

Chicago-Kent College of Law

From the Selected Works of Richard Warner

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Teaching Law with Computers

Richard Warner, *Chicago-Kent College of Law*

TEACHING LAW WITH COMPUTERS

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We would like to thank our many colleagues at Chicago-Kent who have discussed electronic teaching with us on numerous occasions, as well as the members of the E-TEACH discussion list, whose ideas have helped us refine our thinking about these issues. We also gratefully acknowledge the contribution of the 1995-96 and 1996-97 experimental laptop computer sections at Chicago-Kent (the E-LEARN sections); their patience and cooperation (with survey after survey) and their insightful feedback are much appreciated.

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INTRODUCTION

Thirty years from now the big university campuses will be relics. Universities won't survive. [The computer revolution is] as large a change as when we first got the printed book.¹

Bold predictions about the impact of the computer revolution on education—including legal education—are increasingly common, sometimes expressed with hope and excitement, sometimes with fear and loathing. Major changes may indeed loom just over the horizon, but the specific form they will take remains quite unclear. Although the long-range impact of computer technology on legal education is crucially important, no less significant is the question of how, or even whether, existing technologies can be integrated usefully and appropriately into traditional legal education. More precisely, our question is: Do computers currently provide an effective tool for achieving significant pedagogical goals? We believe they do.

In support of this claim, we examine a variety of ways to integrate computers into law teaching. Our aim is not merely to mar-

1. Robert Lenzner & Stephen S. Johnson, *Seeing Things as They Really Are*, *FORBES*, Mar. 10, 1997, at 122, 127 (quoting Peter Drucker). Drucker continues:

It took more than 200 years (1400 to the late 1600s) for the printed book to create the modern school. It won't take nearly that long for the big change. Already we are beginning to deliver more lectures and classes off campus via satellite or two-way video at a fraction of the cost. The college won't survive as a residential institution. Today's buildings are hopelessly unsuited and totally unneeded.

Id. Drucker sees the changes as driven, at least in part by economics; he contends that "the cost of education has risen as fast as the cost of health care . . ." *Id.* Drucker is hardly alone in his vision of radical change. Nicholas Negroponte, for example, contends that, as a result of access to the Internet, "schools will change to become more like museums and playgrounds for children to assemble ideas and socialize with other children all over the world." NICHOLAS NEGROPONTE, *BEING DIGITAL* 6 (1995).

shal support for a controversial claim; we also offer our discussion as a practical pedagogical guide to computerized instruction. We draw, in part, on our experience over the last three years with Chicago-Kent's experimental E-LEARN section.² The section consists of 100 volunteer first-year students; all of the students are required to have laptop computers and are provided with electronic versions of their class materials. Our experience with this section lends significant support to the claim that a judicious use of computers can improve legal instruction.

I. PEDAGOGICAL GOALS

[P]roducing sophisticated learning is a function of the sophistication of the discussion that surrounds the use of the technology—not the sophistication of the technology.³

The claim that computers can be effective tools for achieving important pedagogical goals naturally raises the question: What goals? We will focus on three widely accepted aims:⁴ (1) *Imparting a basic knowledge of black letter rules*. An adequate knowledge of an area of law requires knowledge of the relevant legal

2. For accounts of the E-LEARN section and Chicago-Kent's other computer-related initiatives, see Richard Warner, *Teaching Electronically: The Chicago-Kent Experiment*, 20 SEATTLE U. L. REV. 383 (1997); Peter W. Martin, *What Do Law Students with Laptops and Electronic Casebooks Do? The Chicago-Kent Computer Section (1995-96)* (Oct. 15, 1996) <<http://www.law.cornell.edu/papers/kentrtptf.htm>> (page citations to the Martin report in this article are to the print copy, published May 1996, on file with the authors); Rosemary Shiels, *Law Students and Hypertext: One Law School's Model*, 3 J. INFO. L. & TECH. (1996) (Sept. 30, 1996) <<http://elj.warwick.ac.uk/elj/jilt/bileta/1996/3shiels/>>; Richard A. Matasar & Rosemary Shiels, *Electronic Law Students: Repercussions on Legal Education*, 29 VAL. U. L. REV. 909 (1995); Ronald W. Staudt, *An Essay on Electronic Casebooks: My Pursuit of the Paperless Chase*, 68 CHI.-KENT L. REV. 291 (1992); David J. Maume, Jr. & Ronald W. Staudt, *Computer Use and Success in the First Year of Law School*, 37 J. LEGAL EDUC. 388 (1987); Ronald W. Staudt, *Computers at the Core of Legal Education: Experiments at IIT Chicago-Kent College of Law*, 35 J. LEGAL EDUC. 514 (1985).

3. Stanley Pogrow, *Learning Dramas: An Alternative Curricular Approach to Using Computers with At-Risk Students*, in TECHNOLOGY IN TODAY'S SCHOOLS 45, 46 (Cynthia Warger ed., 1990).

4. Every reader will have his or her preferred list of pedagogical goals as well as preferred ways for formulating and understanding those goals. Our intent is to focus on a small number of goals that most law teachers recognize as fundamental.

rules. Of course, knowing the black letter rules is a far cry from understanding the law. Part of understanding the law is knowing the underlying rationales—the various purposes—behind the black letter rules. Hence, the second goal: (2) *Developing an understanding of the rationales underlying the rules*. The purpose of a rule guides its application to fact patterns and is the key to identifying and justifying exceptions and to resolving conflicts with other rules. Of course, you can, in three years of law school, teach only a small fraction of black letter rules and associated rationales, no matter how intensively you try to educate students. This is one reason it is essential for students to learn how to master new areas of the law on their own. This implicates the third goal: (3) *Developing the ability to analyze legal issues independently*.

For convenience, we will refer to these three goals as “the basic goals,” even though there are a variety of other goals with good claims to being “basic.”⁵ There is a small but growing literature evaluating the effectiveness of computer-assisted instruction (“CAI”) in legal education and suggesting that CAI can help achieve these goals.⁶ The much larger body of literature focusing

5. The three goals that form our focus are certainly included among the goals for legal education identified by an influential British study by the Lord Chancellor's Advisory Committee on Legal Education and Conduct (“ACLEC”). See Lord Chancellor's Committee on Legal Education, *ACLEC - Review of Legal Education—A Consultation Paper* (June 1994) <<http://elj.warwick.ac.uk/ncl/ reports/chancell.html>>. The study suggests that the aim of legal education should be to provide

[an] understanding of the *fundamental principles and concepts* of English Law and the Law of the [European Community], and develop the skills needed to solve legal problems; to provide a rigorous theoretical and analytical education to enable students to develop a constructive and critical approach to the processes of law; to enable students to see the law within its social, economic, political, historical, ethical, and cultural context; to inform by comparisons from other legal systems.

Id.

6. A survey of the literature conducted by Paul Teich in 1991 revealed that there were only two experimental studies on the effectiveness of computer-assisted instruction in the legal education setting, both dating from the 1970s. See Paul F. Teich, *How Effective Is Computer-Assisted Instruction? An Evaluation for Legal Educators*, 41 J. LEGAL EDUC. 489 (1991). Additional studies have appeared in the last several years that provide encouragement to those interested in using CAI in legal education. See, e.g., Stephen J. Shapiro, *The Use and Effectiveness of Various Learning Materials in an Evidence Class*, 46 J. LEGAL EDUC. 101 (1996)

on nonlegal instruction also supports this conclusion. One survey of the literature describes "a substantial body of research indicating that CAI, when employed in college classroom teaching, may improve learning while significantly and consistently reducing the time needed for instruction."⁷ More specifically, available evidence clearly indicates that computers can help achieve the first goal, the rote memorization of black letter rules. Many researchers

have conducted meta-analysis research studies on CAI effectiveness and found that students receiving CAI scored better on standardized achievement tests than their peers who received no CAI. They also found that CAI students had better retention and that CAI improved the speed at which students learned a given amount of material.⁸

One may have doubts about whether computers can help significantly with the remaining two goals—understanding the rationales underlying rules and learning to think independently. Law school instruction typically uses the Socratic method, or some variation of it, to achieve these goals. The Socratic instructor does not present an analysis of a legal issue to students who passively record that analysis in their notes; rather, the students themselves construct the analysis in response to questions the instructor poses. Actively constructing the analysis leads students to see the relevant underlying rationales behind the rules while teaching them how to think their own way through a legal issue. We think computers can help here as well. However, we wish to emphasize the point with which we began: "producing sophisticated learning is a function of the

(reporting a statistical analysis of student surveys that suggests that tutorials are more effective than a hornbook in teaching students evidence); Max Young, *'Help' with Sale of Goods: Initial Thoughts*, 3 J. INFO. L. & TECH. (Sept. 30, 1996) <<http://elj.warwick.ac.uk/elj/jilt/BILETA/1996/3young/default/>> (discussing the pedagogical effectiveness of hypertext); Jerald G. Schutte, *Virtual Teaching in Higher Education: The New Intellectual Superhighway Or Just Another Traffic Jam?* (visited Jan. 7, 1998) <http://www.csun.edu/search/search_areas/hfsoc012/virexp.htm> (reporting a statistical study in which students receiving the entire instruction virtually outperform students receiving traditional in-class instruction). The Young and Schutte studies are discussed in greater detail in Sections III.B.1. and V.B.4., *infra*, respectively.

7. Teich, *supra* note 6, at 490.

8. Glen H. Crumb, *Using Computer Assisted Instruction to Support Learners*, in TECHNOLOGY IN TODAY'S SCHOOLS, *supra* note 3, at 55, 56. Crumb's remark concerns studies conducted on elementary and high school students.

sophistication of the discussion that surrounds the use of the technology—not the sophistication of the technology.”⁹ In what follows, we will discuss a variety of ways in which you can use technology—sometimes sophisticated, sometimes simple—to enhance the quality of interactions between teacher and student, and between student and student.

In considering how to enhance the quality of teacher-student and student-student interactions, we will *not* address the fact that students learn in different ways. The issue of “learning styles” and their relation to computerized instruction, while of considerable importance, lies outside the scope of this essay.¹⁰

II. USING PROJECTORS

Law students—especially first-year students—need to learn how to orient themselves in the vast field of legal information presented to them, a terrain in which they often find themselves lost, at least to some degree. One way to help orient students during class is to link a laptop computer to a projector. The result is an electronic blackboard that allows you to project on a screen in front of the class anything the computer is currently displaying. You can, in this way, very effectively display how to organize, analyze, and present the large amount of information the computer puts (literally) at your fingertips.

A. *Displaying Cases, Statutes, and Other Authoritative Materials*

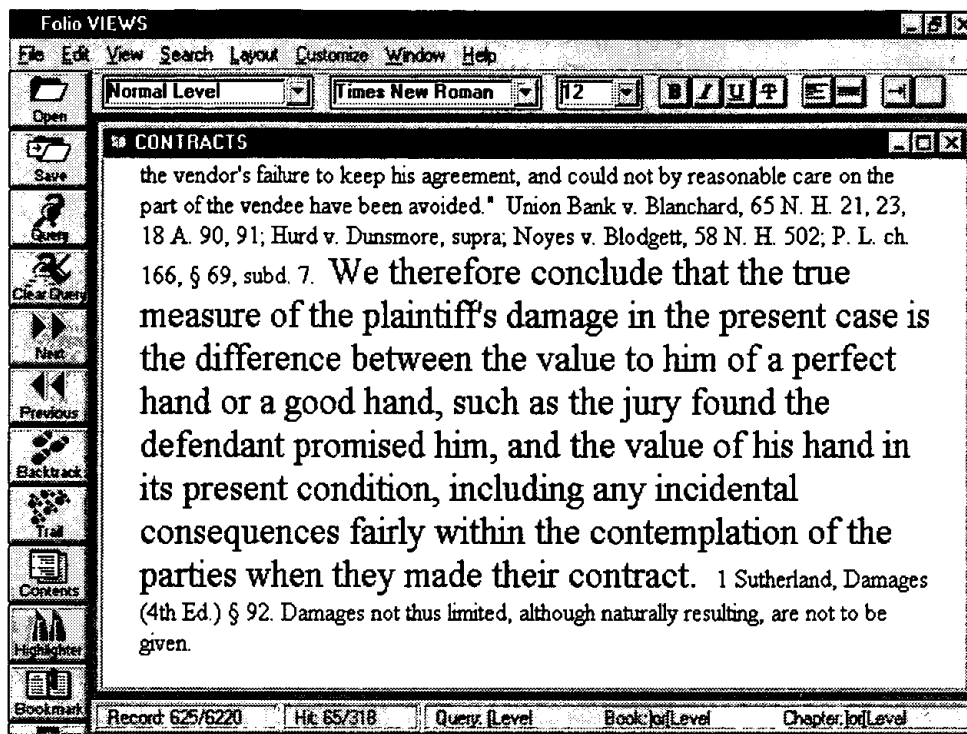
One way to help orient students is by displaying crucial passages from cases, statutes, and other authoritative materials. If you have such materials in electronic form, you can project the text in front of the class. Displaying appropriate passages at crucial points helps students do what they often have difficulty doing on their own: focusing on the relevant language in the materials they read.¹¹

9. Pogrow, *supra* note 3, at 46.

10. For a discussion of learning styles and their relation to computerized instruction, see Richard Jones & John Scully, *Hypertext Within Legal Education*, 2 J. INFO. L. & TECH. (May 7, 1996) <<http://lrc.law.warwick.ac.uk/elj/jilt/cal/2jones/>>. We currently have research planned that investigates the relation between learning styles and the use of computers in legal instruction.

11. This can be particularly useful in statutory courses, where close attention

Here is an example from the "hairy hand" case, *Hawkins v. McGee* (displayed in Folio Views):¹²



The words in the larger font are the *Hawkins* court's statement of the expectation measure of damages; using a large font (18-to-24 point) sets the relevant language off from the rest and makes the type visible from the back row of a 100-seat classroom.

Displaying key passages using a projector furthers the first two basic goals: imparting a basic knowledge of black letter rules, and developing an understanding of the underlying rationales behind

to the statutory language is crucial. See, e.g., Peter Strauss, *Use of Video Projector*, E-TEACH discussion list, Sept. 27, 1996 ("It is impossible for me now to imagine teaching a statute-oriented course without using [a projector with laptop or transparencies]. Having the language before us all, the subliminal message that the text of the statute counts, are . . . essential, in my judgment.") (electronic copy on file with authors).

12. This is from a "home made" casebook that Richard Warner developed with the help of Chicago-Kent's Center for Law and Computers. Folio Views is one of two document storage and retrieval programs used as a software platform for electronic casebooks and other legal materials. The other program is West's Premise.

the rules. To learn the rules, students have to find them in what they read, but many students have difficulty identifying the relevant rules in the ocean of information presented to them. Students can, of course, find some statement of the rules in a study guide or hornbook, but if they fail to spot the rules as they occur in cases, they fail to focus on what they crucially need to understand: the role of rules "in action"—specifically, the role rules play in deciding cases. Arriving at such an understanding is an essential part of learning the black letter law and is a necessary first step toward grasping the underlying rationale for the rule.

Survey results confirm that displaying important passages helps students in precisely this way. Professor Peter Martin, the Co-Director of Cornell's Legal Information Institute, surveyed students in the E-LEARN section about a variety of issues during the 1995-96 academic year.¹³ One factor surveyed was the students' attitude toward using a projector "to draw attention to key passages of the materials under discussion, in 'real time,' that is as they became the subject of discussion, not just as [the instructor] introduced them."¹⁴ Martin notes that sixty-six of the sixty-eight students responding rated the use of the projector to display relevant passages as "particularly effective."¹⁵ Anecdotal reports from instructors at other schools confirm this result.¹⁶ We suggest that the

13. In addition to surveying students, Professor Martin observed a number of E-LEARN class sessions and met periodically with instructors and students in the program. The report he wrote summarizing his conclusions is on file with the authors and is available on the Internet. See Martin, *supra* note 2.

14. *Id.* at 11.

15. Martin asked:

One of your teachers, Prof. Warner, has himself been using a laptop with a projected image in support of classroom presentation and interchange. Which of the following uses of that presentation technology do you find particularly effective (compared to the non-electronic alternatives)? You can select more than one or none.

- ___ drawing attention to key passages of the assigned materials
- ___ putting a problem in front of the class for discussion
- ___ displaying the important points of discussion

Id., attachment 2, at 5. Out of 68 students responding, 66 selected the first; 59, the second; and 60, the third.

16. See generally Shelley Saxer, *Use of Video Projector*, E-TEACH discussion list, Sept. 28, 1996 ("students tell me they love it") (electronic copy on file with authors); Bob Lawless, *Re: Welcome from the List Managers*, E-TEACH dis-

explanation for this overwhelmingly affirmative reception is that displaying passages helps orient students in the vast field of information in which they are learning to operate. It does so by helping them identify and understand the role of legal rules.

B. *Displaying Hypotheticals and Recording Responses*

You need not, of course, confine yourself to projecting cases and other authoritative materials. Another use of the projector is to display hypotheticals.¹⁷ As Professor Ralph Brill points out:

When I present a hypothetical, it is written out and up on the screen. In the past, when I presented one in oral form, I often got student responses that overlooked a key fact in the hypo. With the full hypo there before them, this doesn't happen. When it was in oral form, they had to do two things at once . . . remember the hypo and reason from what they knew to the application. Now they don't have to worry about trying to remember all the facts . . . they are there before them.¹⁸

When displaying a hypothetical, you can also record student responses. For example, if you want students to practice identifying legal issues and applying relevant rules to them, you can project a hypothetical and, by simply typing in a word processor, record various student suggestions. You can modify and refine the responses until what appears on the screen is a model of the sort of analysis you want.

Professor Martin's survey results also confirm the effectiveness of this approach.¹⁹ Martin asked students about the use of the projector "to put a problem or hypothetical before the class for discus-

cussion list, Sept. 27, 1996 (student response was "overwhelmingly positive") (electronic copy on file with authors); Pedro A. Malavet, *Re: Welcome from the List Managers: Projectors*, E-TEACH discussion list, Sept. 27, 1996 ("Student reaction has been overwhelmingly positive. Every one of my evaluations included the overheads in the answer to the question 'What did you like most about the instructor's method?'" (electronic copy on file with authors).

17. See Charles D. Kelso & J. Clark Kelso, *How Computers Will Invade Law School Classrooms*, 35 J. LEGAL EDUC. 507, 509 (1985). You can switch easily back and forth between a file containing hypotheticals and another file containing cases or other materials by pressing Alt-Esc, in Windows 3.1, or by pressing Alt-Tab, in Windows 95.

18. Ralph Brill, *E-Learning*, E-TEACH discussion list, Sept. 27, 1996 (electronic copy on file with authors).

19. See *supra* notes 13-15 and accompanying text.

sion; and to record, in outline form, the several responses to such a problem.”²⁰ Well over 80% of the sixty-eight students responding rated this use as “particularly effective.”²¹ This use of the projector serves all three pedagogical goals: imparting a basic knowledge of black letter rules, developing an understanding of the underlying rationales behind the rules, and developing the ability independently to analyze legal issues. As with the projection of authoritative materials, students trying to find their way through a vast field of information appreciate a map. They especially appreciate seeing the map arise before them out of their own suggestions and analysis. This provides visible evidence that they are developing the skills needed to find their own way, evidence provided by means of an exercise that refines and increases those skills. In addition, projecting the analysis on a screen in front of the class presents it in a form that allows time for reflection and discussion as well as accurate note-taking.

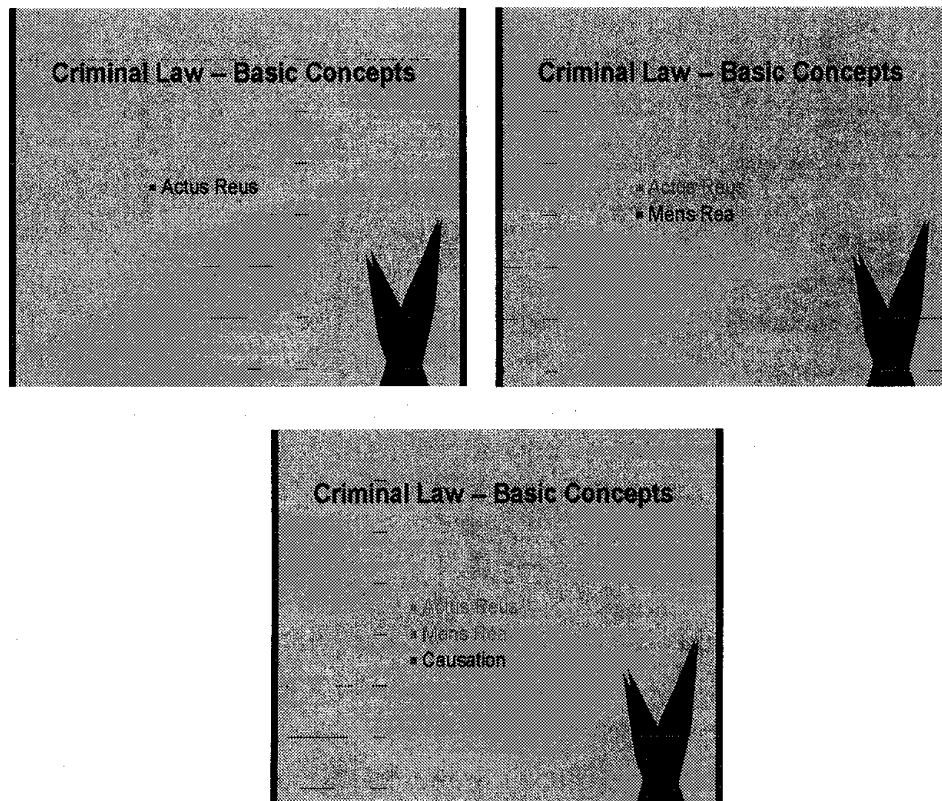
C. *Presentation Software*

Students who are trying to assimilate large amounts of unfamiliar information often have difficulty perceiving and following the conceptual framework their instructors impose on the material in their classroom presentations. A visually presented outline aids students considerably, and increasing students’ ability to assimilate information furthers their realization of the basic goals. Here is an example of part of an outline for a Criminal Law class prepared by one of us (Stephen Sowle) using Lotus’ Freelance Graphics presentation software.²² A click of the mouse reveals successive topics as the instructor covers them:

20. Martin, *supra* note 2, attachment 2, at 5.

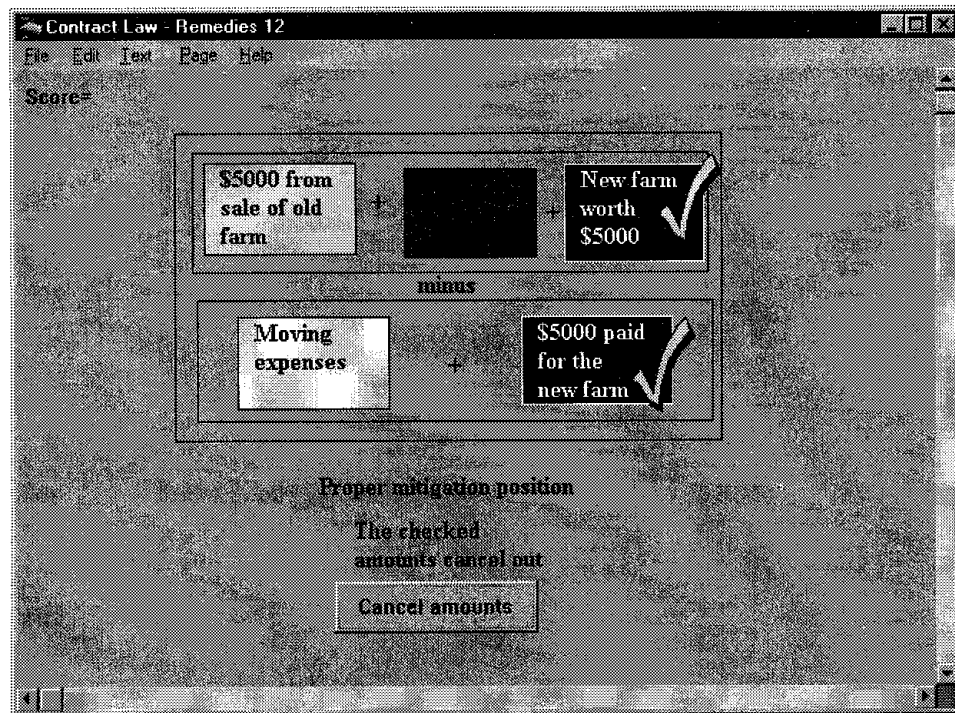
21. *See id.*

22. Other popular presentation packages include Microsoft’s Powerpoint and Corel Presentations. Most software packages designed for creating presentations or “slides” will help you decide on a design that is both easy to see for students and easy to create for the instructor.

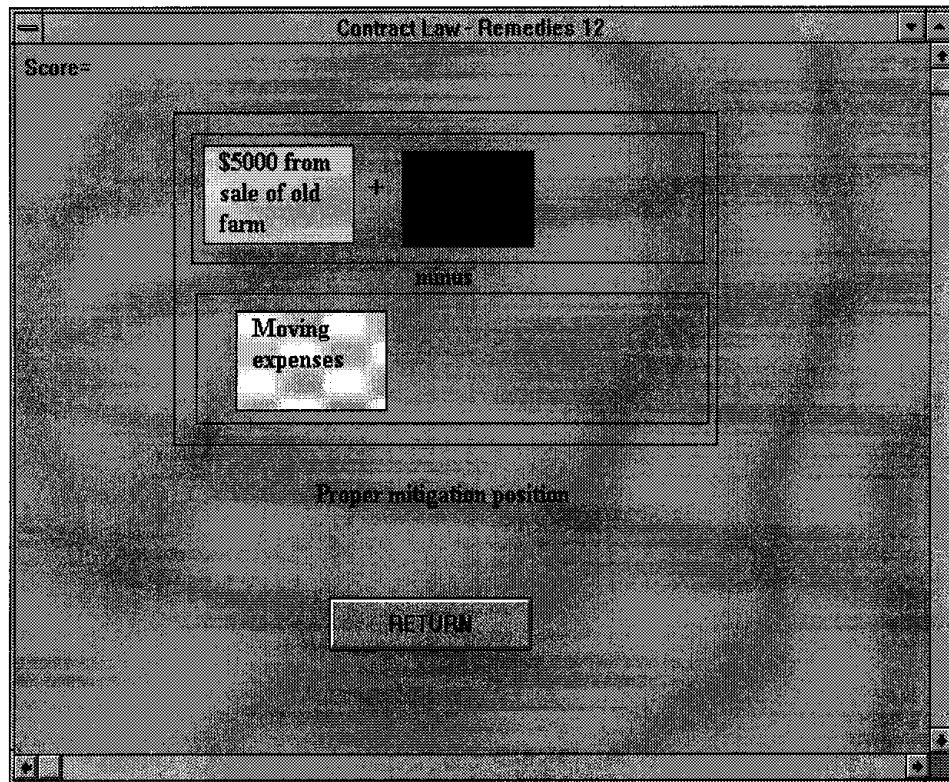


You can use presentation software to present concepts graphically as well as verbally. Here, for example, is graphic representation of the calculation of the position of a proper mitigator after a breach of contract:²³

23. This example is taken from a tutorial on contract law prepared by Richard Warner using Asymetrix's Toolbook program. Unlike using presentation software, you have to learn a programming language to use Toolbook. Toolbook applications are controlled by programs that the developer of the application writes him or herself. The programming language, however, is relatively easy to learn.



Clicking on the “Cancel amounts” button eliminates the checked boxes:



This example illustrates the qualitative presentation of quantitative concepts. Many students find such presentations much more accessible than purely mathematical presentations of the same concepts. You can also effectively present quantitative information in a quantitative way. Projecting a spreadsheet and working through various possibilities can help students see the economic consequences of legal decisions.²⁴

D. *Displaying Students' Screens*

If both you and the students in your class are linked to a net-

24. One limitation in using most presentation software packages is that it is difficult or impossible to vary from your prepared sequence of images. Although this is fine for lectures, it may inhibit more free-flowing discussions. Frustration with this limitation of presentation programs is common among law professors. See, e.g., Steven D. Jamar, *Re: Video Projectors*, E-TEACH discussion list, Sept. 27, 1996 (electronic copy on file with authors). Although some programs provide work-arounds for this problem, they tend to be awkward to use.

work, various software packages allow you to project whatever is on the screen of one or more of the students' computers.²⁵ Thus, you might, for example, ask students to formulate the narrowest interpretation of a holding of a case, or to draft a clause in a contract, and then project the students' attempts on the screen and critique and modify them. Legal writing provides another example. Suppose a student in a legal writing class has a question about the structure of a long, complex sentence. Rather than write the sentence on the board, you can simply take control of the student's computer and display the sentence in question to the entire class. Short answer pop-quizzes are another possibility; you can spot-check student answers in front of the class using this technology. Finally, if students have prepared graphics or outlines of material as part of their answers in class, these can be displayed to the faculty member or to the entire class without the need of copying files, installing software, and so forth. This approach makes students think independently and present their results in a very public way—something they will do as practicing lawyers.

E. Effects on the Classroom

Law school instruction is unique in its extensive use of the Socratic method. Using a projector can detract from or enhance this style of teaching. It detracts when students see their essential classroom activity as copying down the projected material. You can avoid this problem by simply providing students with copies of the projected material.²⁶ This eliminates the need—or, at least, what students may perceive as the need—to copy the projected material verbatim. Your own response to the projector may also inhibit Socratic discussion. When using a projector, you may find yourself strongly inclined to lecture in order to explain the projected material.²⁷ It is natural to want to elaborate on the projected

25. Many such programs are available, including Timbuktu from Farallon and PcAnywhere from Symantec.

26. You can hand out Xerox copies, e-mail the relevant files to students, or post the files on the Internet for downloading and printing.

27. We have noticed this tendency in our own teaching, and comments by colleagues at other schools suggest that our experience is not idiosyncratic. Roger Andersen of the University of Toledo College of Law, for example, noted at a re-

outline. You can avoid this problem by using the projected material as a reference point for a discussion that goes well beyond the material. Projecting basic points or issues keeps crucial information before the entire class and helps focus the discussion on the relevant topics. In this way, projection can enhance Socratic dialogue.

F. Technical Considerations

Until recently, projecting from a computer typically required two devices: an overhead projector (of the sort used to project transparencies) and an LCD (liquid crystal display) panel linked to the computer and placed on top of the projector. The only practical alternative was to use a large RGB (red, green, blue) projector, such as a BARCO. These devices are expensive, difficult to maintain, and do not (by current standards) produce a very clear image.²⁸ Recent innovations in display device technology have led to a new breed of lightweight, less expensive LCD projection devices for use with computers without the need for a separate overhead projector. These new LCD projectors project clear, sharp images in classrooms without the need to use special high-intensity overhead projectors or the dimming of the classroom lights. They require fewer plugs and wires and are consequently easier to set up, and some project sound and full motion video as well as still images. The drawback is cost: LCD projectors are more expensive than an overhead projector-LCD panel combination.²⁹ Getting the

cent conference that he too had to combat this tendency. Roger W. Andersen, *Modern Audio-Visual in the Classroom*, Workshop on Teaching with Technology at the Association of American Law Schools Annual Meeting (Jan. 4, 1997).

28. If you are using a BARCO and it appears fuzzy no matter how much you try to focus it, you should have it serviced by a qualified professional and put back into proper alignment. This servicing is usually necessary once per year depending on the age and frequency of use of the equipment. BARCO and similar RGB projectors also require a converter for the VGA signal from your computer to the RGB (red, green, blue) signal that the device needs to display. These converter boxes are sometimes temperamental and are not guaranteed to work with every computer display you may encounter. For this reason, along with the expense, the purchase of a newer, portable, light-weight LCD display device may well be worth the cost.

29. The Sharp XG-E1100U LCD projector, for example, currently lists for \$7995.00; a high quality overhead projector and LCD panel combination costs around \$4500.

projection device to the classroom also raises cost issues. The new LCD projectors are small enough to be easily portable; however, the costs involve staff time necessary to deliver, set up, and pick up the projectors. A more convenient alternative is to install the projector permanently in the ceiling of the classroom; of course, this eliminates portability and adds the expense of installation.

The computer side of the computer-LCD projector combination merits some attention. Typically, you would bring your laptop computer to class and link it to a built-in or portable projection device.³⁰ You will need a reliable computer capable of quickly and easily running the software that you will be using in the classroom. Time spent waiting on the computer to load software, or clicking on icons and navigating menuing systems, can be distracting.³¹

Image size, color, and shape are obviously important.³² Is the

30. Most laptops now come with a "quick key" for changing the video mode of the computer among three options: the image appears only on the computer's display; the image appears only on the external screen in front of the class; the image appears on both the display and the screen. Often these keys will have a small blue monitor or TV screen icon. Pressing the key (usually Fn and F4 or something similar) toggles the video mode between these three settings: internal, external, and both. If you hook up your laptop to an LCD display device and cannot get a picture, try pressing this key until you get the desired setting. Most people find that working with both the internal screen and the external screen simultaneously is easiest. Some laptops may require you to have the external display device connected before you turn on your computer, but most newer computers simply require you to plug the LCD device into the external VGA port, located in most cases on the back of the projector or LCD panel.

31. Those who pace while they teach may worry about being tied down to the computer. See, e.g., Pedro A. Malavet, *Re: Use of Video Projector*, E-TEACH discussion list, Sept. 27, 1996 (electronic copy on file with authors). One solution is an "air mouse." This is a wireless remote control mouse that allows you to operate the computer from a distance. However, many committed pacers (colleagues at Chicago-Kent and at other schools) report that operating the computer without remote control imposes no significant limit on their circumambulations. The concern expressed by pacers—that use of a projector will slow them down—may in fact be an advantage in disguise. Some students complain that projected images are not left on the screen long enough; having to walk back to the computer before moving to the next screen gives students additional time to complete their notes and catch their breath.

32. Be sure you turn off any screen savers during your presentation as they often distract the audience and can sometimes even cause the video display device to reset and require a restart of the computer. If your laptop includes power saving utilities you may need to disable these before class to prevent any accidental interruptions of your presentation.

screen visible from all seats? Is the size of the text being displayed large enough so that everyone can see? Within limits, bigger is better. As noted earlier, our experience is that 18-to-24 point type is easily visible from the back of a 100-seat classroom. When changing the color of the type in order to make a particular passage stand out, choose a color that is easily readable; students report that text displayed in red is rather difficult to see. In general, color choice requires some care. Colors should be highly contrasting but pleasing to the eye. Image shape is not usually a problem; however, you will sometimes find that the image looks more like a wedge than a square, typically larger at the top and smaller at the bottom. This is called "keystoning." You can eliminate it by raising the height of the projector so that the image being displayed is closer to level with the projector. Another way to prevent keystoning is to change the angle of the screen itself by anchoring the bottom of the screen further back than the top. This method, however, can result in focusing problems.

The quality of the image—especially its size—is in part a function of where you put the projector.³³ One obvious consideration is to position the display equipment so that it does not prevent students from seeing either the screen or the instructor. The easiest way to do this is to make sure the projector is in position when students fill out the seating chart. Students can position themselves so they have a clear view. You also want to position the projector so that it does not shine in your own eyes; the high intensity light is hardly pleasant. If you can bear the expense, a built-in, ceiling mounted projector may, in some cases, be the best choice.

III. ELECTRONIC INSTRUCTIONAL MATERIALS

Presently available electronic instructional materials divide into two types: tutorials and electronic casebooks. We will now consider issues of creating, delivering, and using such materials.

33. You should have a VGA extension cable at least 10 feet long in case you need to situate the projector a long distance from where you will be working with the computer. Some familiarity with using the remote focusing device that comes with most projectors can also be quite helpful.

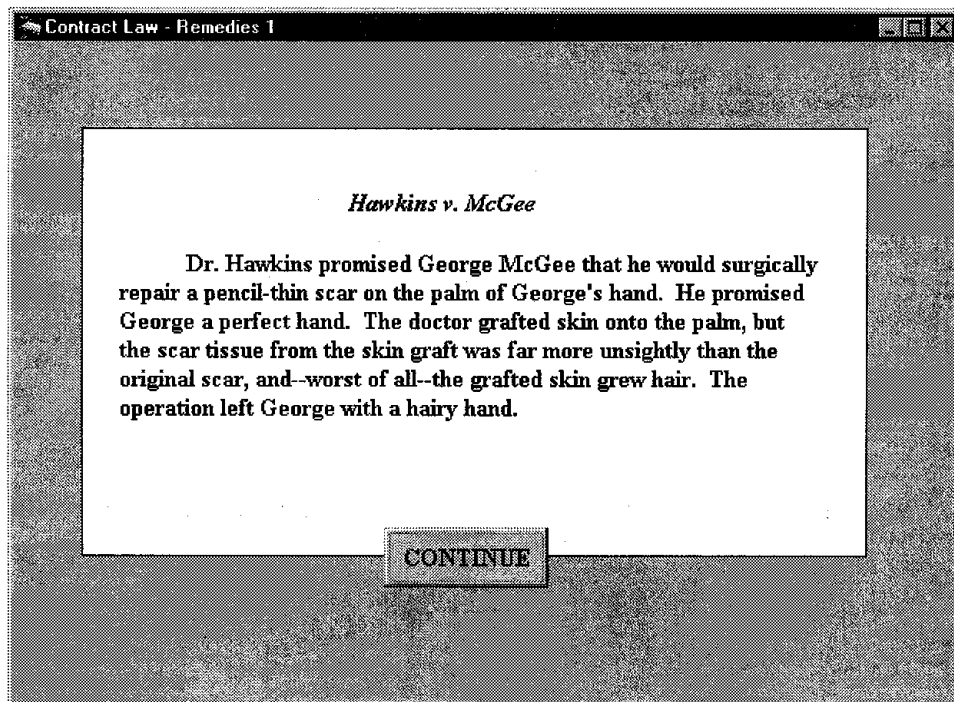
A. *Tutorials*

Earlier, when discussing the goal of imparting a grasp of the black letter rules, we emphasized that the relevant knowledge is knowledge of the rules "in action," that is, the role rules play in deciding cases. There is, however, a pure memory task associated with learning the black letter rules: To understand the role of rules in deciding cases or grasp the rationale for a rule, students must know what the rules are. Interactive computer tutorials provide a way to remove this rote memory task from the classroom, thereby freeing class time for the pursuit of other goals. If students arrive in class having already completed the memory task of learning the relevant rules, you can devote more class time to discussing the rationales underlying the rules, explaining hypothetical applications of the rules, investigating theoretical and practical issues, and so on.

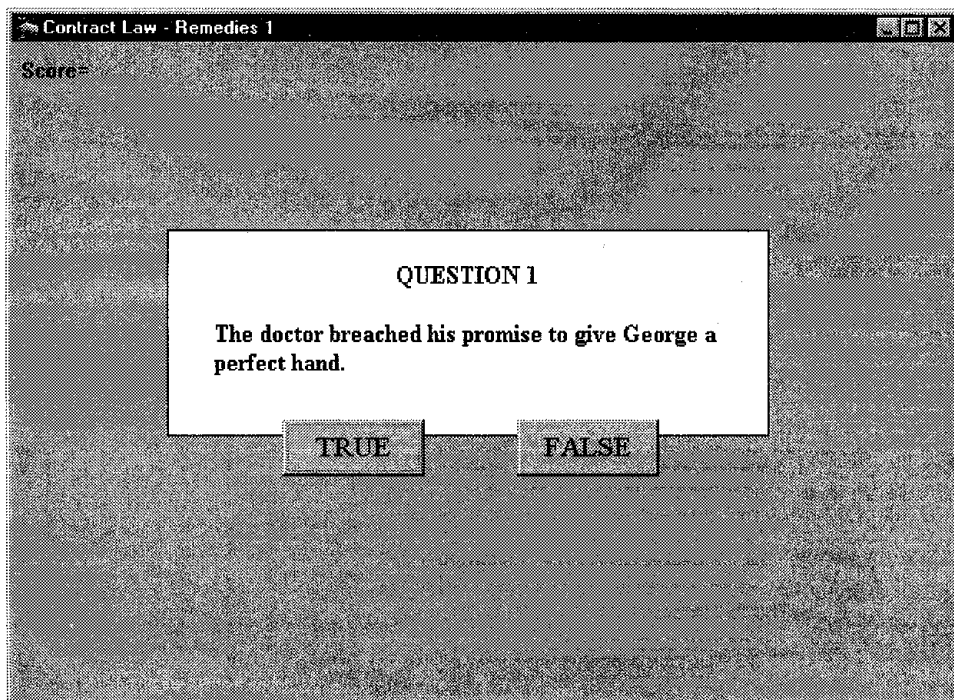
1. *One Approach to Constructing Tutorials*

One of us (Richard Warner) has designed a series of approximately thirty tutorials covering the basic common law of Contracts. In the typical tutorial, a student reads a brief amount of text and then answers a question based on what he or she has just read. The point is to use reinforcement to aid learning. The technique is the same as the often recommended technique for remembering names: Upon being introduced to Jones, one says, "Pleased to meet you, *Jones*," repeating the name as an aid to memory.³⁴ Here is a typical sequence of text followed by a question:

34. There is an excellent discussion of tutorial design in a CALI online manual for law professors. See CALI: THE CENTER FOR COMPUTER-ASSISTED LEGAL INSTRUCTION, HOW TO WRITE A CALI LESSON USING CALI-IOLIS (Dec. 1995) <<http://www.cali.org/iolis/toc.html>>.



When the student clicks on "continue," he or she sees the following screen:



The question may seem absurdly simple, but, in a carefully crafted lesson, a great deal can be taught in such simple steps.

One reason tutorials are effective instructional devices is that the computer is a patient drill master. Students can go through the tutorial repeatedly until they are satisfied they have mastered the material. They find the private, interactive, self-paced nature of the instruction appealing and effective. Survey results confirm this. Here are the results of two surveys conducted by Richard Warner of students in his Contracts class:

Statement	Average*
A. I learned more from the course because of the tutorials.	5.63
B. Difficult concepts in the course were clarified by the tutorials.	5.43
C. The tutorials gave me an opportunity to apply concepts and principles from the course.	5.29
D. The tutorials provided feedback that contributed to my understanding of the subject matter.	5.16
E. I believe the tutorials should continue to be offered as part of this course.	5.74
F. I would like to see other tutorials available in this course and other courses.	5.60

Number responding: 88 of 100

Date: April 1994

Statement	Average*
A. I learned more from the course because of the tutorials.	5.15
B. Difficult concepts in the course were clarified by the tutorials.	4.96
C. The tutorials gave me an opportunity to apply concepts and principles from the course.	5.09
D. The tutorials provided feedback that contributed to my understanding of the subject matter.	5.02
E. I believe the tutorials should continue to be offered as part of this course.	5.55
F. I would like to see other tutorials available in this course and other courses.	5.60

Number responding: 85 of 100

Date: April 1996

* **Scale:** 1 = very strongly disagree 3 = disagree 5 = strongly agree
2 = strongly disagree 4 = agree 6 = very strongly agree

The data strongly suggest that interactive tutorials provide an effective way of handling the pure memory task of learning black letter rules.

Handling this memory task is not the only use for interactive tutorials, of course. You can design them to achieve other pedagogical ends. You could, for example, design tutorials that focus on the underlying rationales behind the rules. Tutorials of this sort would ask students to respond to a series of fact patterns by explaining why a rule does or does not apply. Another example: First-year students studying Contracts often have difficulty applying the abstract rules of offer and acceptance to the conversational and written exchanges that occur in the give-and-take of real life negotiations. You can help them practice interpreting such exchanges by integrating videos into interactive tutorials that ask students to assess the legal significance of various elements of the interchanges between the parties. Appropriately designed tutorials of this sort could help students see links between abstract legal rules and the complicated scenarios their future clients will pres-

ent. Seeing such links is an essential step in developing the capacity to analyze legal issues independently.³⁵

2. *Effects on the Classroom*

As noted earlier, if students use tutorials to learn legal rules outside of class, you can devote more class time to a variety of other pedagogical purposes. It is important that classroom discussion not simply go over the same ground the tutorials cover. You might be inclined to do so on the theory that the repetition will help students learn the material; however, our experience is that students tend to respond *very* negatively to such repetition. If students have covered certain rules or concepts in a tutorial, they expect class to extend their knowledge—either with new material or a more thorough treatment of the tutorial material. One approach here is to present hypotheticals that require students to apply the rules and concepts in the tutorial to novel situations. This helps avoid another danger inherent in the use of tutorials—that the tutorials may give students the sense that they understand more than they do. If a student repeatedly goes through a tutorial, he or she will master the questions it asks and learn to complete the lesson without a mistake. However, the student may have acquired little more than the ability to answer correctly the specific questions asked; he or she may not have acquired the ability to apply the legal rules and concepts presented in the tutorial to novel situations not addressed in the tutorial itself.³⁶ Presenting hypotheticals that require stu-

35. One can also design an "expert system" for use in teaching. An expert system poses a series of choices to the user, and, as the user makes his or her selections, the program develops an analysis of a legal issue. For example, Lilian Edwards's Succession Advisor is an expert system that poses a series of questions, the answers to which determine who inherits property under Scotland's rules for intestate succession. Lilian Edwards, *Building an Intestate Succession Advisor: Compartmentalisation and Creativity in Decision Support Systems*, in *INFORMATICS AND THE FOUNDATIONS OF LEGAL REASONING* 311, 311 (Zenon Bankowski et al. eds., 1995). Such systems can help students understand the systematic structure in a body of legal doctrine. See also Michael Lambiris & Gram Oberem, *Natural Language Techniques in Computer-Assisted Legal Instruction: A Comparison of Alternative Approaches*, 43 J. LEGAL EDUC. 60 (1993) (describing the use of artificial intelligence to develop "intelligent tutoring systems").

36. This phenomenon is well-known, according to John Mayer, Executive Director of the Center for Computer-Assisted Legal Instruction ("CALI"). See

dents to deal with new situations counteracts the tendency to think that mastering the tutorial means mastering the rules and concepts it presents.

3. *Technical Considerations*

a. *Creating Tutorials*

Until recently, creating tutorials meant programming—in Visual Basic, Toolbook, Authorware, or some similar software platform. This is not the insurmountable obstacle it may seem. It does not mean that the professor has to learn how to program. Many law students have significant programming experience and either know, or can quickly learn, an appropriate program. You can hire such a student as a research assistant and give him or her a word-processing file that indicates the sequence of screens you want the user to see and the content you want to appear on each screen. Alternatively, a member of your Computer Center staff may be able to do the programming for you.

Recent developments make the creation of tutorials even simpler than this. You can now create them on your own without any knowledge of programming. The Center for Computer-Assisted Legal Instruction ("CALI"), for example, distributes a program called CALI-IOLIS, which is designed to allow law professors to create tutorials without any programming knowledge.³⁷ CALI-IOLIS is a Windows program that can easily be used to create tutorials by almost anyone with a basic familiarity with Windows and a word processor. Although simple to use, the program is very flexible and can incorporate video and graphics.

One advantage to writing your own tutorials is that you can produce precisely what you want. However, there are a large number of tutorials already written and readily available to you and your students. CALI distributes an entire library of tutorials to all students at CALI member schools. Students may freely copy tutorials

John Mayer, *Computer tutorials and "nintendoing,"* E-TEACH discussion list, Oct. 25, 1996 (electronic copy on file with authors).

37. See CALI: The Center for Computer-Assisted Legal Instruction Home Page (visited Jan. 7, 1998) <<http://www.cali.org>>.

from this library.³⁸

b. *Delivering Tutorials to Students*

Using tutorials in teaching requires, of course, that students have access to them. We recommend that the tutorials be installed on the computers in the student computer lab. Many schools, unfortunately, have relatively few computers available for student use. This makes using tutorials in teaching problematic, as you cannot count on every student owning, or having access to, a computer. A long-term solution is to require every student entering your law school to own a computer.³⁹ This may be preferable to the school's investing in lab computers that will be quickly outmoded.

Students who have computers of their own typically prefer to run the tutorials on their computers instead of the lab computers (convenience is one obvious reason). How do you get the tutorials to the student machines? If your school has a local area network ("LAN") through which students can access software and files, you can place the tutorials in a common directory on the network so that students can copy them onto a floppy disk. Files larger than 1.4 megabytes ("MB") will not fit on a standard disk, but there are ways to distribute materials over the 1.4-MB limit. If, for example, your school can provide a place where students can connect their own laptops to the LAN (or in the classroom itself), the students can easily exchange files and information via the LAN. Another distribution method for larger files is the use of portable ZIP drives⁴⁰ or other portable large storage media. A ZIP drive can be placed in an accessible area where students can connect their laptops. Providing students with a copy of your materials on a ZIP disk can serve as a way of distributing information if a LAN is not available. File transfer protocol ("FTP") and World Wide Web servers can also be used to distribute information to students. Many different kinds of electronic materials can be distributed in

38. Most law schools are CALI members; CALI's law school membership currently numbers 174. See CALI: The Center for Computer-Assisted Legal Instruction Member List (last modified Oct. 13, 1997) <<http://www.cali.org/calitech/members.html>>.

39. See discussion *infra* Section IV.D.

40. A ZIP drive is an external disk drive that uses 100-MB disks.

this manner quickly and easily to students, including outlines, syllabi, notes, practice questions, and secondary reading materials.

B. *Electronic Casebooks*

We can clearly use computer tutorials to teach legal rules, but can—or should—we use computers to present cases and other materials? Is there any rationale for an electronic casebook? Electronic casebooks have burst onto the educational scene in the past two years and are not likely to go away. As legal publishers make more of their titles available in electronic form, you will increasingly find students not only taking notes on their laptop computers, but also using their computers to read assignments, consult the text in class, and generate outlines. We believe that electronic casebooks can help instructors pursue the basic pedagogical goals identified at the beginning of the article in a more effective manner. As discussed in Section II, projecting materials available in electronic form can help orient students and enhance classroom discussion. Our question here, however, is whether there are sound pedagogical reasons for encouraging students to use electronic casebooks.

1. *Student Use of Electronic Casebooks*

Our experience with Chicago-Kent's E-LEARN section provides useful insight. The E-LEARN section uses the current (first) generation of electronic casebooks. These casebooks reproduce the material in a printed casebook in either Folio Views or Premise, the two major software platforms for electronic casebooks. Unlike print casebooks, you can easily search electronic casebooks for words and phrases; you can create hypertext links⁴¹ to materials in the book and to online materials;⁴² you can cut and paste materials into a word processor or other program; and you can highlight the

41. Hypertext links are made in hypertext markup language ("html"). Hypertext language, used in the creation of online materials, is the nonlinear presentation of text that allows a user to jump from idea to idea following his or her own associative pathways. See, e.g., PHIL JAMES, OFFICIAL NETSCAPE COMMUNICATOR BOOK, WINDOWS EDITION 8 (1997).

42. Hypertext links can be created in Views but not in Premise. In Premise, you are limited to the links built into the book by the publisher.

text and take notes within the casebook, and then later collect all the notes in a hierarchical outline of the major topics of the book.⁴³ The crucial question is, do these features add sufficient value to give electronic casebooks an advantage over print casebooks? The current verdict of student users of electronic casebooks would appear to be a rather qualified "yes."

In surveying the E-LEARN section, Professor Martin found that, in pre-class preparation, the majority of students did *not* read the relevant material on the computer, but preferred the print version instead.⁴⁴ Further, most students did not take advantage of the hypertext features of the software to construct hypertext links to relevantly similar and dissimilar cases—a use that we thought held particular pedagogical promise.⁴⁵ In class, the majority of students took notes using a word processor, not, as we had expected, in the electronic casebook itself. When class discussion focused on a particular case or statute, most students referred to the print version of the casebook, not the electronic version. In preparing for final exams, most did not make significant use of the outlining feature built into the software.

The students did not, however, simply ignore the electronic casebook. Rather, they used it extensively as a sophisticated storage and retrieval system—specifically, to search for particular passages; to import passages verbatim into their class notes, case briefs, and outlines; and to download and manipulate cases from LEXIS and WESTLAW for use in their legal writing assignments. Martin concludes:

The capacity to search, link, and annotate, alone, however, seemed for most to be insufficient reason to choose the screen over a more familiar interface. Electronic casebooks in which the authorities cited in an assigned opinion or subsequent problem or note are a "point and click" away and interactive casebooks with built in tutorials, exercises, and problems are likely to exert a stronger pull in competition with print. But electronic casebooks that simply place a digital copy of what is essentially flat book material in even a very sophisticated software environment will, by virtue of habit and experience, but probably

43. This is only possible in Views, not Premise.

44. See Martin, *supra* note 2, at 4.

45. See Warner, *supra* note 2.

more enduring reasons as well, be put aside by many for the print equivalent.⁴⁶

As Martin himself remarks at a later point in the report, the students' failure to exploit the casebook's capacities for linking and annotating does not mean that electronic casebooks offer no advantages over their print counterparts.⁴⁷ Half of the students responding to Martin's survey indicated that they would prefer a course that had materials in electronic form (in addition to print) over one that had only a book.⁴⁸ What explains this preference? We suggest that students find the access to information provided by electronic casebooks a useful organizational device. As one student remarked in a written comment in Martin's survey, "Without the computer my notes would look like this [a chaotic scribble followed]."⁴⁹

The question these results pose is: How can we exploit the capacities of the computer to make electronic casebooks a more effective instructional device? We suggest the following:

(1) Given that students are not constructing their own hypertext links to similar and dissimilar cases, provide such links in the casebook along with questions that prompt students to explain to themselves why the linked materials are relevant. Such materials can further the realization of the second of the basic pedagogical goals: understanding the rationales underlying the rules. To understand the rationale for a rule is, in part, to grasp the relevant similarities among the cases where the rule applies. There is some evi-

46. Martin, *supra* note 2, at 4.

47. Martin comments:

Does all this mean that the electronic casebook was not valued or used? No. Recall that half the group viewed having an electronic version of course materials as important enough that, all things equal, they would prefer a section that had materials in that form (in addition to print) over one that had only a book. Those who did their course notes in [Folio Views], though not within the casebook, did so in part because of the capacity to link those notes to the book. Indeed, that is the principal advantage of using [Folio Views] rather than WordPerfect or Word for daily notes. Notes on a particular case can be linked to the case or even a particular passage in it.

Id. at 4-5.

48. *See id.*

49. *Id.*

dence that hypertext-linked materials help students see such similarities. Consider Professor Max Young's program, *'Help' with Sale of Goods*.⁵⁰ This program contains Young's lecture notes presenting the basic law governing the sale of goods, as well as relevant statutes, case references, and edited cases. All the material is systematically linked by hypertext. As Young notes, "One of the advantages of hypertext is that by layering information, and being able to easily create cross-references, the immediate structure of a subject can be shown to the user."⁵¹ Data from Young's survey of his students indicates that they found the systematic structure revealed by hypertext links particularly helpful in understanding the subject matter of the course.⁵²

(2) Build interactive tutorials into the casebook. Instead of notes and questions students passively read, interactive tutorials can lead students through a self-instructional learning process. Tutorials, as noted earlier, can be used to pursue all three of the basic pedagogical goals.⁵³

(3) Make greater use of the multimedia capacities of computers. As noted earlier, graphics can represent quantitative concepts—such as the mathematical relationships between various elements of the damage rules in Contracts and Torts—in qualitative form. Full-motion video can be used to present the points of view of the parties in a case. This method would effectively capture the emotional and narrative aspects of cases—aspects that students will confront in practice. Full-motion video can also present arguments for the parties and make the legal issues come alive with a vividness that mere print rarely achieves. Such techniques can dramatize dry conceptual frameworks and relieve the relentless abstraction that can characterize legal information. The point is not simply to assist those who find it difficult to follow abstract chains of argument, but also to illustrate faithfully and for everyone the

50. See Young, *supra* note 6.

51. *Id.* at 8.

52. See *id.* at 8, 12-13. It is important that the hypertext links reveal a meaningful structure in the material. See Jones & Scully, *supra* note 10, at 22. It can be counterproductive to merely pepper texts with hypertext links to further material that is in some way relevant. See *id.*

53. See discussion *supra* Section III.A.

links between conceptual thought and reality. Acquiring the ability to see such links is an essential step in acquiring the ability to analyze legal issues independently.

2. *Effects on the Classroom*

A significant number of students in Professor Martin's survey reported that using the electronic casebook kept them better organized and helped them quickly locate information as it became relevant in classroom discussions.⁵⁴ Classroom discussion tends to be better when students are well-prepared and can locate relevant information efficiently, so there is some reason to think that student use of existing electronic casebooks improves classroom performance.⁵⁵ The next generation of electronic casebooks promises to have a much greater impact on the classroom. The electronic casebook innovations suggested above would make electronic casebooks an effective *self-instructional* device. Students who consistently and effectively taught *themselves* would arrive in the law school classroom with considerably more knowledge than they do now. As an instructor, you could then build on this knowledge to deepen their theoretical and practical understanding of the law.

This suggestion may provoke the following objection: "If you make it too easy for students to learn the law, they will not learn to read and understand cases and statutes when they are on their own as lawyers." The objection is that, in our concern to achieve our first two goals—imparting knowledge of black letter rules and their underlying rationales—we have undercut our attempts to achieve our third goal—developing the ability independently to analyze legal issues. In reply, we contend that a well-thought-out program of self-instruction can help achieve the third goal. Consider, by way of analogy, teaching neuroanatomy. There are many intricate anatomical structures in the brain. How would you teach a student to identify these structures when dissecting a brain? Would you provide a basic "road map" by explicit instruction about what to look for and how to find it? Or, would you have the student dissect the

54. See Martin, *supra* note 2, at 7.

55. While we do not think this is correct, one possible criticism is that the students who opted into the E-LEARN section might have done better than other students in a "traditional" classroom setting.

brain without guidance as to what he or she should be looking for? Obviously, the former. We simply suggest the same approach when teaching students to dissect cases and statutes: We should give them a basic black-letter road map. When students come to class equipped with this basic knowledge, class time can be used more effectively to develop the capacity to analyze issues independently.

3. *Technical Considerations*

While the major publishers of legal textbooks are making more and more electronic versions of texts available, relatively few electronic casebooks are currently available commercially.⁵⁶ You can create a "home-made" electronic casebook based on materials that you compile yourself, but this can require a significant amount of time.⁵⁷ Chicago-Kent provides its E-LEARN section with electronic versions of all of the required texts. For the Fall 1996 term, Chicago-Kent's computer staff spent 70 to 140 hours per "home-made" casebook preparing and formatting material. Less time was required on materials available from the publisher in electronic format, but time was still spent creating electronic versions of supplementary materials provided, in most cases, by the instructors themselves, and not available in a commercial electronic format. Even if a commercial electronic casebook is available, you may want to customize it to some degree, adding hypertext links to tutorials, notes, commentary, hypertext links for navigation, and other information.

If you decide to create your own electronic casebook, you have three basic software options: Folio Views, Premise, and RoboHELP. RoboHELP is less well known than either Views or Premise and deserves some commentary here.⁵⁸ It is a program that

56. The Appendix, *infra*, contains a list of all currently available electronic casebooks.

57. You may save some time by securing from the publisher a license to create an electronic version of the print casebook you are using. The publisher may grant a limited license to create an electronic version on the condition that it be used only for the class you are currently planning to teach, and that the electronic version be distributed only to students who have already purchased the print version.

58. RoboHELP is available from Blue Sky Software. See Bluesky Software,

automates the making of Windows "Help" files. RoboHELP turns the process of making such files into a simple point-and-click operation. You can present any sort of information using such files, including the types of materials typically found in casebooks. Max Young's *'Help' with Sale of Goods* is an example of a casebook created as a Help file.⁵⁹ RoboHELP is easy to use, and the programs it creates can run on any computer that runs Windows; thus, end-users need no additional software. Moreover, students who use Windows should already know how to use a Windows Help file. This may make RoboHELP a reasonable choice for faculty whose schools offer little in the way of computer support.

Whatever format you use for electronic casebooks, supporting student use of electronic casebooks can take a great deal of time. Students (and many faculty members) need training in the use of a computer, the software, and the many ways in which the electronic casebook can be used in conjunction with paper-based materials and traditional study habits. Students have a far higher expectation of service, availability, and reliability when their educational experience is directly dependent upon their computers. Laptop computers, in general, are not as reliable, sturdy, or accessible as books. They are not made to function for long periods of time, and so experience heat-related failures far more often than desktop computers. They do not respond well to being lugged around in backpacks and book bags, being dropped on the floor beside a chair, and banged around as books are. They are also an easy target for theft, and the loss of a laptop, especially one containing the only copy an entire semester's notes, can be quite disastrous, both financially and academically.

Our aim in making these observations is not to dampen enthusiasm for electronic teaching. These problems can be overcome. As the E-LEARN section demonstrates, you can create extensive electronic materials and train students to use them. Our experiences with the E-LEARN section show that one key to the success of such a project is creating realistic expectations in students about the degree of support the school can provide. In general, it is es-

RoboHELP Product Information (last modified Jan. 6, 1998) <<http://www.blue-sky.com/products/inforh.htm>>.

59. See *supra* note 6 and text accompanying *supra* note 50.

sential that the administration, the faculty, and the students are all aware, not simply of the advantages, but also of the potential problems, in using electronic materials.

Delivery of electronic casebooks is easy if students acquire commercially available electronic casebooks through a bookstore. But where you have made your own materials, or modified a commercially available product, you will need a way to deliver them efficiently to large numbers of students. Our earlier discussion of delivering tutorials outlines the available options.⁶⁰

IV. LAPTOPS IN THE CLASSROOM

If you use a laptop in the classroom to project text or other material, it is unlikely that you will be the only one in the room with a computer. Increasingly, students are arriving at law school with laptop computers and are bringing them into the classroom. Many schools are considering, or have already adopted, requirements that all entering students purchase laptop computers. In this section, we address some of the issues raised by the presence of laptops in the classroom.

A. *Effects on Note-Taking*

One concern expressed is that students who take class notes on their laptops may attempt to transcribe the class, that is, may try to capture in their notes a nearly verbatim account of what the professor and/or their classmates say. The fear is that, to the extent students attempt this, they will be less engaged as classroom participants. Although we share this concern with "stenographic" note-taking, we believe the problem is a relatively modest one and that instructors can take steps to counteract this tendency.

In his report on the 1995-96 E-LEARN section, Professor Martin comments on this concern:

Do computers encourage students to concentrate on taking complete notes to the detriment of reflection and participation? . . . My own impression, based on class visits, is that the ability to capture more of what takes place in the classroom may indeed accentuate a tendency on the part of some beginning students to

60. See discussion *supra* Section III.A.3.b.

sacrifice real time analysis and reflection to transcription but that most learn before too long how unwise that is. I observed that whenever the teacher posed a challenging problem or stirred real discussion any tendency toward transcription ceased.⁶¹

Martin's comments indicate that special efforts may be called for in the first semester or year to address this problem, but that it probably is unnecessary in upper-level courses. One approach suggested by Martin's observations is to emphasize Socratic discussion and analysis of hypotheticals over lecturing. Another approach is to periodically stop class discussion or a lecture when the instructor senses that students are taking notes excessively, and remind the students of the negative consequences of stenographic note-taking. Finally, if you do not mind sharing your class notes with students, you can make them available on a Web site or by other means before or after class; this presumably will reduce student anxiety about capturing everything that happens in class in their notes.

B. *Keyboard Noise*

Another concern is that the noise generated by significant numbers of students taking notes on their laptops will be distracting to both the instructor and the students. The experiences of participants in the E-LEARN section, in which 80% or more of students typically take class notes on their laptops, provide a useful perspective on this issue. Professor Martin reports that "[a]ll I spoke with, students and faculty, found that the sound of so many keyboards in action swiftly slipped into the background. Almost no one found it a significant distraction."⁶² In fact, some E-LEARN instructors have found the keyboard noise helpful, in that it provides a form of "aural feedback" on the level of class note-taking and can be used to help gauge when students are having trouble with a particular concept.

Anecdotal reports from other schools indicate that keyboard noise can be a source of annoyance in some situations. Ironically, it appears that the fewer the number of laptops in a classroom, the

61. Martin, *supra* note 2, at 9.

62. *Id.*

greater the possible distraction caused by their use. This is probably explained by the fact that the "white noise" generated by a large number of laptops is more easily ignored than the tappings of relatively few students. In cases where students have complained about the noise, some instructors report success in solving the problem by requiring laptop users to sit in one part of the classroom.

To the extent that keyboard noise is perceived to be a problem, there is a possible technological fix. Many laptops currently on the market are equipped with "noiseless" keyboards that generate little or no noise. If your school adopts a general policy on student use of laptops, you can consider making it a requirement that students purchase laptops with such capabilities if they want to use them in the classroom.

C. Extra-Curricular Use of Laptops in the Classroom

Students with laptops may be tempted to use their machines for entertainment rather than academic purposes when their interest in the class flags. The student who appears to be taking notes quite studiously may, in fact, be playing an intense game of Tetris or engaged in a chess match against the computer. If the classroom is wired for LAN access, the possibilities for distraction are multiplied: Students may be "surfing the 'Net," reading or sending e-mail, or researching a legal writing assignment on LEXIS or WESTLAW.

How prevalent is this problem? Again, Martin's report is instructive:

I saw nothing [in my class visits] that would lead me to believe that computer games and web surfing (or e-mail and on-line research) are a more serious threat to classroom concentration and engagement than crossword puzzles, newspapers, and private correspondence or doodles.⁶³

Martin also notes that, if you do not plan to use LAN connections to support your teaching (e.g., for in-class drafting exercises or testing), you can prohibit students from connecting to the LAN or arrange for the LAN connections to be turned off in your class-

63. *Id.*

room during class time.⁶⁴ If you are a pacer in class, you can also make a point of periodically roaming through the aisles and commenting (humorously or otherwise) when you observe a student using his or her computer for extra-curricular activities.

D. Requiring All Students to Buy Laptops

Some schools already require entering students to purchase laptop computers; others are debating whether to do so.⁶⁵ We believe that schools should take this step only if they conclude there is a clear pedagogical rationale for doing so, and only if they have adequate Computer Center resources to support such a step.

At Chicago-Kent, we currently require only those students who participate in the E-LEARN project to buy laptop computers. With these students, the rationale for requiring laptops is clear: We are providing them with electronic versions of their casebooks and other materials in order to evaluate the pedagogical effects of immersing law students in an electronic learning environment. With other students, we do not feel there is a compelling pedagogical rationale, currently, to require them to purchase laptops. Rather than adopting a blanket policy that applies to all students, many schools might be well advised to evaluate this question in terms of particular program areas, special projects, and the like.

Another important consideration is the required level of support from your computer staff. In our experience, an enormous amount of staff time is required in order to configure individual student laptops to work with the school's LAN and to provide other needed support.⁶⁶ Many schools simply do not have adequate Computer Center staff currently to meet those needs.

One argument in favor of requiring students to own laptops is that the requirement can solve the problem of limited availability of lab computers. This problem is a very real one: It is difficult to make effective use of computer technology for instructional pur-

64. *See id.*

65. According to information compiled from responses to a request posted on the E-TEACH discussion list, ten schools currently require, or plan to require, students to own computers. Of these, five specifically require laptop computers.

66. At Chicago-Kent, configuration of PCMCIA cards to the LAN takes an average of thirty minutes per laptop.

poses if students do not have adequate access to computers.⁶⁷ We believe a better solution in some cases, however, may be to invest in additional lab computers, which require less Computer Center support and can be used by multiple students rather than by only one.

If your school does conclude that there is a convincing rationale for students to own laptops and that you have adequate staffing to provide needed support, one advantage of requiring students to buy laptops (as opposed to merely encouraging them to do so) is that the cost of the laptops can be included in the financial aid support provided to students—an important consideration for students of limited financial means.

V. EXPANDING THE WALLS OF THE CLASSROOM

Computers offer a variety of ways in which to extend instruction beyond the confines of the classroom. Our focus will be on the use of e-mail, discussion groups, and the Internet.

A. *E-Mail and Discussion Groups*

E-mail can be used for a number of purposes, including: continuing discussions beyond the limited time available in the classroom, answering questions that students were not able to ask in class (due to time constraints or shyness), conducting optional or required short-answer quizzes, and making announcements about administrative details. Most of these functions can also be realized through a discussion group, which is essentially a private Internet-style forum for electronic discussion.

1. *Effective Use of E-Mail*

E-mail and discussion groups can expand the walls of the class-

67. Limited availability of computers is a common source of frustration among law professors attempting to integrate computer technology into their teaching. See, e.g., Michael MacNeil, *Introduction*, E-TEACH discussion list, Sept. 26, 1996 (reporting low use by students of an online forum for class discussion due to limited access to computers) (electronic copy on file with authors); Pedro A. Malavet, *Re: Introduction*, E-TEACH discussion list, Sept. 26, 1996 (limited availability of computers has prevented extensive use of e-mail among students) (electronic copy on file with authors).

room by facilitating continuing contact between professor and student. We discuss below several of the most common uses of these devices, but many more are possible, depending on the precise nature of the course and the professor's instruction style and pedagogical goals.

a. *Continuing Discussion Outside of Class*

Every professor has experienced the frustration of having to stop discussion of a topic in class before it has been fully aired in order to move on to the next topic. E-mail can provide an effective means for you to continue such discussions without taking up additional class time. You can use e-mail, for example, to pose additional hypotheticals, address policy considerations or doctrinal subtleties there was insufficient time to discuss in class, and clarify areas about which students seemed confused. To avoid confusion as you move on to new topics in class, it is best to limit the amount of time devoted to such elaborations to a few days or, at most, a week.

You can use e-mail to create a virtual classroom environment by encouraging students to respond to your postings with comments and questions, as they would if you were presenting the material in the classroom. You can then forward to the entire class particular comments or questions that you find particularly perceptive or useful, along with your responses. To the extent that you succeed in generating substantial discussion, this use of e-mail can further all of the basic pedagogical goals: It can assist students in better understanding the black letter rules and their underlying rationales, and help students learn how to analyze legal issues independently, especially if you pose hypotheticals for discussion.

Persuading students to participate in such discussions can be difficult, particularly in their first year. One option is to give credit for participation in e-mail discussions, as you would for participation in class.⁶⁸ Another option is to "break the ice" by requiring

68. This can be particularly effective with discussion groups. *See infra* note 118 and accompanying text. Encouraging participation in discussions can be more difficult than persuading students to use e-mail. Trotter Hardy notes that using e-mail to help determine class participation offers a means of objective verification of the quality and quantity of participation by specific students. *See I.*

students to write a restaurant or movie review and distribute it to the class early in the semester.⁶⁹ Whatever incentives you use, perhaps the most important factor in encouraging student participation is for you to show that you take the online discussions seriously by responding to student contributions and by making references to online discussions in class.⁷⁰

If you use a Socratic teaching style or a variation of it, you may view e-mail discussions as either boon or bane. On the plus side, you are more likely to receive considered responses to your questions, because students will have more time to think about their answers. This may allow the dialogue to move quickly to a more sophisticated level compared with the typical classroom exchange. On the negative side, the immediacy of direct interaction is absent, and students are not challenged to think on their feet in an extended, focused exchange, which many instructors see as the main advantage of the Socratic method.

b. *Answering Student Questions*

Students often have questions that cannot be addressed in class because of limited class time, the question is tangential to the issues you want to emphasize in class, or the student fails to raise his or her hand due to shyness or a sense of intimidation. E-mail can provide a useful means for answering such questions, thereby assisting students in understanding the legal rules discussed in class and their rationales.

A concern expressed by some instructors is that encouraging students to use e-mail for questions and comments will send a false signal that the instructor does not welcome office visits. Although

Trotter Hardy, *An Experiment with Electronic Mail and Constitutional Theory*, 44 J. LEGAL EDUC. 446, 448 (1994) ("Instead of relying on memory or even notes, which are sketchy at best, I had before me at the end of the semester every word the students had said.").

69. Kathryn Sampson at the University of Arkansas, Fayetteville has reportedly had success with this method. See Jan M. Levine, *Introduction*, E-TEACH discussion list, Sept. 27, 1996 (electronic copy on file with authors).

70. You should consider whether your "default rule" will be to identify the students whose messages you forward, or to keep their identities confidential. In our experience, students are more likely to participate in such e-mail discussions if they are assured that their identities will remain unknown unless they explicitly authorize use of their name.

this is possible, our experience is that exactly the opposite occurs. You must clearly communicate to students that you welcome office visits and do not view e-mail as a replacement for visits, but rather as a useful complement. Many students are too shy to visit their professors, even during office hours set aside for that purpose, and e-mail provides a means for such students to express their thoughts in a way that seems less intrusive and more anonymous. In our experience, these students are much more likely to find the courage to visit you in person once they have broken the ice via e-mail. For less timid students, your willingness to address their questions by e-mail may help convince them that you are serious in encouraging them to come see you in person.

c. *Conducting Short-Answer Quizzes*

E-mail can be an efficient means of conducting optional or graded quizzes on class material.⁷¹ One of our colleagues, Ralph Brill, has used e-mail to pose short-answer questions in his first-year Torts class. He distributes the questions by e-mail and asks students to submit their responses by e-mail by a designated date. He then uses e-mail to draft and return comments on each student's answers. The entire process can be done from the professor's and students' computers without any paper changing hands, saving both time and resources.

d. *Collaborative Projects*

E-mail can be used as a forum for students to conduct collaborative projects that might be difficult to coordinate effectively outside of an electronic environment. An innovative example of this is reported by Professor I. Trotter Hardy of the College of William and Mary School of Law, who assigned a class of fourteen seminar students to draft a constitution for a hypothetical country, using only e-mail communication.⁷² Although the experiment was not an

71. Graded e-mail quizzes may raise concerns about students assisting one another in violation of your prohibition on such help. See discussion *infra* Part V.B.2.d. (discussing essentially the same issue in the context of the Internet). We suggest analogizing such quizzes to homework, take-home exams, or papers, which also call for unmonitored graded work outside the classroom. See *id.*

72. See Hardy, *supra* note 68.

unqualified success,⁷³ Hardy found a number of advantages to using e-mail for the exercise, including: meetings did not have to be scheduled;⁷⁴ students were forced to do more writing than they would have done otherwise;⁷⁵ a complete transcript of the deliberations was easily produced at the end of the semester;⁷⁶ e-mail provided a forum for students who did not participate actively in class to express themselves;⁷⁷ and Hardy was able to gauge the evolution of student understanding of the materials assigned for the course.⁷⁸

e. Administrative Use of E-Mail

For many professors, the first several minutes of class are frequently devoted to administrative "housekeeping" matters, such as how far the students should read for the next class, rescheduling a canceled class, and announcing an upcoming event. Over the course of a full semester, these minutes can add up to a significant amount of time. Informing students that such matters will be addressed by e-mail can save these precious minutes and contribute to an atmosphere of studiousness in class.

2. Discussion Groups

Discussion groups can be used for all of the purposes discussed above, with the exception of short-answer quizzes.⁷⁹ Discussion groups are electronic bulletin boards that use Internet technology. When you access a discussion group, your screen will display all

73. *See id.* at 451. Hardy concludes that "conducting a constitution-writing exercise through the use of e-mail is a worthwhile thing to do, but that it is too slow to permit fourteen people to come anywhere close to writing an entire constitution in twelve weeks." *Id.* He states that a less ambitious project (e.g., drafting a takings clause or a free speech clause rather than an entire constitution) may be more appropriate for e-mail collaboration exercises. *See id.*

74. *See id.* at 447.

75. *See id.* at 448.

76. *See id.*

77. *See id.* at 449.

78. *See id.* at 451.

79. Because all postings to discussion groups can be viewed by all members, discussion groups can be used to post questions, but in most cases are inappropriate as a method for students to post their answers.

of the messages that have to date been posted by participants in the group. Typically, messages are listed, or "threaded," by topic and, within topics, by date and time. Here is an example:

Contracts 251 – Section 001 – Spring, 1997
 Contracts Discussion Forum
 [Post Message] [Archive]

Estoppel – Michael G Schwartz 11:22:12 2/10/97 (0)
Yet Another Consideration Problem – Stephanie W Tipton 10:22:22 2/10/97 (1)
 Re: Yet Another Consideration Problem – Christopher J Carroll 11:22:30
CTA Transfer Cards – Darrel Oman 11:34:36 2/07/97 (1)
 Re: CTA Transfer Cards – Niki Kanellopoulos 13:03:02 2/08/97 (0)
Promissory Estoppel? – Any L Wilson 15:33:03 2/06/97 (5)
 Re: Promissory Estoppel? – Laura J Meredith 17:15:58 2/06/97 (1)
 Re: Re: Promissory Estoppel? – Sean M OLeary 12:07:26 2/07/97 (0)
 Re: Promissory Estoppel? – Grace Law 17:16:23 2/06/97 (2)
 Re: Re: Promissory Estoppel? – Suzanne J Price 15:48:57 2/09/97 (1)
 Re: Re: Re: Promissory Estoppel? – Stephanie W Tipton 11:33:17
Promissory Estoppel – Michael G Schwartz 12:17:30 2/06/97 (4)
 Re: Promissory Estoppel-apply interpretation doctrine–Richard Warner 14:23:59

You can read an existing message by clicking on it with your mouse and add a new message either by replying to an existing message or by creating a message with a new topic. All messages posted to the discussion group can be read by all participants and retained indefinitely.⁸⁰

3. *Comparative Advantages of E-Mail and Discussion Groups*

Assuming you have the technology to support both e-mail and discussion groups, which should you use? It depends. For many instructors, an important advantage of e-mail is that it allows them to control discussions by acting as the gatekeeper for everything

80. West's TWEN Web site includes the ability to create online discussion groups. See *infra* note 98.

distributed to the class. With discussion groups, by contrast, students can post anything they want for all members of the class to read.⁸¹ Another potential advantage of e-mail—at least if your LAN is set up so that new e-mail messages appear as soon as users sign on, or students are in the habit of checking their e-mail regularly—is that students are guaranteed to see (and, one can only hope, to read) your messages. With discussion groups, you may find it hard to persuade students to access the site regularly, and participation in discussions may suffer accordingly. In our experience, this problem is very real; largely for this reason, we have had noticeably more success using e-mail than discussion groups.⁸²

Assuming you can overcome these problems, discussion groups have one distinct advantage over e-mail groups: Because messages appear in threaded form and all messages can be accessed from a single screen, it is much easier for students to follow the flow of particular discussions and to comprehend the development of concepts and arguments, especially during the first year, when students are struggling to learn basic legal concepts and styles of legal reasoning. During this time, threading can be a considerable advantage in helping students understand the material you assign them.⁸³ A compromise solution is the threaded archiving of e-mail discussions on a Web server through commonly-available free programs

81. For some instructors, this feature of Usenet groups may be an advantage rather than a disadvantage. It may be particularly well-suited to smaller, seminar-style classes. As noted below, e-mail lists can also be set up to allow students to post messages to the entire class.

82. One of us (Richard Warner) is currently experimenting with using class credit as an incentive for students to access and participate in a discussion group set up for class discussion. *See generally infra* notes 118-19 and accompanying text. The results so far are encouraging: significantly more students are participating as compared with a similar discussion group set up for the same course a year ago. This accords with the experience of Ralph Stein. *See infra* note 115. There is, however, the potential problem that students may participate *only* in order to receive credit and thus may not provide useful or considered comments. Thus far, this does not seem to be a significant problem in Professor Warner's discussion group. Stein reports that the quality of discussion was *higher* in the online discussion group than in traditional office or phone discussions with students. *See id.*

83. *See, e.g.,* Burford C. Terrell, *Stimulating Student Discussion*, E-TEACH discussion list, Sept. 26, 1996 (reporting "much better" results with threaded discussion than regular mailing list) (electronic copy on file with authors).

such as Mhonarc.⁸⁴

4. *Effects on the Classroom*

Active use of e-mail or a discussion group can have a number of beneficial effects on the classroom. As noted above, you can save valuable classroom time if you make announcements or give quizzes electronically rather than during class. More importantly, using e-mail or a discussion group to continue classroom discussion and to answer student questions allows you to devote as much time as you feel is needed to expanding on issues discussed in class or clarifying areas of confusion: You no longer need to worry that spending additional time addressing a particular topic will be at the expense of an equally important (or more important) topic later in the course.⁸⁵ By making effective use of these technologies, classroom time ceases to be a zero-sum game.

One consequence of this is that, as with tutorials,⁸⁶ using e-mail or discussion groups to supplement classroom discussion frees up additional classroom time for, among other things, delving more deeply into theoretical and policy considerations and exploring hypothetical applications of the legal rules under discussion. Classroom time can thus be reserved for discussion of difficult or sophisticated issues that are best taught in direct exchanges with students.

Another benefit is that students who lack the confidence to participate actively in class may feel more comfortable taking part in on-line discussions, particularly if their identity can be kept anonymous. This can help counteract the unfortunate tendency for classroom discussion to be dominated by only a few students.

5. *Technical Considerations*

To use e-mail effectively, all of your students must have e-mail

84. See University of California, Irvine, Office of Academic Computing, *MHonARC, An Email-to-HTML Converter* (visited Jan. 6, 1998) <<http://www.oac.uci.edu/indiv/ehood/mhonarc.html>>.

85. An additional use of the technology is to provide a forum for discussion of material that you assign but do not plan to discuss in class due to time constraints.

86. See discussion *supra* Section III.A.2.

accounts and must be persuaded to consult their accounts on a regular basis. This task is greatly aided if your school has an ingrained "e-mail culture."⁸⁷ At Chicago-Kent, for example, students are given e-mail accounts when they arrive, and they quickly realize that the administration and their professors rely heavily on e-mail to make announcements and communicate information on a wide range of academic and administrative subjects. Most students check their e-mail at least once a day. Even if your school does not have such an e-mail culture, you can create one in your class by requiring all students to have e-mail accounts and holding them responsible for information distributed by e-mail. You can then use e-mail aggressively in the early weeks of the course to send the message home.⁸⁸

To distribute e-mail messages to the entire class, you first have to create a list of your students' e-mail addresses. Several options are available. First, you can create a "private" mailing list; with this option, you are the only person who can send or forward messages to the entire class.⁸⁹ Second, you can create a "public" mailing list; with this option, a list "address" is created (e.g., *crimlaw1@kentlaw.edu*), and anyone who knows the list address can post messages that will be distributed automatically to the entire class. Third, you can use a "mailing list manager" ("MLM"), also known as a "listserv," which is essentially a much more sophisticated version of a public mailing list that allows you to control who may subscribe and post to the list.⁹⁰ Most MLMs run on

87. Creating such a culture is much easier if your LAN is set up so that new e-mail messages appear on each user's screen automatically as soon as the user signs on.

88. You may not want to go as far as one of our colleagues supposedly did some years ago. After assigning some 700 pages of reading on the first day of class, he reportedly sent an e-mail to the students saying that they really needed to read only the first 30 pages.

89. Most e-mail systems allow users to create and save such lists, which usually can be compiled in a matter of minutes even for a fairly large class. It may also be possible for your school's computer staff to automatically create such mailing lists for you from information supplied electronically by the Registrar's Office.

90. Internet e-mail discussion lists such as LAWPROF and E-TEACH use MLM software. Although generically referred to as "listservs," the term "listserv" is the name of a specific software product. A better term is "mailing list" or "list."

Unix systems, but some⁹¹ can be run on less powerful operating systems such as Windows NT. You will need to consult with your computer support staff to determine the best software for your needs.

If you do use a mailing list for your class, it is a good idea to maintain an archive of everything posted to the list. An archive can easily be created through most MLM software, but there are several software packages that can be used to create Web-based archives, which are often easier for students to use. In particular, Mhonarc⁹² provides easy to use archiving capabilities. These archives provide access to the information discussed on your mailing list in a threaded fashion, as with a discussion group.⁹³

If you decide to use a discussion group instead of a mailing list, you and your students will need access to a computer network with Internet capabilities and Web browser software, such as Netscape, or specialized "newsreader" software.⁹⁴ You will likely need the assistance of computer support staff to set up a discussion group for your class.⁹⁵ Because many students will require some instruction in accessing and using the discussion group site, you will also need training support from appropriate technical staff.⁹⁶ Use of e-

There are several varieties of listserv software, but they all operate on similar principles. The most common are ListProc, *see* Corporation for Research and Educational Networking ("CREN") Software Tools (visited Jan. 7, 1998) <<http://www.cren.net/listproc/index.html>>; LISTSERV, *see* L-Soft International's LISTSERV Home Page (last modified Dec. 4, 1997) <<http://www.listserv.net/listserv.stm>>; and Majordomo, *see* Great Circle Associates' Majordomo (visited Jan. 7, 1998) <<http://www.greatcircle.com/majordomo/>>. Listservs are very flexible, allowing you to exercise a great deal of control over the list if you wish (with subscriptions and postings screened by you), or little or no control at all (with anyone allowed to subscribe and post). For more information on MLMs and e-mail in general, *see* WILL SADLER, USING INTERNET E-MAIL (1995).

91. For example, LISTSERV.

92. *See* University of California, Irvine, Office of Academic Computing, *MHonARC, An Email-to-HTML Converter* (visited Jan. 6, 1998) <<http://www.oac.uci.edu/indiv/ehood/mhonarc.html>>.

93. *See* discussion *supra* Section V.A.1.a.

94. Common newsreaders include NN, TRN, Trumpet, and RN.

95. Discussion groups can be configured in a manner similar to public mailing lists so that only certain addresses are allowed to post or submit information. However, this configuration may be difficult depending on a number of factors.

96. Discussion groups are relatively simple to use, so the amount of instruction needed will probably be minimal, and written instruction guides may be suffi-

mail and discussion groups will work effectively, of course, only if students have reasonable access to your school's computer network from lab computers, their own laptops, or through dial-in access from their home computers.⁹⁷

B. *The Internet*

Discussion groups illustrate one pedagogical use of the Internet. But, other than as a vehicle for such discussions, how and why should you use the Internet to teach? One way to approach this question is to consider the ways in which, from an instructional point of view, the Internet is like an electronic casebook and the ways in which it differs from one.⁹⁸

1. *Similarities to Electronic Casebooks*

The pedagogically significant features of electronic casebooks are the ease and effectiveness of their search functions; their hypertext capability; their various organizational and annotation tools (e.g., note-taking and automatic outlining features); and the capacity to incorporate interactive tutorials and multimedia presentations. The Internet shares all of these features with electronic casebooks. This naturally raises the question: What advantages does the Internet offer over electronic casebooks? Why should one consider using the Internet in addition to, or instead of, electronic casebooks installed on local hard drives? There are two reasons. First, the Internet offers instructional possibilities electronic casebooks cannot. Second, it provides a format for integrating a variety of instructional possibilities into a systematic approach to electronic and virtual teaching. We consider these two points in turn.

cient. Alternatively, you can use the discussion group capabilities at West's TWEN site. See *infra* note 98.

97. Chicago-Kent currently does not provide access to discussion groups from home. A number of students in the E-LEARN section have expressed frustration with this, commenting that they would prefer to read and participate in online class discussions from home in the evening.

98. West's TWEN Web site offers a variety of options to use in developing a virtual classroom. One can post information and articles, create online discussion fora and e-mail discussion groups, and construct hypertext links to Web sites. See TWEN-The West Education Network Home Page (visited Jan. 7, 1998) <<http://twen.com>>.

2. *The Internet's Instructional Possibilities*

a. *Delivery of Materials*

Posting materials on the Internet is an efficient way to distribute them to students. You need only post the information once, and anyone can access the information at any time from anywhere. If you make the material downloadable, students may, if they wish, transfer the material to their local hard drives. Efficient communication with students, especially in large classes, can eliminate impediments to learning such as failures to receive relevant materials and assignments.

Not only can the Internet facilitate the delivery of materials, it can, in a sense, even eliminate the need to do so: You do not need to deliver the material to the students when you can deliver the students to the material. For example, in teaching environmental law, you could include links from the Web site you have set up for the course to relevant sites containing scientific and regulatory information about the environment (such as the EPA's home page).⁹⁹ This approach not only informs students that such sources of information exist, it also creates opportunities for independent research. Of course, care must be taken to avoid information overload.¹⁰⁰ Students may lack the ability to efficiently organize and analyze an initially confusing array of information, and, if they lack that ability, they may learn little as they flounder ineffectually in an ocean of information.

b. *Online Discussions*

We have already examined online discussions at some length. Here we note two further interesting uses of such discussions. The first is what Murray Turoff calls "Question-Answer Activity."¹⁰¹ The "instructor asks a discussion question, and every student must supply an answer before he or she can see the answers of the other

99. See United States Environmental Protection Agency Home Page (last modified Dec. 29, 1997) <<http://www.epa.gov>>.

100. See *infra* text accompanying note 116.

101. See Murray Turoff, *Designing a Virtual Classroom* (Mar. 1995) <<http://www.njit.edu/njit/Department/CCCC/VC/Papers/Design.html>>.

students.”¹⁰² Turoff remarks that this “feature . . . forces equal participation in any discussion issue the instructor triggers in this manner. It forces each student to do independent thinking about the issue.”¹⁰³ A variant of this approach is an online discussion in which a few students in the class are “on call” each week. The “on call” students are required to respond to the questions you post while the rest read but do not respond online. This approach produces a manageable volume of postings while still requiring all students to participate.

c. *Tutorials*

As noted earlier, interactive tutorials can help students master legal rules and concepts outside of class, and we have argued that using tutorials in this way can help promote all three basic pedagogical goals identified at the outset. The advantage of having students use such tutorials on the Internet is that it is possible to keep track of how well they perform. You can find out, for example, how many students missed question 6 of the tutorial on expectation damages. Such information indicates which topics need further emphasis in class and which topics do not. Of course, collecting such information raises privacy issues, especially if the performance reports allow you to determine by name how well particular students have done. Appropriate disclosures should certainly precede the collection of such information.

d. *Quizzes*

You can post automatically graded multiple choice tests on a Web site. There are two ways to conceptualize such an approach. First, you can see it as a form of homework. When all students turn in the same homework assignments, some students may have simply copied other students’ work, or may have obtained help from other students. You have no effective way to prevent this. The penalty for failing to do one’s own work is a lack of understanding that results in a poor exam performance. You could treat the Internet multiple choice tests as “homework” in this sense and

102. *Id.*

103. *Id.*

spot test for genuine mastery on the final exam. "Homework-style" evaluations can be very useful. When students use them as intended, the evaluations provide important feedback that assists the student in mastering the material. The second way to think of Internet multiple choice tests is as genuine tests where you prohibit unauthorized help. Unfortunately, there is no reasonable way to achieve this. You could do this over the Internet if you required all students to take the test at the same time in a proctored room, but then there would be little point in using the Internet for the test. One point of using the Internet is to allow easy access to information by students at any time, from any location.

e. *Study Groups*

You can also use the Internet to facilitate cooperative studying among students by creating a web site that only students in a particular study group can access.¹⁰⁴ In this way, the Internet can promote *cooperative* learning. Turoff notes that "[s]tudies of the use of computer-mediated communication facilities . . . have tended to support the point of view that for mature, motivated learners, this mode of learning [cooperative group learning] can be more interactive and more effective than the traditional (physical) classroom."¹⁰⁵

3. *The Internet as an Integrating Format*

To see the integrative possibilities of the Internet, let us return briefly to electronic casebooks. Imagine an electronic casebook that contains the relevant cases, statutes, and other authoritative legal and secondary materials. Interactive tutorials are strategically interspersed among the hypertext-formatted materials. In addition to hypertext links to material "inside" the casebook, it also contains links "outside" the casebook to e-mail, to the threaded discussion for the class, and to Web sites (e.g., a site for the user's study groups and a site for the course containing a schedule, syllabus,

104. Virginia Commonwealth University's "Web Course in a Box" software allows you to set up such web sites. See Virginia Commonwealth University's Web Course in a Box (visited Jan. 6, 1998) <<http://views.vcu.edu/wcb/intro/wcbintro.html>>.

105. Turoff, *supra* note 101.

and special course announcements). Finally, imagine that the instructor (and perhaps even the students) can supplement the casebook at any time by adding material to which anyone using a copy of the casebook has immediate access.

The links "outside" the book and the ability to add material immediately available to all means that, with today's technology, what we have described is not merely an electronic casebook loaded on a local hard drive; it is a learning environment on the Internet. You can think of it as a sort of super-electronic-casebook, or—to use the current term of art—a virtual classroom environment. Whatever you call it, it provides a format that usefully integrates a variety of electronic instructional tools.

What are the benefits of such integration? There are three points to note. First, integration means convenience, and convenience matters. A student who, while reading the casebook, thinks of a question to e-mail to the instructor, or an issue to raise in the online discussion, is more likely to send the e-mail or post the comment if doing so is merely a matter of clicking on a convenient icon. Second, a virtual classroom environment can promote cooperative group learning. The virtual classroom provides an environment in which students can easily share questions, insights, and materials through e-mail, online discussion, and study group and course Web sites. Cooperative learning is an appropriate form of law school instruction, much as cooperative projects are a prominent feature of legal practice. Further, as noted earlier, there is some evidence that cooperative learning is instructionally effective.¹⁰⁶ Third, the virtual classroom environment provides an opportunity for the instructor to impose a meaningful structure on a wide range of materials. This observation is an extension of a point made earlier when discussing hypertext, where we quoted Max Young's observation that one of "the advantages of hypertext is that by layering information, and being able to easily create cross-references, the immediate structure of a subject can be shown to the user."¹⁰⁷ We also noted that Young's students found the systematic structure re-

106. See Turoff, *supra* notes 101-03 and accompanying text; *see also* Hardy, *supra* note 72 and accompanying text.

107. Young, *supra* note 6.

vealed by hypertext links particularly helpful.¹⁰⁸ The point to emphasize here is that hypertext links are not the only way to reveal "the immediate structure of a subject." You can also do so by including, in notes contained in the assigned reading, suggested topics for online discussion, for study group projects, and for independent research.

4. *Effects on the Classroom*

There is little data upon which to base an assessment of the effects of virtual classroom instruction on the traditional classroom. However, an interesting study by Jerald G. Schutte suggests that learning can be significantly enhanced by combining Internet technology with traditional classroom instruction.¹⁰⁹ Schutte divided students in his statistics class in to two groups: traditional classroom students and virtual classroom students. The traditional classroom students met on Saturdays from 9:00 a.m. to 1:30 p.m. and submitted weekly problem assignments.¹¹⁰ The virtual classroom students did not receive face-to-face in-class instruction; instead, they

had four assignments each week: 1) e-mail collaboration . . . in which they generated weekly statistical reports and sent them to the instructor using e-mail; 2) hypernews discussion in which a weekly discussion topic was responded to twice a week by each student; 3) forms input via the WWW which allowed for student submission of the same homework problems being solved by the traditional class; and 4) a weekly moderated Internet chat . . . in which student discussion and dialogue were carried out in real time in the virtual presence of the professor.¹¹¹

Schutte reports that the "virtual students scored an average of 20 points higher on the 100 point midterm and final exams."¹¹²

Some may object that this result is not as startling as it seems.

108. *See id.* It is important that the hypertext links reveal a meaningful structure in the material. It can be counterproductive to merely pepper texts with hypertext links to further material that is in some way relevant. *See Jones & Scully, supra* note 10, at 22.

109. *See Schutte, supra* note 6.

110. *See id.*

111. *Id.*

112. *Id.*

After all, the e-mail collaboration and the discussion group participation required the virtual students to develop reports and take part in discussions not required of the traditional students. While Schutte does not address the issue, it is not unreasonable to think that the traditional students did not participate as actively while present in the traditional classroom. It is plausible that the virtual students worked harder and more actively, and one might unsympathetically observe that it is no surprise that actively-learning, hard-working students learn more effectively than students who work less hard and believe that attending class means mastering the material.¹¹³ But this reaction misses the point of the study, which is that virtual instruction can promote self-reliant learning in which students actively take steps to ensure that they understand the subject matter.¹¹⁴

What would happen if we supplemented traditional classroom instruction with virtual instruction? Would we promote self-reliant learning? The prospect is attractive. Getting students to analyze legal issues on their own is one way to take an important step toward the goal of developing the capacity to analyze legal issues independently. One approach would be to require participation in an online discussion in which students would post and analyze hypotheticals. In creating, analyzing, and commenting on each other's analyses, students would independently analyze legal issues. Some have experimented with such discussions, and they have reported a mixture of success and failure.¹¹⁵

113. Teich notes that some "critics have charged that if CAI is effective when used as a supplement to conventional instruction, it is the result of the simple fact that extra study enhances learning." Teich, *supra* note 6, at 495 (citing Paul Hager & James Knowlton, *Invalid Implicit Assumptions in CBI Comparison Research*, 14 J. COMPUTER-BASED INSTRUCTION 84, 85 (1987)).

114. Teich notes that the "research does not . . . support the theory that extra study inevitably enhances learning. Traditional instruction combined with a number of supplemental techniques has been proven to be no better than traditional instruction alone." *Id.*

115. Professor Ralph Stein reports one of the successes. Stein incorporated an on-line discussion in his Fall 1996 day division Constitutional Law II course and evening division Constitutional Law I course. Participation was optional but the option was presented "in a manner that made it clear that failure to participate was unwise." Ralph Stein, *FWD: RE: Online discussion groups*, E-TEACH discussion list, Feb. 3, 1997 (electronic copy on file with authors). The on-line discus-

One worry is that instructors and students who are already engaged in traditional instruction will view the addition of virtual instruction as an excessive burden. Those with experience in distance learning¹¹⁶ are familiar with the problem:

Historically, the use of computers to facilitate human communication quickly introduces the key problem of "information overload." Those who have attempted to conduct remote education with a significant number of students utilizing electronic mail can appreciate the truth of this observation. A key element in the design of software to support distance education is the minimization of information overload for both instructor and students.¹¹⁷

Survey results suggest that students receiving traditional in-class instruction do find the addition of an online discussion helpful, although they also suggest that "information overload" may be a serious worry. Richard Warner surveyed his Spring 1997 Contracts class, in which students were required to participate actively in an online threaded discussion.¹¹⁸ Students were asked whether they

sion was part of a virtual environment that included:

- 1) Questions by [Stein] based on class discussion and assignments and aimed at the next class.
- 2) Supplemental material in the form of mini-essays by [Stein].
- 3) Longer, topic-oriented problems that were, in effect, practice exams.
- 4) Student questions.
- 5) Student responses.
- 6) Downloaded (by [Stein]) articles on breaking constitutional law cases and issues.

Id.

Stein reports that "by the end of the semester 1) Virtually 95% of each class at the least 'lurked.' 2) Approx. 24% of the classes actively participated in varying degrees." *Id.* He notes that the "overall quality of the questions posed was higher than what I am used to getting when talking to students by phone or in my office," and that there was "a notable morale effect, across the board, in both classes." *Id.* But see Martin Dean, *Re: Using Threaded Discussion Groups*, E-TEACH discussion list, Mar. 13, 1997 ("[T]he technologically secure students use the system, and most of the rest don't. I too am very disappointed in the response.") (electronic copy on file with authors); Arnold Cohen, *Re: Discussion Groups*, E-TEACH discussion list, Mar. 17, 1997 ("I have attempted to have a virtual classroom . . . requirement in my third year courses, with a singular lack of success.") (electronic copy on file with authors).

116. Distance learning is discussed *infra* Section V.C.

117. Turoff, *supra* note 101.

118. Participation is "required" in the sense that a substantial number of points are available for participation. The purpose is to maximize participation by post-

strongly agreed, agreed, disagreed, or strongly disagreed with the following questions:

Statement	Agreeing or strongly agreeing
A. Posting messages helps me understand legal doctrines and issues.	84%
B. Reading messages helps me understand legal doctrines and issues.	82%
C. Reading messages makes me more confident about talking about legal doctrines and issues.	74%
D. Posting messages makes more confident about talking legal doctrines and issues.	78%
E. Other courses should use discussion forums.	73%

Number responding to: (A), 44; (B), 55; (C), 54; (D), 42; (E), 57
Date: February 5, 1997

As the percentages indicate, the clear majority found the online discussion helpful. The percentage agreeing with (E) ("Other courses should use discussion forums") is perhaps surprisingly low given the higher percentages who found posting (84%) and reading (82%) helpful. Written comments included with the questionnaires indicate that some students do perceive the required participation in the online discussion as a significant demand on their time and that, consequently, they would prefer participation in such discussions to be optional.¹¹⁹ These comments suggest that information

ing comments as opposed to mere "lurking." The idea is that posting involves students in actively analyzing legal issues. In a typical section in which some students did not have access to computers, this approach might raise significant fairness concerns. However, Professor Warner's Contracts section is part of the E-LEARN project, in which all students are required to have laptop computers. The students' voluntary participation in E-LEARN indicates a commitment to using the computer as an instructional tool.

119. Students perceive that there are significant demands on their time. The first year at Chicago-Kent includes a very rigorous Legal Writing program that makes considerable demands on student time. In addition, Professor Warner's Contracts students were required to learn the black letter law by doing interactive computer tutorials outside of class. The survey of attitudes toward the threaded discussion was distributed two days after a major Legal Writing brief was due.

overload may be a serious potential danger of combining online discussions with traditional classroom instruction.

5. *Technical Considerations*

Web-based discussion tools, both asynchronous (like e-mail and discussion groups) and synchronous (like Internet Relay Chat), can be used to hold virtual meetings and discussions that are automatically archived and searchable via the Web pages.¹²⁰ Video conferencing on the Internet is possible using free software, for example, CUSeeMe,¹²¹ and QuickCam cameras (now available in color), which only cost about \$100-\$200. These can easily be linked to Web pages. Virtual worlds, called MOOs, MUDs, and MUSHes,¹²² provide a way to construct virtual environments for use as electronic classrooms. Many now provide Web interfaces as well.¹²³

The "Web Course in a Box" program available from Virginia Commonwealth University is an example of a virtual classroom system.¹²⁴ Simon Fraser University is also developing "Virtual U" along similar lines.¹²⁵ These systems are complete packages designed to provide electronic alternatives for the tools commonly found in the education setting, including gradebooks, scheduling, discussion fora, and whiteboard applications. Chicago-Kent is using a beta version of "Web Course in a Box." All scheduled classes are entered into the system and students are automatically enrolled in the virtual section of their class allowing them to see the Web pages for that class and participate in the discussion group

120. In synchronous discussions, users are online at the same time and send and receive messages in real time; in asynchronous discussions, users are typically not online at the same time and do not exchange messages in real time.

121. See White Pine's CU-SeeMe Home Page (visited Jan. 7, 1998) <<http://www.cuseeme.com/>>.

122. MUD stands for "multi-user dimension"; MOO means "MUD object-oriented"; and MUSH is a "multi-user sensory hallucination."

123. See, e.g., Chaco Communications Product Page (visited Jan 7, 1998) <<http://www.chaco.com/products/contents.html>>.

124. See Virginia Commonwealth University's Web Course in a Box (visited Jan. 6, 1998) <<http://views.vcu.edu/wcb/intro/wcbintro.html>>.

125. See Simon Fraser University Home Page (visited Jan. 7, 1998) <<http://www.sfu.ca/index.htm>>.

for that class. Faculty members are (at their request) trained to use the system, and encouraged to experiment with it to help determine the advantages of working with a Web-based virtual classroom component.

The World Wide Web now makes it possible for just about anyone to publish material electronically and have it immediately available to his or her students, or even the entire world. Most major word processors now provide a way to convert just about any word processing document to HTML, the markup language used on Web servers. It is now fairly simple for novice users to place materials for their students on Web sites, easing the workload and allowing more efficient use of conventional classroom time. The biggest impediment right now to use of the Web is simply a lack of understanding of the possibilities that it holds and the ease with which publishing can take place in this environment. Once those barriers begin to fall, there will be increased use of the Web in all areas of academia.

You can even use Web pages to construct computer tutorials. For example, you could follow expository material with a multiple choice question hyper-linked to the "answers" either in another document on the Web server, or even in the same document. The student must use the "back" button on the Web browser to return to where he or she was before answering the question. The simplicity of authoring Web-based documents makes it an appealing first step into computer-based tutorials for many faculties. Programs for use with the World Wide Web that provide more sophisticated instructional materials have already appeared.¹²⁶ Toolbook II from Asymetrix also provides a mechanism for creating computer tutorials and distributing them via the Web. CALI¹²⁷ is on the verge of releasing a Web-based tool—WEBOLIS—for producing simple to relatively complex tutorials.¹²⁸

126. For an example of a script you can use to create multiple-choice questions, see Electronic Frontier Foundation (visited Sept. 16, 1997) <http://www.eff.org/pub/sol/Scripts...oice/multiple_choice_questions.cgi>.

127. CALI is the Center for Computer-Assisted Legal Instruction. See *supra* note 34.

128. See discussion *supra* Section III.A.3.a.

C. *Distance Learning*

As discussed in the previous section, the Internet can be used to supplement traditional classroom instruction. The Internet, as well as various video conferencing systems, can also be used as a *substitute* for traditional instruction by making it possible for an instructor to teach students who are geographically dispersed. Materials can be made available to students on a Web site.¹²⁹ E-mail or discussion groups can be used to keep the instructor in touch with students and as a means for students to interact with one another. Virtual classroom sessions can be conducted in "real time" by using video conferencing technology or Internet conferencing systems.¹³⁰

Although distance learning has been little used in American law schools thus far,¹³¹ it has the potential to revolutionize legal instruction—for better or worse. The economic advantage is obvious. Suppose a faculty member teaches students in ten different schools, with each school contributing an appropriate fraction of the instructor's salary. A school could meet its curricular needs while reducing the number of faculty required and, of course, the amount spent on faculty salaries.

When we turn to pedagogy, it is the *disadvantages* that are obvious. The most obvious is the loss of physical proximity. When the instructor and the students are simultaneously physically present in the same room, the interaction has an immediacy and spontaneity that even the most sophisticated video conferencing systems cannot approach. The instructor and students are more readily responsive to each other, and group dynamics can lead both the instructor and the students to insights that might not occur, or would occur less readily, outside the group. Further, a teacher is not merely a con-

129. Given the multimedia capabilities of the Internet, the materials can be provided in a wide variety of formats—written, graphic, video, or audio.

130. There are a variety of conferencing systems. Picture-Tel is one example; our initial experiments with Picture-Tel at Chicago-Kent have been entirely satisfactory.

131. Andrea Johnson of California Western School of Law and Peter Martin of Cornell Law School are among the relatively few law professors who have conducted distance learning courses. For an informative account of Johnson's course, see Andrea L. Johnson, *Distance Learning and Technology in Legal Education: A 21st Century Experiment*, 7 ALB. L. J. SCI. & TECH. 214 (1997).

veyor of information; a teacher—a good one, at least—is also a model of intellectual and professional virtues such as responsibility, thoroughness, and tolerance. These virtues are most effectively on display when teacher and student are present in the same classroom.¹³²

The pedagogical advantages of distance learning are less obvious. There are, however, three potential pedagogical gains. First, there is a potential virtue in distance learning's main disadvantage, the absence of an on-site instructor. In an appropriately designed distance-learning course, one might exploit the instructor's absence to make students approach legal issues in an independent way and thus further the goal of developing the inability to analyze legal issues. This is precisely the point we made earlier when discussing Jerald Schutte's study.¹³³ Second, distance learning allows easy access to relevant expertise. Suppose, for example, that, because of faculty on leave, retirements, or other factors, a school has no one qualified to teach Corporate Tax. Rather than press the least-qualified resident instructor into service, the school could arrange for distance learning from a fully qualified instructor at another school. Third, distance learning allows students to make contact with students at other schools. Attitudes, customs, cultures, and expectations vary across the country. Exposure to these differences can help law students gain knowledge they will need to understand their clients. It remains to be seen if these advantages can, on occasion, outweigh distance learning's disadvantages.

VI. EXAMS ON COMPUTER

As more and more students use computers for an increasing variety of tasks, demand will grow for permission to take exams on computers. This is particularly true if you or your school encourages students to use computers for other aspects of their legal education.¹³⁴ Although there are some clear advantages to allowing

132. Although not conducted in the specific context of distance learning, some studies suggest that CAI techniques are more effective when used in conjunction with, rather than as a substitute for, traditional classroom instruction. See Teich, *supra* note 6, at 495.

133. See *supra* text accompanying notes 109-12.

134. We first encountered this problem with students in the E-LEARN section,

students to do so, there are also certain disadvantages that must be considered, as well as some possibly daunting technical and logistical problems. Over time, though, it is likely that the factors standing in the way of using computers for exam-taking will disappear.

A. *Advantages*

Some of the advantages of allowing students to take exams on computer are obvious. First, exams written on computers are much easier for instructors to read. Second, for the increasing number of students who feel more comfortable composing on screen than by hand, exams on computer are easier to write.

An additional advantage is that computer technology opens up possibilities for constructing exams that are not possible (or are more difficult) on paper. For example, short-answer exam questions that build upon one another can be constructed using the same software and conceptual approach used in creating computer tutorials.¹³⁵ An interesting variation on this has been developed by Professor Brett Amdur at Villanova University School of Law, in response to the perceived problem that students who fail to spot an issue in an exam question receive no credit at all for that issue, even though they may have been able to answer the question correctly had they spotted it.¹³⁶ Using Toolbook,¹³⁷ Professor Amdur designed a "layered" exam that precludes students from seeing a particular question until they have answered all of the questions preceding it, and that also prevents students from changing an answer to a question once they have "submitted" that answer.¹³⁸ This permits the instructor to pose a general question based on a fact situation (e.g., "what are the rights of the parties?") and then, after

the main purpose of which, obviously, is to enable and encourage students to make extensive use of computer technology in their legal studies. Many students understandably felt some resentment when we were unable to guarantee that they would be able to write all of their exams on computer.

135. See discussion *supra* Section III.A.

136. The description that follows is adapted from a posting to the E-TEACH list by Professor Amdur. See Brett Amdur, *Computerized Essay Exams*, E-TEACH discussion list, Oct. 2, 1996 (electronic copy on file with authors).

137. See *supra* note 23.

138. Professor Amdur credits his colleague, Frederick Rothman, with the original idea of a layered exam. See Amdur, *supra* note 136, at 7.

the student has submitted the answer, to pose a series of more specific questions on issues the student may or may not have spotted or discussed in the earlier answer (e.g., "Did you discuss Issue X in your answer to question 1? If not, address it now.") Students who addressed the particular issue in the earlier question, of course, receive more credit than those who addressed it only after prompting.¹³⁹

B. *Disadvantages and Equity Concerns*

The disadvantages of using computers for exam-taking are somewhat less obvious, but no less important. First, your students will almost certainly have to take the essay portion of the bar exam by hand, and you may not be doing them any favors by allowing them to take most or all of their law school exams on computer.¹⁴⁰

Second, there are equity concerns with allowing students to write exams on computer. If you or your school does not permit students to use their own laptop computers for exams, there may not be enough lab computers to ensure that all students who want to take a particular exam on computer can do so. Although clever scheduling can minimize this problem, it may not be able to eliminate it. If demand exceeds supply, the concern is that those who would like to take the exam on computer, but cannot do so, will be disadvantaged—either because they are not as proficient in writing exams by hand, or because they will be forced to forego the perceived advantage that computer-written exams have in the grading process.¹⁴¹ At Chicago-Kent, in situations where demand exceeds

139. Multimedia technology other than the computer can also be used. One suggestion has been to use video technology, particularly in skills-based courses, to supplement or replace traditional bluebook exams. Video can be used to simulate more realistically a situation on which you wish to test students (e.g., arguments by counsel for and against the admission of certain evidence), and can be a useful way for students to review and evaluate their own performance. See Kimberlee K. Kovach, *Virtual Reality Testing: The Use of Video for Evaluation in Legal Education*, 46 J. LEGAL EDUC. 233 (1996).

140. At least one of our colleagues at Chicago-Kent relies on this consideration in refusing to permit students to take her exam on computer.

141. Although it is beyond the scope of this article, this concern raises an interesting issue of grading psychology: whether professors unconsciously tend to grade more generously exams written on computer. Many students seem to believe that computer-written exams have this advantage, and in our experience at

supply, our current policy is to leave it up to each individual professor whether to allocate available lab computers by lottery, or to prohibit all students from taking the exam on computer.

If students are permitted to take exams on their own laptop computers, a similar equity concern arises with respect to students who do not own (perhaps because they cannot afford) laptop computers. This concern may be allayed if there are sufficient lab computers to accommodate students who do not have laptops. In addition, increasing numbers of students, even those of limited financial means, are opting to buy laptop computers before entering law school, and many law schools now require, or are thinking about requiring, all entering students to own laptops.¹⁴² If adequate financial aid funds are made available to needy students who otherwise could not afford the expense, the equity concerns should largely disappear.

C. Technical Considerations

The logistics of using lab computers for exams are relatively simple. The main requirement is that the lab computers must be isolated from key parts of the LAN so that students cannot communicate with one another by e-mail during the exam or access prohibited files or databases. At Chicago-Kent, students are instructed to log in under a special name that gives them access only to a limited set of software (mainly, a choice of word processing programs) on the LAN.¹⁴³ Students are instructed at the beginning of the exam to label each of the two disks they are given (a main disk and a backup) and to create headers within the exam itself

least some students opt to take their exams by computer largely for this reason, even if they feel more comfortable writing exams by hand. Although we are unaware of any empirical data on this question, one of our colleagues, Stuart Deutsch, has speculated that any skewing that occurs probably happens in both directions. The virtues of the best exams, and the flaws of the worst exams, may stand out more starkly when written on computer, thus leading toward a slight upward skew at the top and a slight downward skew at the bottom. Assuming these roughly balance each other out, there would be little or no difference between exams written on computer and those written by hand.

142. See discussion *supra* Section IV.D.

143. To prevent them from downloading prohibited material onto the computer's hard drive prior to the exam, students should not know ahead of time which computer they will be using for the exam.

containing their exam number, the name of the professor, and the course title. Training is provided to students along with written documentation on the entire exam process well before the beginning of the exam period. A Computer Center staff member is on hand during all exams in case of problems.

With laptops, the biggest problem is closed book exams, especially if the casebook is available in electronic form. Exam lockout software, available now for both Windows and Macintosh, provides a technological solution to this problem. These programs temporarily block students from accessing any material on their computers' hard drives.¹⁴⁴ Even if you give open book exams, though, you may have a problem if you decide that you do not want students to be able to cut-and-paste prepared material (e.g., from an outline) into their exam answers.¹⁴⁵ This problem has no obvious solution—other than trusting students, or using especially aggressive proctoring—if you want students to be able to consult an electronic casebook or other material stored on their hard drive.

An additional concern that applies to both computer labs and individual laptop use for exams is the inherent fallibility of computer software and storage mechanisms. Many popular software packages available today contain undocumented "bugs" that could

144. An examination security software program, Xmn8r (formerly Examiner), is designed for Windows-based machines. See ExamSoft Co. Home Page (visited Jan. 7, 1998) <<http://www.examinator.com/Pages/home.html>>. Electronic Bluebook, developed at the University of Oregon Law School, is made for Macintoshes. Although significant testing of Examiner has yet to occur, the possibility of a secure and reliable program for use on students' own computers is an exciting one.

145. Professor Sara Sun Beale of Duke University School of Law has expressed this concern. Additionally, she hypothesizes that it may be impossible to reuse exam questions in later years because, even if all copies of the exam are collected, electronic versions of the answers stored on students' hard drives may be passed along to subsequent students. See Sara Sun Beale, *Exams on Computer*, E-TEACH discussion list, Oct. 14, 1996 (electronic copy on file with authors). One of us (Stephen Sowle) has twice allowed his E-LEARN students to take his open book exam on computer, relying mainly on stern warnings to prevent students from cutting-and-pasting prepared material into their answers. The answers received from these students did not differ noticeably from answers to similar exam questions written by students who were not allowed to use their own computers. In one instance, however, there was an anonymous accusation that a student had been observed cutting and pasting during the exam.

cause a student to completely lose hours worth of work. Relying on a backup on a hard drive and/or a floppy disk does not always prove entirely adequate. Granted, instructors or school personnel can lose bluebooks, but the likelihood of complete failure to recover information from a computer disk is much higher. Students who use a computer during an exam need to understand the risks inherent in doing so and be comfortable with their grasp of their computer and software well before the exam.

At Chicago-Kent, all exams taken on lab computers are backed up routinely throughout the course of the exam to the computer's hard disk and a floppy disk.¹⁴⁶ Students are also instructed to print to the LAN print queue (which does not actually get sent to the printer unless necessary) at least once per hour. There have been several occasions where the only existing non-corrupted version of the exam following a computer failure has been the last print-out that the student made. Multiple backups cannot be relied on as a 100% fail-safe mechanism. Despite the relatively low level of risk, many students will see *any* risk of losing their exam work as too great, while others will embrace the benefits of using the computer. The best solution is ultimately one in which a computer system is designed specifically for testing, that operates independently of commercial software word processors and ensures a high level of data protection and recovery.

VII. CONCLUSION: TECHNOLOGY AND PEDAGOGY

Legal education will inevitably become more dependent on computer technology. This does not mean, however, that we must accept uncritically every innovation made possible by technology. In our view, successful use of computer technology in the classroom requires reliable, easy-to-use technology that serves clearly articulated pedagogical goals. Technology without a sound pedagogical rationale will not endure, and instructors will avoid technology that is unreliable or difficult to use.

146. All word processing software is configured so that automatic timed backups are made every 15 minutes during the exam in case of a system crash. In the event of a crash, a stand-alone copy of WordPerfect 5.1 for DOS is installed on the hard drive of each lab computer.

We suggest six questions to guide the choice of technology. (1) Is there a clear pedagogical rationale for using the technology? Making the rationale clear to yourself—and your students—leads to optimum use. (2) Have you integrated the technology into an overall pedagogical plan in a way that avoids information overload?¹⁴⁷ (3) Can you master the technology to the point where you can use it easily and without distraction? (4) Is the failure rate of the technology low enough that it promises to be relatively trouble-free in the classroom? (5) If and when the technology does fail, can you quickly and easily rearrange your plans to compensate for the failure? (6) Do you have a reliable, fairly current computing environment, including a computer network and competent support staff in adequate numbers? The availability of reliable equipment and a LAN is critical to the success or failure of computer use in the classroom. Without adequate video projection equipment, for example, using a laptop for display purposes loses all of its effectiveness. Without access to a network, adequate numbers of machines for students, and networked applications like e-mail and Web browsers, tutorials, discussion lists, and other networked resources are useless.

If your use of technology meets these basic criteria, we feel confident that the integration of computers into the educational experience will be an enriching one for both you and your students.

147. See discussion *supra* Section V.B.2.b.

APPENDIX
COMMERCIALLY AVAILABLE ELECTRONIC CASEBOOKS

Alphabetically by Subject

Subject Matter	Title	Edition	Author	Publisher
Administrative	[Statute] Administrative Procedure Act & Related Material			LII
Administrative	Model State Act			LII
Antitrust	Antitrust Law, Policy and Procedure: Cases, Materials, Problems	3rd	Sullivan, Hovenkamp	Michie
Appellate Advocacy	The Moot Court Book: A Student Guide to Appellate Advocacy	3rd	Gaubatz & Mattis	Michie
Appellate Advocacy	Appellate Courts: Structures, Processes and Personnel	1st	Meador, Rosenberg & Carrington	Michie
Appellate Advocacy	Winning an Appeal	3rd	Moskovitz	Michie
Business Organizations	Corporations	7th	Cary & Eisenberg	Foundation
Business Organizations	Agency and Partnership: Cases, Materials, Problems	4th	Hynes	Michie
Business Organizations	Agency and Partnership: Cases, Materials, Problems	4th (Abridged)	Hynes	Michie
Business Organizations	Agency and Partnership: Selected Statutes and Form Agreements	1995 ed.	Hynes	Michie
Business Organizations	Business Associations	2nd	Klein & Ramseyer	Foundation
Business Organizations	Corporations: Cases, Materials, Problems	3rd	Soderquist, Sommer, Lewis, & Bockius	Michie
Business Organizations	Materials and Problems on Corporations: Law and Policy	3rd	Solomon, Schwartz, Bauman & Weiss	West
Civil Law [CS*]	The Civil Law Tradition: Europe, Latin America, and East Asia	1st	Merryman, Clark & Haley	Michie
Civil Procedure	Cases on Civil Procedure	6th	Cound, Friendenthal, Miller & Sexton	West

Subject Matter	Title	Edition	Author	Publisher
Civil Procedure	[Hornbook] Civil Procedure	2d	Friedenthal, Kane & Miller	West
Civil Procedure	Pleading & Procedure: State & Federal	7th	Hazard, Tait & Fletcher	Foundation
Civil Procedure	Civil Procedure: A Modern Approach	2nd	Marcus, Redish & Sherman	West
Civil Procedure	[Statute] Federal Rules of Civil Procedure			C-K
Civil Procedure	[Statute] The Constitution of the United States of America			LII
Clinical	Drafting Contracts	2nd	Burnham	Michie
Clinical	Trial Technique and Evidence	1st	Fontham	Michie
Clinical	Legal Argument: The Structure and Language of Effective Advocacy	1st	Gardner	Michie
Clinical	Anatomy of a Lawsuit	Revised	Simon	Michie
Clinical	Trial Process: Law, Tactics and Ethics	2nd	Tanford	Michie
Commercial	Commercial Transactions: Secured Financing: Cases, Materials, Problems	1st	Nimmer & Hillinger	Michie
Commercial	Problems and Materials on Commercial Law	4th	Whaley	LBC/AL B
Commercial	[Statute] The Uniform Commercial Code			LII
Computer	Computer Law		Staudt	C-K
Conflicts	Cases, Comments, Questions on Conflicts	5th	Cramton, Currie, Kay & Kramer	West
Constitutional	Constitutional Law: Principles and Policy: Cases and Materials	4th	Barron, Dienes, McCormack, Redish	Michie
Constitutional	Civil Rights Legislations: Cases and Materials	3rd	Eisenberg	Michie
Constitutional	[Hornbook] Constitutional Law	5th	Nowak and Rotunda	West
Constitutional	Modern Constitutional Law: Cases and Notes	4th	Rotunda	West
Constitutional	Constitutional Law Casebook		Stone, Sediman, Sunstein & Tushnet	LBC/AL B
Constitutional	[Statute] Civil Rights Statutes			LII

Subject Matter	Title	Edition	Author	Publisher
Constitutional [CS [*]]	State Constitutional Law: Cases and Materials	2nd	Williams	Michie
Constitutional	Constitutional Law	9th	Cohen & Varat	Foundation
Contracts	Contracts: Cases and Doctrines		Barnett	LBC/AL B
Contracts	Principles of Contract Law		Burton	West
Contracts	Cases, Problems, and Materials on Contracts	2nd	Crandall and Whaley	LBC/AL B
Contracts	Contracts	6th	Dawson, Harvey & Henderson	Foundation
Contracts	Contracts	5th	Farnsworth & Young	Foundation
Contracts	Contracts: Law in Action (Vol. 1 & Vol. 2)	1st	Macaulay, Kidwell, Whitford, Galanter	Michie
Contracts	Contracts: Cases and Materials	4th	Murray	Michie
Contracts	Contract Law and Theory	2nd	Scott, Leslie	Michie
Contracts	Contract Law and Theory: Secondary Materials: Selected Provisions: Restatement of Contracts and UCC	1988 ed.	Scott, Leslie	Michie
Contracts	Contracts Law		Warner	C-K
Contracts [CS [*]]	Murry on Contracts	3rd	Murry	Michie
Criminal	Hall's Criminal Law: Cases and Materials (and Appendix)	5th	Baker, Benson, Force, George	Michie
Criminal	Cases and Materials on Criminal Law		Dressler	West
Criminal	Cases and Materials and Text on Criminal Law	5th	Johnson	West
Criminal	[Hornbook] Criminal Law	2nd	LaFave and Scott	West
Criminal	Cases, Materials and Problems in Criminal Law		Rudstein	C-K
Criminal	Criminal Law: Cases and Materials	1st	Saltzburg, Diamond, Kinports, Morawetz	Michie
Criminal Procedure	Criminal Procedure: The Post-Investigative Process: Cases and Materials	1st	Cohen & Hall	Michie

Subject Matter	Title	Edition	Author	Publisher
Criminal Procedure	Cases on Modern Criminal Procedure	8th	Kamisar, LaFave and Israel	West
Criminal Procedure	Cases and Materials on American Criminal Procedure	5th	Salzburg and Capra	West
Criminal Procedure	Criminal Procedure: Regulation of Police Investigation: Legal, Historical, Empirical and Comparative Materials	1st	Slobogin	Michie
Disability	Disability Law: Cases, Materials, Problems	1st	Rothstein	Michie
Disability [CS*]	The Law of Disability Discrimination: Cases and Materials	1st	Colker	Anderson Pub. Co.
Employment	Employment Discrimination	3rd	Friedman & Strickler	Foundation
Employment	Employment Law	3rd	Rothstein & Liebman	Foundation
Employment	Employment Discrimination Law: Cases and Materials	4th	Smith, Craver & Clark	Michie
Employment	Employment Law: Cases and Materials	1st	Willborn, Schwab & Burton	Michie
Employment	Employment Law: Selected Federal and State Statutes	1993 ed.	Willborn, Schwab & Burton	Michie
Energy	Energy Resources, Conservation, and Economics: Cases and Materials		Bosselman & Rossi	C-K
Environmental [CS*]	Planning and Control of Land Development: Cases and Materials	4th	Mandelker, Cunningham & Payne	Michie
Evidence	Evidence in the Nineties: Cases, Materials and Problems for an Age of Science and Statutes	3rd	Carlson, Imwinkelried & Kionka	Michie
Evidence	Evidence Problems and Materials	1st	Friedland	Michie
Evidence	Evidence Cases and Problems	1st	Friedland	Michie
Evidence	Evidentiary Distinctions: Understanding the Federal Rules of Evidence	1st	Inwinkelried	Michie
Evidence	Evidentiary Foundations	3rd	Inwinkelried	Michie

Subject Matter	Title	Edition	Author	Publisher
Evidence	Evidence	8th	Waltz & Park	Founda- tion
Evidence	[Statute] Federal Rules of Evidence			LII
Evidence [CS*]	Federal Rules of Evidence: Rules, Legislative History, Commentary and Authority	1995 ed.	Weissenberger	Anderson Pub. Co.
Family	Family Law: Cases, Text, Problems	2nd	Ellman, Kurtz & Bartlett	Michie
Family	Domestic Relations	3rd	Wadlington	Founda- tion
Immigration	Immigration: Process and Policy	3rd	Aleinkoff, Martin & Motomura	West
Intellectual Property	Copyright for the Nineties: Cases and Materials	4th	Gorman, Ginsburg	Michie
Intellectual Property	Patent Law and Policy: Cases and Materials	1st	Merges	Michie
Intellectual Property	[Statute] Copyright Act			LII
Intellectual Property	[Statute] Berne Convention			LII
Intellectual Property	[Statute] Patent Act			LII
Intellectual Property	[Statute] Trademark Materials Act			LII
Intellectual Property	[Statute] GATT 1994			LII
Intellectual Property [CS*]	Trademark and Unfair Competition Law: Cases and Materials	2nd	Ginsburg, Liman, Goldberg & Greenbaum	Michie
International	International Business and Economics: Law and Policy	1st	Stephan, Wallace & Roin	Michie
International	International Business and Economics: Documents: Law and Policy	1993 ed.	Stephan, Wallace & Roin	Michie
International	International Trade Law: Cases and Materials	1st	Bhala	Michie
Justice	Law and Justice: Cases and Readings on the American Legal System		Nance	C-K (Carolina Academic Press -- Print)

Subject Matter	Title	Edition	Author	Publisher
Labor	Labor Relations Law: Cases and Materials	9th	Merrifield, St. Antoine & Craver	Michie
Labor	Labor Relations Law: Selected Federal Statutes and Sample Bargaining Agreement	1994 ed.	Merrifield, St. Antoine & Craver	Michie
Legal Writing	The Legal Writing Teaching Assistant		Grinker	C-K
Legal Writing	Legal Reasoning and Legal Writing: Structure, Strategy, and Style	2nd	Neumann	LBC/ALB
Legal Writing	Legal Writing: Getting It Right and Getting it Written	2nd	Ray and Ramsfield	West
Legal Writing	Legal Research Guide: Patterns and Practice	2nd	Roberts & Schlueter	Michie
Legal Writing	Basic Legal Citation			LII
Native American [CS*]	American Indian Law: Cases and Materials	3rd	Clinton, Newton & Price	Michie
Products Liability	Products Liability: Cases, Materials, Problems	1st	Phillips, Terry & Vandall	Michie
Professional Responsibility	Professional Responsibility	6th	Morgan & Rotunda	Foundation
Professional Responsibility	Problems in Legal Ethics	3rd	Schwartz, Wydick and Perschbacher	West
Professional Responsibility	Lawyers and the Legal Profession: Cases and Materials	3rd	Simon & Schwartz	Michie
Professional Responsibility	Legal Ethics in the Practice of Law	1st	Zitrin & Langford	Michie
Professional Responsibility	[Statute] Topical Overview of Professional Rules and Rules for CA, DC, ID, NY, TX, plus Model Rules			LII
Professional Responsibility	[Statute] Rules of Conduct Governing Lawyers and Judges			LII
Property	[Hornbook] Law of Property	2nd	Cunningham, Stoeckel & Whitman	West
Property	Property Law: Rules, Policies, and Practices		Singer	LCB/ALB

Subject Matter	Title	Edition	Author	Publisher
Real Estate	Cases on Real Estate Transfer, Finance and Development	4th	Nelson and Whitman	West
Securities	[Statute] Federal Securities Statutes			LII
Torts	Torts and Compensation - - Personal Accountability & Social Responsibility for Injury	2nd	Dobbs	West
Torts	Tort Law: Cases, Materials, Problems	1st	Phillips, Terry, Maraist & McClennan	Michie
Torts	Prosser, Wade & Schwartz's Torts	9th	Wade, Schwartz, Kelly & Partlett	Foundation
Torts [CS*]	Constitutional Torts	1st	Nahmod, Wells & Eaton	Anderson Pub. Co.
Trial Advocacy	Fundamentals of Pre-Trial Litigation	3rd	Haydock, Herr and Stempel	West

* Coming soon

Alphabetically by Author

Subject Matter	Title	Edition	Author	Publisher
Immigration	Immigration: Process and Policy	3rd	Aleinkoff, Martin & Motomura	West
Criminal	Hall's Criminal Law: Cases and Materials (and Appendix)	5th	Baker, Benson, Force, George	Michie
Contracts	Contracts: Cases and Doctrines		Barnett	LBC/ALB
Constitutional	Constitutional Law: Principles and Policy: Cases and Materials	4th	Barron, Dienes, McCormack, Redish	Michie
International [CS*]	International Trade Law: Cases and Materials	1st	Bhala	Michie
Energy	Energy Resources, Conservation, and Economics: Cases and Materials		Bosselman & Rossi	C-K
Clinical	Drafting Contracts	2nd	Burnham	Michie
Contracts	Principles of Contract Law		Burton	West
Evidence	Evidence in the Nineties: Cases, Materials and Problems for an Age of Science and Statutes	3rd	Carlson, Imwinkelried & Kionka	Michie
Business Organizations	Corporations	7th	Cary & Eisenberg	Foundation
Native American [CS*]	American Indian Law: Cases and Materials	3rd	Clinton, Newton & Price	Michie
Criminal Procedure	Criminal Procedure: The Post-Investigative Process: Cases and Materials	1st	Cohen & Hall	Michie
Constitutional	Constitutional Law	9th	Cohen & Varat	Foundation
Disability [CS*]	The Law of Disability Discrimination: Cases and Materials	1st	Colker	Anderson Pub. Co.
Civil Procedure	Cases on Civil Procedure	6th	Cound, Friendenthal, Miller & Sexton	West
Conflicts	Cases, Comments, Questions on Conflicts	5th	Cramton, Currie, Kay & Kramer	West

Subject Matter	Title	Edition	Author	Publisher
Contracts	Cases, Problems, and Materials on Contracts	2nd	Crandall and Whaley	LBC/ALB
Property	[Hornbook] Law of Property	2nd	Cunningham, Stoebuck & Whitman	West
Contracts	Contracts	6th	Dawson, Harvey & Henderson	Foundation
Torts	Torts and Compensation - Personal Accountability & Social Responsibility for Injury	2nd	Dobbs	West
Tax	Federal Income Tax Doctrine: Structure and Policy: Text, Cases, Problems	1st	Dodge, Fleming & Geier	Michie
Criminal	Cases and Materials on Criminal Law		Dressler	West
Constitutional	Civil Rights Legislations: Cases and Materials	3rd	Eisenberg	Michie
Family	Family Law: Cases, Text, Problems	2nd	Ellman, Kurtz & Bartlett	Michie
Contracts	Contracts	5th	Farnsworth & Young	Foundation
Clinical	Trial Technique and Evidence	1st	Fontham	Michie
Civil Procedure	[Hornbook] Civil Procedure	2d	Friedenthal, Kane & Miller	West
Evidence	Evidence Problems and Materials	1st	Friedland	Michie
Evidence	Evidence Cases and Problems	1st	Friedland	Michie
Employment	Employment Discrimination	3rd	Friedman & Strickler	Foundation
Clinical	Legal Argument: The Structure and Language of Effective Advocacy	1st	Gardner	Michie
Appellate Advocacy	The Moot Court Book: A Student Guide to Appellate Advocacy	3rd	Gaubatz & Mattis	Michie
Intellectual Property [CS*]	Trademark and Unfair Competition Law: Cases and Materials	2nd	Ginsburg, Liman, Goldberg & Greenbaum	Michie
Intellectual Property	Copyright for the Nineties: Cases and Materials	4th	Gorman, Ginsburg	Michie

Subject Matter	Title	Edition	Author	Publisher
Legal Writing	The Legal Writing Teaching Assistant		Grinker	C-K
Trial Advocacy	Fundamentals of Pre-Trial Litigation	3rd	Haydock, Herr and Stempel	West
Civil Procedure	Pleading & Procedure: State & Federal	7th	Hazard, Tait & Fletcher	Foundation
Business Organizations	Agency and Partnership: Cases, Materials, Problems	4th	Hynes	Michie
Business Organizations	Agency and Partnership: Cases, Materials, Problems	4th (Abridged)	Hynes	Michie
Business Organizations	Agency and Partnership: Selected Statutes and Form Agreements	1995 ed.	Hynes	Michie
Evidence	Evidentiary Distinctions: Understanding the Federal Rules of Evidence	1st	Inwinkelried	Michie
Evidence	Evidentiary Foundations	3rd	Inwinkelried	Michie
Criminal	Cases and Materials and Text on Criminal Law	5th	Johnson	West
Criminal Procedure	Cases on Modern Criminal Procedure	8th	Kamisar, LaFave and Israel	West
Business Organizations	Business Associations	2nd	Klein & Ramseyer	Foundation
Criminal	[Hornbook] Criminal Law	2nd	LaFave and Scott	West
Contracts	Contracts: Law in Action (Vol. 1 & Vol. 2)	1st	Macaulay, Kidwell, Whitford, Galanter	Michie
Environmental [CS*]	Planning and Control of Land Development: Cases and Materials	4th	Mandelker, Cunningham & Payne	Michie
Civil Procedure	Civil Procedure: A Modern Approach	2nd	Marcus, Redish & Sherman	West
Appellate Advocacy	Appellate Courts: Structures, Processes and Personnel	1st	Meador, Rosenberg & Carrington	Michie
Intellectual Property	Patent Law and Policy: Cases and Materials	1st	Merges	Michie
Labor	Labor Relations Law: Cases and Materials	9th	Merrifield, St. Antoine & Craver	Michie
Labor	Labor Relations Law: Selected Federal Statutes and Sample Bargaining Agreement	1994 ed.	Merrifield, St. Antoine & Craver	Michie

Subject Matter	Title	Edition	Author	Publisher
Civil Law [CS*]	The Civil Law Tradition: Europe, Latin America, and East Asia	1st	Merryman, Clark & Haley	Michie
Professional Responsibility	Professional Responsibility	6th	Morgan & Rotunda	Foundation
Appellate Advocacy	Winning an Appeal	3rd	Moskovitz	Michie
Contracts	Contracts: Cases and Materials	4th	Murray	Michie
Contracts [CS*]	Murry on Contracts	3rd	Murry	Michie
Torts [CS*]	Constitutional Torts	1st	Nahmod, Wells & Eaton	Anderson Pub. Co.
Justice	Law and Justice: Cases and Readings on the American Legal System		Nance	C-K (Carolina Academic Press -- Print)
Real Estate	Cases on Real Estate Transfer, Finance and Development	4th	Nelson and Whitman	West
Legal Writing	Legal Reasoning and Legal Writing: Structure, Strategy, and Style	2nd	Neumann	LBC/ALB
Commercial	Commercial Transactions: Secured Financing: Cases, Materials, Problems	1st	Nimmer & Hillinger	Michie
Constitutional	[Hornbook] Constitutional Law	5th	Nowak and Rotunda	West
Products Liability	Products Liability: Cases, Materials, Problems	1st	Phillips, Terry & Vandall	Michie
Torts	Tort Law: Cases, Materials, Problems	1st	Phillips, Terry, Maraist & McClennan	Michie
Legal Writing	Legal Writing: Getting It Right and Getting it Written	2nd	Ray and Ramsfield	West
Legal Writing	Legal Research Guide: Patterns and Practice	2nd	Roberts & Schlueter	Michie
Disability	Disability Law: Cases, Materials, Problems	1st	Rothstein	Michie
Employment	Employment Law	3rd	Rothstein & Liebman	Foundation

Subject Matter	Title	Edition	Author	Publisher
Constitutional	Modern Constitutional Law: Cases and Notes	4th	Rotunda	West
Criminal	Cases, Materials and Problems in Criminal Law		Rudstein	C-K
Criminal Procedure	Cases and Materials on American Criminal Procedure	5th	Salzburg and Capra	West
Criminal	Criminal Law: Cases and Materials	1st	Saltzburg, Diamond, Kinports, Morawetz	Michie
Professional Responsibility	Problems in Legal Ethics	3rd	Schwartz, Wydick and Perschbacher	West
Contracts	Contract Law and Theory	2nd	Scott, Leslie	Michie
Contracts	Contract Law and Theory: Secondary Materials: Selected Provisions: Restatement of Contracts and UCC	1988 ed.	Scott, Leslie	Michie
Clinical	Anatomy of a Lawsuit	Revised	Simon	Michie
Professional Responsibility	Lawyers and the Legal Profession: Cases and Materials	3rd	Simon & Schwartz	Michie
Property	Property Law: Rules, Policies, and Practices		Singer	LCB/ALB
Criminal Procedure	Criminal Procedure: Regulation of Police Investigation: Legal, Historical, Empirical and Comparative Materials	1st	Slobogin	Michie
Employment	Employment Discrimination Law: Cases and Materials	4th	Smith, Craver & Clark	Michie
Business Organizations	Corporations: Cases, Materials, Problems	3rd	Soderquist, Sommer, Lewis, & Bockius	Michie
Business Organizations	Materials and Problems on Corporations: Law and Policy	3rd	Solomon, Schwartz, Bauman & Weiss	West
Computer	Computer Law		Staudt	C-K

Subject Matter	Title	Edition	Author	Publisher
International	International Business and Economics: Law and Policy	1st	Stephan, Wallace & Roin	Michie
International	International Business and Economics: Documents: Law and Policy	1993 ed.	Stephan, Wallace & Roin	Michie
Constitutional	Constitutional Law Casebook		Stone, Sediman, Sunstein & Tushnet	LBC/ALB
Antitrust	Antitrust Law, Policy and Procedure: Cases, Materials, Problems	3rd	Sullivan, Hovenkamp	Michie
Clinical	Trial Process: Law, Tactics and Ethics	2nd	Tanford	Michie
Torts	Prosser, Wade & Schwartz's Torts	9th	Wade, Schwartz, Kelly & Partlett	Foundation
Evidence	[Statute] Federal Rules of Evidence			LII
Contracts	Contracts Law		Warner	C-K
Evidence [CS*]	Federal Rules of Evidence: Rules, Legislative History, Commentary and Authority	1995 ed.	Weissenberger	Anderson Pub. Co.
Tax	Federal Income Tax on Business Enterprises: Cases, Statutes, Rulings	1st	Westin, McNulty & Beck	Michie
Commercial	Problems and Materials on Commercial Law	4th	Whaley	LBC/ALB
Employment	Employment Law: Cases and Materials	1st	Willborn, Schwab & Burton	Michie
Employment	Employment Law: Selected Federal and State Statutes	1993 ed.	Willborn, Schwab & Burton	Michie
Constitutional [CS*]	State Constitutional Law: Cases and Materials	2nd	Williams	Michie
Professional Responsibility	Legal Ethics in the Practice of Law	1st	Zitrin & Langford	Michie
Administrative	[Statute] Administrative Procedure Act & Related Material			LII
Administrative	Model State Act			LII
Civil Procedure	[Statute] Federal Rules of Civil Procedure			C-K

Subject Matter	Title	Edition	Author	Publisher
Civil Procedure	[Statute] The Constitution of the United States of America			LII
Commercial	[Statute] The Uniform Commercial Code			LII
Constitutional	[Statute] Civil Rights Statutes			LII
Evidence	[Statute] Federal Rules of Evidence			LII
Intellectual Property	[Statute] Copyright Act			LII
Intellectual Property	[Statute] Berne Convention			LII
Intellectual Property	[Statute] Patent Act			LII
Intellectual Property	[Statute] GATT 1994			LII
Legal Writing	Basic Legal Citation			LII
Professional Responsibility	[Statute] Topical Overview of Professional Rules and Rules for CA, DC, ID, NY, TX, plus Model Rules			LII
Professional Responsibility	[Statute] Rules of Conduct Governing Lawyers and Judges			LII

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