Policy and Procedures 2-3 (2007), available at [http://www.law2.byu.edu/policiesandprocedures/policies%20and%20procedures%20\(current\).doc](http://www.law2.byu.edu/policiesandprocedures/policies%20and%20procedures%20(current).doc)

2. University of Chicago Law School (laptop computers required to take finals). See The University of Chicago, The Law School, Laptop Recommendations Memo (letter from Ted Russell, Directory of Information Technology, University of Chicago Law School, to Incoming Students (May 31, 2007)), available at <<http://www.law.uchicago.edu/students/laptop-memo.html>> (last visited Jan. 10, 2008).

3. University of Denver Sturm College of Law. See University of Denver, Sturm College of Law, Laptop Requirement Information, available at <<http://www.law.du.edu/laptop/index.html>> (last visited Jan. 10, 2008).

4. Florida State University College of Law. See Florida State University, College of Law, Laptop Requirement, available at <http://www.law.fsu.edu/admitted_students/laptop.html> (last visited Jan. 10, 2008).

5. University of Florida Levin College of Law. See The University of Florida, Fredric G. Levin College of Law, Library & Technology, Mandatory Laptop Computer Policy, available at <<http://www.law.ufl.edu/services/mandatory.shtml>> (last visited Jan. 10, 2008).

6. George Washington University Law School. See The George Washington University Law School, Jacob Burns Law Library, Notebook Computer Requirement, available at <<http://www.law.gwu.edu/Burns/About/computing/notebooks.htm>> (last visited Jan. 10, 2008).

7. University of Houston Law Center. See University of Houston Law Center, Laptop Requirements Academic Year 2006-2007, available at <<http://www.law.uh.edu/admissions/laptops.html>> (last visited Jan. 10, 2008).

8. University of Indiana Law School. See Indiana Law, The Computer Requirement for 2007, <http://www.law.indiana.edu/technology/requirement.shtml> (last visited Jan. 10, 2008).

9. Mercer University School of Law. See Mercer University School of Law, Laptop Program, available at <<http://www.law.mercer.edu/administrative/technology/laptop.cfm>> (last visited Jan. 10, 2008).

10. Michigan State University College of Law. See Michigan State University College of Law, Laptop Requirement & Recommendations, available at <<http://www.law.msu.edu/tech/students/computer.html>> (last visited Jan. 10, 2008).

11. University of Minnesota Law School. See University of Minnesota Law School, Law School Laptop Program, available at <<http://www.law.umn.edu/laptop/index.html>> (last visited Jan. 10, 2008).

12. University of New Mexico Law School. See University of New Mexico School of Law, School Required Laptop Program (effective Fall 2006), available at <<http://lawschool.unm.edu/students/it/laptop-program.php>> (last visited Jan. 10, 2008).
13. New York University School of Law. See New York University School of Law, NYU School of Law Laptop Configuration Process, available at <<http://www.law.nyu.edu/technology/laptops/laptopsetup.html>> (last visited Jan. 10, 2008).
14. Northwestern University School of Law. See Northwestern Law, Notebook Program, available at <<http://www.law.northwestern.edu/notebook/>> (last visited Jan. 10, 2008).
15. Nova Southeastern University Shepard Broad Law Center. See Nova Southeastern University Law Center, Computer Ownership Details, available at <http://www.nsulaw.nova.edu/library_tech/laptopinfo/computers.cfm> (last visited Jan. 10, 2008).
16. University of Oregon School of Law. See University of Oregon School of Law, Technology, available at <<http://www.law.uoregon.edu/tech/>> (last visited Jan. 10, 2008).
17. University of Richmond School of Law. See University of Richmond, School of Law, Law and Information Technology, Richmond Law's Laptop Program: First in the Nation, available at <<http://law.richmond.edu/librarytech/lawtech.php>> (last visited Jan. 10, 2008).
18. Rutgers School of Law at Camden. See Rutgers School of Law, Camden, Laptop Requirement, available at <<http://camlaw.rutgers.edu/site/admissions/laptop.shtml>> (last visited Jan. 10, 2008).
19. Seattle University School of Law. See Seattle University School of Law, Admissions, Laptop Requirement, available at <<http://www.law.seattleu.edu/admission/laptop?mode=standard>> (last visited Jan. 10, 2008).
20. Seton Hall University School of Law. See Seton Hall Law, Welcome to the Division of Legal Computing, Laptop Requirements (Fall 2007!!!), available at <http://law.shu.edu/administration/legal_computing/student/laptop_specs.htm> (last visited Jan. 10, 2008).
21. Stanford University Law School. See Stanford Law School, Advanced Tuition & Financial Aid, Laptop Computers, available at <<http://www.law.stanford.edu/program/tuition/advanced/>> (last visited Jan. 10, 2008).
22. Stetson University College of Law. See Stetson University College of Law, Admissions, Enrollment Checklist, Laptop Requirements, available at <<http://www.law.stetson.edu/admissions/enrollmentchecklist.asp>> (last visited Jan. 10, 2008).
23. Syracuse University College of Law. Syracuse University College of Law, Computer Requirements for Law Students, available at <<http://www.law.syr.edu/itss/requirements.asp>> (last visited June 13, 2007).

24. Texas Tech University School of Law. See Texas Tech University, School of Law, Laptop Program, available at <<http://www.law.ttu.edu/prospective/financialaid/types/laptop/>> (last visited Jan. 10, 2008).
25. Thomas Jefferson School of Law. See Thomas Jefferson School of Law, Laptop Requirement, Dell Laptop Purchase Program, available at <http://www.tjsl.edu/laptop_requirement> (last visited Jan. 10, 2008).
26. Wake Forest University School of Law. See Wake Forest University School of Law, Letter from Ed Raliski, Director of Law School Information Services, To Incoming First Year Students, Transfer Students, and L.L.M. Students (Apr. 15, 2007), available at <http://law.wfu.edu/prebuilt/laptop_requirements.pdf> (last visited Jan. 10, 2008).
27. University of Wisconsin Law School. See University of Wisconsin Law School, Current Students, Law School Rules, available at <<http://www.law.wisc.edu/current/rules/chap11.htm>> (last visited Jan. 10, 2008).
28. Yale Law School. See Yale Law School, Incoming Students, YLS Student Computing Frequently Asked Questions, available at <<http://www.law.yale.edu/about/incomingStudents.asp>> (last visited Jan. 10, 2008).

Appendix 2

ABA approved schools that strongly recommend students own laptop computers.

1. University of Arizona James E. Rogers College of Law. See University of Arizona, James E. Rogers College of Law, Information Technology, Computer Requirements, available at <<http://www.law.arizona.edu/it/requirements.cfm>> (last visited Jan. 10, 2008).

2. Arizona State University Sandra Day O'Connor College of Law. See Arizona State University, Sandra Day O'Connor College of Law, Prospective Students, Laptops at the Law School, available at <<http://www.law.asu.edu/?id=178#laptops>> (last visited Jan. 10, 2008).

3. University of Buffalo Law School. See The State University of New York University, Student Life & Services - Information Technology, Student Computer Recommendations, available at <http://www.law.buffalo.edu/itwebsite/default.asp?firstlevel=0&secondlevel=2&filename=computer_recommendations> (last visited Jan. 10, 2008).

4. Cornell Law School. See Cornell University Law School, Computer Requirement, available at <http://www.lawschool.cornell.edu/admissions/admitted/comp_req.cfm#CP_JUMP_2596> (last visited Jan. 10, 2008).

5. The University of Dayton School of Law. See University of Dayton School of Law, Computer Configuration Requirements, available at <<http://law.udayton.edu/NR/exeres/8F74645D-F775-433E-97F9-EEoB37E4E50F.htm>> (last visited Jan. 10, 2008).

6. DePaul University College of Law. See DePaul University College of Law, Laptop Computers, available at <http://www.law.depaul.edu/students/information_technology/laptop.asp> (last visited Jan. 10, 2008).

7. Duke University Law School. See Duke Law, Library & Technology, Computing Services, available at <<http://www.law.duke.edu/computing/#renovation>> (last visited Jan. 10, 2008).

8. George Mason University School of Law. See Computing Information for Incoming Students, 2007-08 (statement by Deborah M. Keene, Associate Dean), available at <http://law.gmu.edu/libtech/computer_memo.html> (last visited Jan. 10, 2008).

9. University of Idaho College of Law. See University of Idaho College of Law, Laptop Requirements, available at <<http://www.law.uidaho.edu/default.aspx?pid=80795>> (last visited Jan. 10, 2008).

10. Marquette University Law School. See Marquette University Law School, Buying a Computer: Laptop vs. Desktop, available at <<http://law.marquette.edu/cgi-bin/site.pl?2130&pageID=45>> (last visited Jan. 10, 2008).

11. Southern Illinois University School of Law. See Southern Illinois University at Carbondale, Technology @ School of Law, Recommendations

for Laptop Computers, available at <<http://www.law.siu.edu/index.htm>> (last visited Jan. 10, 2008).

12. Vanderbilt University Law School. See Vanderbilt University Law School, Computer Recommendations for VULS Students, available at <<http://law.vanderbilt.edu/student-resources/computer-recommendations/index.aspx>> (last visited Jan. 10, 2008).

13. Vermont Law School. See Vermont Law School, Laptop Recommendations, Laptop Recommendations for the 2007 Entering Class, available at <http://www.vermontlaw.edu/admissions/index.cfm?doc_id=938> (last visited Jan. 10, 2008).

