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DOES THE GRANDMOTHER COME WITH IT?:* TEACHING AND PRACTICING LAW IN THE 21ST CENTURY

Ronald W. Staudt†

By 2001 all of us will have a personal worldwide
wireless telephone number.¹ We will carry in our pockets

* After reading a preliminary draft of this Article, a colleague brought me a copy of Ray Bradbury's, "I Sing the Body Electric," a short story about robotic grandmothers. The point of Bradbury's story and this Article are very different. Bradbury explores the thesis that love is mostly "paying attention to someone." Building on this insight, he proposes that science might construct a robot to be a perfect loving nurturer. I propose a much more modest notion that places the responsibility and opportunity for nurturing on the human teacher. The computer in my model supports the student by extending the student's access to information, to organizational tools and to communications with peers and the teacher.

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I am grateful for the invitation to participate in the National Institute on the Profession of Law in the 21st Century at Case Western Reserve University School of Law and for the guidance from Peter Gerhart, Robert Lawry and Holly Brooks who read early drafts and helped to re-orient parts of this Article. There are many people to thank for their generous encouragement, advice, suggestions, and corrections. Alan Paterson, Henry Perritt, William Andersen, David Johnson, Ethan Katsh, William Boyd, Ann Southworth, Joleen Willis and Rosemary Shiels read drafts and offered helpful comments. Brennon Holmes and Gail Fialek provided important research and clerical help. And, of course, Alice O'Connor and her granddaughter, Jamie, provided the occasion for the inspiration. I alone am responsible for any errors, omissions or analytical gaps.

1. On Apr. 28, 1993, Motorola initiated a campaign to provide mobile computer users a single number for communication via any wireless data network. Mary E. Thyfault, *Anywhere, Anytime, Anyplace*, INFO. WK., Apr. 19, 1993, at 12 (discussing Motorola's MoNet: Mobile Networks Integration Technology). A decade ago, researchers predicted that 900,000 wireless phones would be in use by the year 2000. With seven years to go before the millennium, there are twelve times this many cellular telephone users. Motorola

a digital device that will serve as a telephone, answering machine, beeper, fax machine, word processor, rolodex, calendar, scheduler, calculator, Gameboy, Walkman and stereo television.²

INTRODUCTION

AT a dinner party at my home over the New Year holidays ushering in 1993, my four-year-old daughter sat reading to her grandmother from a book that contained a new feature. It was a book about the movie, *Aladdin*, that was equipped with a series of picture buttons along the right-hand edge of the book. At four or five places on each page, a picture appeared within the text that matched the picture on the buttons. When the text described Aladdin rubbing the lamp, my daughter or her grandmother pushed the lamp button and they could hear the magical sound of the genie from the movie.

I watched this scene with my colleague, Bill Andersen, who had been working during the prior six months on multimedia teaching materials for administrative law. Most recently, Bill had recorded a series of short, mini-lectures. With the help of the CALI programming staff, especially David Kiefer, the CALI/LEAP Programming Director, Bill had incorporated these mini-lectures within a computerized graphical overview of administrative law. When students used this experimental tool, a growing diagram was constructed on the screen illustrating Bill's synthesis of administrative review procedures. The student controlled the pace and screen direction of the presentation by pressing screen buttons using a mouse attached to the computer. At key points, where emphasis might serve the learning objectives that Bill sought to achieve, a button appeared on the screen that looked like Bill's face. By clicking on Bill's face, the student heard Bill's voice describe in

predicts that 20 million workers will carry wireless data terminals. Bart Ziegler et al., *Building a Wireless Future*, BUS. WK., Apr. 5, 1993, at 56, 58; see also Stephen Loudermilk, *Motorola Continues to Go Mobile*, PC WK., Apr. 12, 1993, at 54, 54.

2. Robert L. Scheier, *Startup Preps Pocket Device*, PC WK., Apr. 19, 1993, at 12, 12; see also Thyfault, *supra* note 1, at 12; *EØ Searches for Niches as it Ships First Communicator 400S*, MOBILE DATA REP., Apr. 12, 1993; Mary Fagen, *Writing off the Keyboard*, THE INDEPENDENT, Apr. 5, 1993, at 25; Ralph Oman, *Reflections on Digital Technology: "The Shape of Things to Come"* (Mar. 31, 1993) (World Intellectual Property Organization, Symposium on the Impact of Digital Technology on Copyright and Neighboring Rights, Harvard University, Boston, Ma.) (on file with the author).

greater detail, or with different emphasis, the issues presented by the computer.³

As Bill and I watched my daughter and her grandmother read about Aladdin, he remarked that the book was really multimedia education for children. Triggered by his connection, I suggested that if his administrative law materials were popular enough, perhaps his mini-lectures could be captured on little chips and mass-produced like the Aladdin book. His multimedia tool would be more widely available because law students would not need a computer to use it. Zia Hasan, another guest who was observing my daughter and listening to our discussion, turned to me with a twinkle in his eye, nodded toward my daughter and said: "Does the grandmother come with it?"⁴

This remark has triggered a cascading series of thoughts about the role of human interaction in law teaching and law practice as the millennium approaches. Dr. Hasan's question points to the importance of the human teacher in an educational system that will be filled with teaching machines.⁵ The grandmother was an essential part of my daughter's learning as well as her enjoyment. The grandmother asked her questions, responded to her enthusiasm, prodded her to learn a little bit more of the words as well as the pictures in the book and probed her about the movie and its effect: "Were you afraid to see the genie grow out of the bottle?" These are the things that excellent teachers do to encourage, sustain, and nurture the curiosity and enthusiasm of their students.

Zia Hasan helped me to realize that my experimental use of computers in legal education over the past ten years has not been

3. Bill's use of sound allowed the students to focus their visual attention on his graphic synthesis of the law while he amplified the important points with voice.

4. Whether Dr. Hasan was simply being a clever conversationalist or trying to deliver an important lesson by this perceptive remark is still unclear to me. Zia Hasan is one of the world's leading kinesiologists and a very clever and insightful scholar.

5. For a compilation of effective uses of computing in postsecondary education, see EDUCOM, 101 SUCCESS STORIES OF INFORMATION TECHNOLOGY IN HIGHER EDUCATION: THE JOE WYATT CHALLENGE (Judith V. Boettcher ed., 1993). This is a collection of case studies authored by the college or university implementor responsible for each program. The collection is designed as a guide, reference, and planning book for both higher education and secondary school educators and administrators. See also *Descriptions of 101 Successful Uses of Computer Technology in College Classrooms: EDUCOM Responds to Vanderbilt Chancellor's Challenge*, CHRON. OF HIGHER EDUC., Oct. 16, 1991, at A26 (listing the 101 classroom applications of computer technology detailed in the EDUCOM compilation, with a short summary on each project); EDUCOM, COMPUTING ACROSS THE CURRICULUM: ACADEMIC PERSPECTIVES (William H. Graves ed., 1989) (describing various projects using computing in postsecondary education).

aimed at replacing or substituting for my teaching. I have been trying to identify the best technology to empower my students and thereby to improve my teaching. Ultimately, I want to see that magical future world of 2001 as a live, human, face-to-face teacher. I want to be the "grandmother that goes with my electronic book."

In part I of this Article, I sketch out a model of legal education made possible by emerging hypertext technology and communications tools. I suggest that wide implementation of the model, which I believe to be inevitable in some form, will improve education not by replacing the human teacher, but by improving the learning resources and skills of our students. The electronic advances of the near future that make this model feasible will enrich teaching, rather than substitute for it.

In part II, I trace the parallel implications for law practice of advanced technology like artificial intelligence and pervasive digital communication. These tools may change the work of the lawyer and the structure of the law firm. While the grandmother analogy is not as apt for law practice, the new tools should make the profession more challenging, more interactive, and more collegial.

In part III, I conclude the Article by offering some modest predictions including a suggestion for collaboration between law practice and legal education made possible by the technologies of 2001.

I. LOCATING THE TEACHER IN THE DIGITAL LAW SCHOOL OF 2001

A. *An Overview of Law School Instruction*

Law school challenges students to discover or impose synthesis, organization, or structure on the chaotic primary sources of the law.⁶ In the classroom, casebooks are the paper tools that we use

6. Law school education is broader than this simple goal statement, but many objectives of legal education, especially in the first year, can be derived from this goal. To be complete, the statement should say more about skills. The concept of synthesis needs greater amplification or clarification. I do not believe that there is a grand synthesis of law that orders all primary sources. I do believe that learning requires the student to gather information, to organize it into a working synthesis or conceptual map, and then to apply the synthesis or map to various performances like class discussions and examinations. Lawyers do the same thing in practice but the applications result in briefs, advice, or pleadings. In the remainder of the article, I refer to synthesis as the organization of ideas, the understanding or conceptual map that can serve in the instrumental role of applying information to new intellectual performances.

to guide our students through these raw materials of law. We urge our students to read our law review articles to learn that there are other perspectives, other syntheses, than the conceptual map implicit in the sequence and selection of material in the casebook. Most of our scholarship is devoted to the analysis of whether a proposed synthesis is justified or coherent; real or imaginary; rights based, utilitarian or a reflection of economic choices; or inherently illusory. At the end of a law school course, our dominant testing method asks students to write an analysis that applies these mental constructs to a new problem that lawyers or judges might face in a real or a fanciful world.

My image of the masterful law school class, taught using any version of the "socratic method," is a series of exchanges between and among students and the professor seeking a synthesis of the materials that students have read for that class. My ideal of that series of exchanges is more egalitarian than the Kingsfield model. I seek more interaction between students themselves, less control and more guidance from the podium, more respect for everyone's attempt at synthesis, more group groping for answers, more cooperation, and more exploration. The grandmother image may be a little too benign to fit this scene in most law school classes, but it is more to my liking than Professor Kingsfield, and more likely, in my view, to be effective.⁷

7. There are parallels between my ideal of the masterful law school class and a brilliant second grade class. In each, the teacher engages the students in a problem, an inquiry, an exploration or even a game. The students gather around and work through the process together, contributing, volunteering, probing. The teacher asks questions and guides the exploration with respectful positive and negative reactions to the contributions of the students. For resources exploring conceptual mapping and related learning strategies, see RICHARD WHITE & RICHARD GUNSTONE, *PROBING UNDERSTANDING* (1992); JUDITH TORNEY-PURTA, *SCHEMA THEORY AND COGNITIVE PSYCHOLOGY: IMPLICATIONS FOR SOCIAL STUDIES* (1991); JOHN A. GLOVER, ET AL., *COGNITIVE PSYCHOLOGY FOR TEACHERS* (1990); R.W. HOWARD, *CONCEPTS AND SCHEMATA* (1987); RICHARD E. MAYER, *EDUCATIONAL PSYCHOLOGY: A COGNITIVE APPROACH* (1987); JOAN E. HEIMLICH & SUSAN D. PITTELMAN, *SEMANTIC MAPPING: CLASSROOM APPLICATIONS* (1986); DAVID P. AUSUBEL, *EDUCATIONAL PSYCHOLOGY: A COGNITIVE VIEW*, 127-70 (1968); Richard Roe, *Valuing Student Speech: The Work of the Schools as Conceptual Development*, 79 CAL. LAW REV. 1269, 1299 (1991) ("Students learn by working with ideas, attempting to fit them into their cognitive structures, and reformulating those structures as necessary."); Anthony Palasota, *Expertise in the Law: Some Recent Findings from the Cognitive Sciences About Complex Human Information Processing*, 16 T. MARSHALL L. REV. 599, 601-07 (1991); PAUL T. WANGERIN, *Learning Strategies for Law Students*, 52 ALB. L. REV. 471, 517-27 (1988).

B. An Electronic Law School Model

For the past ten years I have been energized by the possibility that pervasive use of computers in law schools could work a significant transformation, an improving change of legal education.⁸ Reading the work of Dr. Seymour Papert helped me to transform my reformer's longings into a vague vision of how a law school might operate as the information age emerges. Papert's seminal monograph, *Mindstorms: Children, Computers and Powerful Ideas*,⁹ laid out a new approach to teaching mathematics to grade school children. He proposed using pervasive personal computers to enable children to learn by playing with math concepts, computer languages, and geometry. He offered a vision of personal learning through exploration of a computer supported mathematical space. Papert and his MIT colleagues invented the computer language LOGO to create this environment in the computer.¹⁰ Since the introduction of the LOGO methods in the late 1970s, Papert's group has developed a more mature learning theory that he calls constructionism: learning by making.¹¹

Constructionism—the N word as opposed to the V word—shares constructivism's connotation of learning as “building knowledge structures” irrespective of the circumstances of

8. See generally Ronald W. Staudt, *Legal Mindstorms: Lawyers, Computers, and Powerful Ideas*, 31 JURIMETRICS J. 171 (1991) (arguing that artificial intelligence capabilities may assist in the teaching of legal reasoning) [hereinafter *Legal Mindstorms*]; David J. Maume, Jr. & Ronald W. Staudt, *Computer Use and Success in the First Year of Law School*, 37 J. L. EDUC. 388 (1987) [hereinafter *Computer Use and Success*] (suggesting that experiments of computerized education in law schools allow “less talented students to ‘catch up’”); Ronald W. Staudt, *Computers at the Core of Legal Education: Experiments at IIT Chicago-Kent College of Law*, 35 J. L. EDUC. 514 (1985) [hereinafter *Computers at the Core*] (describing law school's computer education experiments and educational possibilities); Ronald W. Staudt & James A. Sprowl, *Automation of Administrative Systems in a Law School Teaching Clinic: Designing a Computer System to Process Case and Time Data for Management and Research*, 1981 AM. B. FOUND. RES. J. 1111 (1981) (finding improvement of services of law school clinics and recommending national research on computers in law school clinics); Ronald W. Staudt & James A. Sprowl, *Computerizing Client Services in the Law School Teaching Clinic: An Experiment in Law Office Automation*, 1981 AM. B. FOUND. RES. J. 699 (1981) (describing first experimental usage of computers in law school clinics).

9. SEYMOUR PAPERT, *MINDSTORMS, CHILDREN, COMPUTERS AND POWERFUL IDEAS* (1980).

10. See *id.* at 1-13; see also EPISTEMOLOGY & LEARNING RESEARCH GROUP, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, *CONSTRUCTIONISM, 1985-1990* (Idit Harel & Seymour Papert eds., 1991) [hereinafter *CONSTRUCTIONISM*].

11. *CONSTRUCTIONISM*, *supra* note 10, at 1.

the learning. It then adds the idea that this happens especially felicitously in a context where the learner is consciously engaged in constructing a public entity, whether it's a sand castle on the beach or a theory of the universe.¹²

Since reading Papert's monograph, I have tried a variety of computer methods in an attempt to find the analogous set of computer tools to support legal instruction.¹³ The theory goes like this: If every student and professor had a small powerful computer equipped with the right software and a readable screen, we should be able to make legal education more enjoyable, more effective, more efficient and more precisely tuned to improve the profession. The primary instrumentality of change in this theory is active student involvement with the electronic texts of the law fostering personal learning through exploration, concept mapping and collaboration.

In my model of the law school of the near future, students are offered an electronic environment that they may explore as they wish. The electronic environment contains all of the relevant texts that a professor determines to be essential for learning in a particular course. Our existing electronic resources in law (LEXIS/NEXIS, WESTLAW, DIALOG, Internet, etc.) permit us to offer to each student, with fairly limited transaction costs, the opportunity to follow those texts wherever they may lead. Students can read every case cited in every assigned case. If the texts are challenging ones, they will lead all over the place. Internal references will support the primary text, at times, but often those "supporting" sources will seem strangely tangential to the point at hand. NEXIS, DIALOG and Internet databases provide the reactions of practitioners and other learned disciplines, and the views of business leaders and social groups involved in the cases.

The faculty, in this model, use the "socratic" law school classroom to challenge the students to explain legal materials, evaluate court decisions, and analyze the strengths and weaknesses of various legal arguments. One measure of success at this approach will be the ability of the students to engage the professor in a discus-

12. *Id.*

13. See generally Ronald W. Staudt, *An Essay on Electronic Casebooks: My Pursuit of the Paperless Chase*, 68 CHI-KENT L. REV. 291, 300-02 (1992) [hereinafter *Paperless Chase*]; Staudt, *Legal Mindstorms*, *supra* note 8; Staudt, *Computer Use and Success*, *supra* note 8; Staudt, *Computers at the Core*, *supra*, note 8.

sion of the synthesis of legal texts that the professor offers. Rather than a static, printed casebook, this faculty-directed synthesis can be a tour of the electronic sources maintained by LEXIS or WESTLAW, or a copy of those edited, electronic texts that the professor finds most pedagogically effective. Once the texts are available in electronic form and students are electronically linked to each other and the professor, an unlimited number of techniques are available to engage the students in more aggressive interaction.

New technology and communications will permit the class to continue beyond its time and place constraints. A central feature of the future law school will be the pervasive availability of computing and electronic communication to all faculty, students, administrators and staff.¹⁴ To communicate, all of the participants in the enterprise will be connected to one another electronically.¹⁵ This connectivity will foster collective work and group exploration of the virtual terrain that is formed of electronic legal texts.

*C. An Example of the Model in Action: The Electronic
Computer Law Course Kit*

In the fall semester of 1992 I was able to test this set of theories in a course called "Computer Law." The course is a substantive investigation of developments in the law triggered by advances in computer technology. Five substantive law fields are examined: torts, criminal law, evidence, civil procedure with a tight focus on discovery, and privacy law. Over a period of four years I compiled a set of teaching materials, mostly edited court opinions, that I had distributed to my students in photocopied sets. In 1991 I began to transform the paper materials into a computerized electronic book. I distributed the book to students that year in both paper and disk formats.

With the diligent and creative help of David Kiefer, both as

14. Pervasive access to computing and electronic communication is already emerging as a central feature of large law firms in the United States. Soon lawyers will be connected to computing, information resources, and communications resources at all times. Trends in the data gathered by the Chicago-Kent Large Firm Survey show strong movements toward use of local and wide area networks. See part 2 *infra* for a summary of the results of the 1992 Chicago-Kent Large Firm Survey demonstrating these trends.

15. Our telephone system, with its multiplying fax machines, is a pervasively available voice network that will become more intimately connected to each of us as personal phone numbers evolve which are able to find us wherever we are. In the near future the telephone network, or a parallel technology, will also provide pervasively available data communication. As the data channel develops, it will be able to carry any kind of information: documents, diagrams, pictures, voice and television. See *supra* notes 1-2.

my research assistant and later as the Programming Director of CALI/LEAP, along with several student research assistants, I was able to complete an electronic kit for this course during the summer of 1992. The electronic course kit is both a publication of materials to read for class like a casebook, and also an environment within which to study. The material is presented in a computer environment called hypertext. Every screen contains text that can be presented for its information content or as a navigation tool. The text used for navigation is styled like a button or box. When a mouse or "hot key" activates the text in the box, another screen is displayed or some computer function is performed.

The law school provided a supply of very small but powerful notebook computers to test this electronic course. The course materials and the associated electronic tools were loaded on the hard disks of these small computers before the beginning of the semester. In addition, we installed a word processor, LEXIS/NEXIS and WESTLAW software, and a software program that allowed students to dial into the electronic mail system on the law school network.¹⁶ The law school has a pervasive network connecting the computers on the desks of every faculty member, administrator, secretary and librarian. Every student has an account on the network for electronic mail. Faculty members were given the software needed to call in from their home computers to exchange electronic mail and transfer files. This computer law class was the first student group to have remote access and the first class to require each student to have a dedicated computer.

Prior to each class period, students read material from the computer course kit. The text of the assigned cases is displayed on the computers as a linked series of screens with buttons to move back and forth through the pages. This text is fixed on the page so that the students can use the mouse to color various parts of it, as they might if they used a yellow highlighter on a paper book. The text of the cases can be blocked and copied to any of several note pages. One purpose of this feature is to help students prepare a set of notes before class that contain important language from the case

16. There are approximately 100 student computers scattered throughout the building, primarily in the library, that students share for computer assisted research, word processing, instruction, and contacting faculty members or anyone on the network. While we loaded the computer law materials on the network server for access by these shared machines, we wanted students to have their computers with the materials wherever they would normally study, including the train, bedroom or backyard.

itself without retyping any of the material. During class, students could mark and copy text to one of the note pages with a couple of mouse clicks.¹⁷

Every student was required to research a fairly narrow question linked to one of the cases in the text. All of these projects were assigned on the first day of class. I encouraged the students to explore the factual settings from which the assigned cases arose, to read news sources and interview the parties and lawyers. I also suggested that they capture text in electronic form so that their projects could be built in hypertext. I told the students that they were making their own contribution to the hypertext casebook using the electronic BookBuilder written by the CALI programming team. When we distributed the hypertext material from each student to the rest of the class, the course materials quadrupled in size.

These student projects laid the groundwork for teaching about the connections and relationships between different fields of law. After the first two or three weeks of research and project preparation, the class contained students who were deeply knowledgeable about every area that we covered during the course. In effect, the projects created a collective intelligence at the beginning of the course that matched, and in detail, frequently exceeded my own. For example, when an issue arose in the section on criminal law about the admissibility of evidence gathered by a computer monitoring device or its implications for personal privacy in the work place, a discussion bubbled up from the students who had already studied the evidence and privacy questions while working on their project topics.

Each student brought the electronic book in the small notebook computer to a special classroom for our weekly two hour class sessions. In the classroom every seat was wired for power and network data connections. Students plugged into the network, as did I, and we were able to communicate both verbally and through electronic mail.¹⁸ I projected the screens from my own electronic

17. We also programmed several synthesis tools to accompany the book. An automatic outline generator copied the chapter, section and case headings and inserted the text contained in the note pages under the appropriate heading. This rough outline can be printed to a disk for editing in a word processor.

18. Only rarely did I use the electronic mail capability of the classroom. In those instances, I distributed to everyone a small text file containing a definition of a new statutory amendment that was especially relevant to the class discussion.

book onto a large screen behind the podium so that everyone could see where I was during the class discussion.

The class format was a traditional, socratic discussion with the background hum of the keyboards. The class sessions were interactive and alive. It was here that the "grandmother" effect showed itself most clearly. I knew that each of my students had done some deep thinking, and some of them had done very extensive research on topics that I had selected for class attention. Because of this, I tended to defer to the "domain expert" students so that much more of what was said in the class came from the students rather than from me. These gains did not come without some uncertainty and anxiety. After teaching for fifteen years, I had become reasonably enamored of my own presentation of material. In fact, if I did not say it, somehow it had not really been said. For me, teaching required that I synthesize the material, organize it in provocative and creative ways, and stimulate discussion among my students to the point where I could "wrap up." In my electronic course, I did not have that feeling of control and completion.¹⁹

Electronic mail extended the class beyond the assigned time. Students sent messages, text files and hypertext booklets to me and one another at all times of the day and night. They were able to plug their notebook computers into the electronic mail system from hundreds of locations in the law school. By using their computers to dial into the law school network from any telephone, they could send electronic mail from home or work. While most of this communication was administrative, relating to due dates for assignments and assistance in using the computer, there were several substantive discussions of importance. The special value of electronic mail is its ability to draw in those verbally reticent students who have great ideas. Some students are more comfortable expressing themselves in writing after careful reflection. These students can make a valuable contribution to the course interaction.²⁰

19. I think this uneasiness was my own reaction to change. As explained later in this section, the final examination results proved that the students discovered a variety of effective syntheses.

20. See Peter W. Martin, *Educating Law Students in the Use of Information Systems by Using Information Systems in the Education of Law Students*, in ALBERTA LEGAL INFORMATION TECHNOLOGY ASSESSMENT PROJECT 2 (Alberta Legal Information Technology Assessment Project ed., 1992). David Johnson has suggested that new technology, like electronic mail should force us to sort out, separate, and reintegrate each objective of the law school classroom. For example, he thinks that if faculty members wish to have dialogues with their students in a thoughtful and intellectually provocative way, it

The final examination created an impetus to find relationships between different topics and connections between the cases and materials in one area and those in another. The final exam was a take-home test that required students to identify pairs of pages. The first page in each pair was to come from one of the assigned readings; the second page in the pair was to come from a different section of the book. A short discussion of the reason that the two pages were conceptually linked completed the examination performance. The format of the examination was an extension of the group construction project. Each of these "pairs" could be added to the course kit as a "hot link" so that the students could click on the link to jump from one page to the other.

I found reading the exams to be fascinating. Reading exams had never been fascinating in the past. Each exam was unique and creative. Students found a wide variety of connections, from the very practical to the extremely abstract. Some found linguistic connections between the words and style of argument used in one case and the style of argument or words used in another. Others found pages in cases that they thought they would want to remember together if ever faced with a client problem in a particular arena. Still others found conceptual links in the reasoning applied by courts, or the underlying problem posed by technology that was the theme of the course. Reading the student projects and the examinations was a learning experience for me. I found new perspectives. I found new and interesting approaches to the material. I think I will be a better teacher when I teach this course again because of the contribution of the students.

From the questionnaires that we distributed to students we learned that, in the early weeks of the course, they had some difficulty adapting to taking notes in class on the computers. After navigating this initial learning curve, students stated that they learned to be at ease in using this tool, preparing for class, and

may be much more effective to have that discussion using electronic mail. An electronic mail connection between the professor and all the students eliminates the need for everyone to be in the same room at the same time. Electronic mail gives students the opportunity to think, research, read, and re-read the question posed before engaging in the discussion with the professor.

On the other hand, there are many objectives that an electronic mail course could not achieve that are accomplished in live classrooms with ease. Group identity builds more effectively when there are interpersonal meetings. It is easier to spark enthusiasm and excitement about material with a live presentation than one that is solely in writing. After all, every lawyer demands an opportunity for oral argument, if it is available.

preparing for the examination. The students generally said that they liked using the computer as a tool for a substantive course and stated that they would recommend this course or a similar electronically-based course to other students.

The students reported that they learned as much or more law in this course using the electronic course kit, as they did in other substantive law school courses. The quality, sophistication, and breadth of the analysis that was exhibited by their examinations supports this self-evaluation. The examination answers showed that students had worked through the material from start to finish looking for connections and themes. There was synthesis at a very high level. They learned the material and learned how to explore new territory more effectively than students who had taken this course in the past without this new methodology.

To summarize, I gauge the "Computer Law" experiment to be my first effective law school analog to Seymour Papert's "Mathland." The electronic course kit, as implemented in the fall of 1992 in my "Computer Law" course, engaged the students in a collaborative exploration of difficult legal material. Students were able to learn the skills needed to use the electronic tools and in the end they enjoyed this new approach to law school. I am convinced that my students worked as hard and learned more than in any of my preceding classes. Electronic tools permitted the students to work 24 hours a day, if they wished. The collaborative course building of the projects and even the exam pushed the students to see relationships and to synthesize material rather than prepare for each class or case as a single unit standing alone.

The "Computer Law" experiment supports the conclusion that the electronic casebook will not displace the professors who prod and question and probe and nurture student exploration of legal material. I taught each class in much the same way that I have taught for years. The classroom was still the focus of the course. Most of the changes in the classroom were improvements. The new technology did not replace my function but helped my students to be more energetic, engaged, and well-prepared in class. While electronic mail may have offered some additional opportunities for substantive discussion, it certainly did not replace the classroom experience. The vast bulk of the substantive discussion between myself and the students occurred in class.

The computer tools that supported these important educational gains will mesh easily with the existing law school structure and the talents of law professors now in the academy. This experiment

does not point to the need to abandon the traditional interpersonal teaching methods that professors find effective. Another law professor unfamiliar with computers would have had a difficult time preparing this first electronic course kit. But he or she could have stepped into the class and taught the same material without investing in a deep understanding of the technology. Over time, the tools for building the electronic materials will improve along with the basic computer literacy of the academy so that electronic course materials will be much easier for individual faculty members to prepare than a similar set of photocopied materials.

We may discover that the most important lesson of this experiment for the students was the experience of using technology to foster cooperative learning. Each student participated in building the information available to every other student. Every student left the course with an electronic database of material about the law that was annotated with their own reflections on the most important and useful material. The computer connectivity that permits law students to learn by constructing their course materials as a group exercise, will also support the increasing need to work in geographically dispersed groups in law practice. Pervasive access to computing and to each other's computers will help them to tie into the synthesis structures of colleagues and experts to learn the law as well as practice the law.

In the session after the exam when students returned their borrowed computers, several graduating third-years suggested that they be included electronically the next time the course was offered. They suggested that their views and experiences from law firms would offer an important new perspective on the electronic discussions generated by the course. I could not have asked for a more powerful endorsement of the experiment.

II. LOCATING THE LAWYER IN THE DIGITAL LAW FIRM OF 2001

Throughout this part, two crossing themes are examined. First, as technological change envelops the legal profession, it is important, even essential, that the uniquely human aspects of our helping profession grow and develop. The grandmother analogy may seem out of place in the high-intensity, competitive world of law practice, but wisdom, interpersonal skill, patience and insight should not. One of the strongest advocates for the use of computers in large firms was Harry Holmes, a partner in the estate planning department of McDermott, Will and Emory, one of the world's

largest law firms.²¹ Harry was the force behind two generations of automated practice systems at this major firm, the first built on Wang minicomputers and the second using personal microcomputer software. Harry saw the systems as both time savers and quality assurance. He would proudly point to the firm's system as a way to help an associate produce a draft of a complicated will and trust in a very short time. Harry was never concerned about being replaced by a computer system. The system got the team to first base, where the lawyering started. Harry told me that his clients paid his high hourly rates because they wanted his judgment, not his drafting skills or his research abilities. They wanted his judgment. The computer scientists working with artificial intelligence are not close to putting Harry's judgment in the computer.

The second theme is the growing importance of communications technology. Harry's efforts were aimed at using the computation power of computers to improve the quality of client service at his firm. Harry's firm and many others have successfully benefitted from improvements on the computational side. However, the most important changes over the next two decades for lawyers and their clients may be found in the communication power of computers. Granting that Harry's judgment or grandmotherly wisdom cannot be replicated by today's technology, computers are incredible communications machines and that capability can be used to leverage Harry's judgment and support the use of grandmotherly wisdom.

A. The Technology Setting in Law Practice

Most of the lawyers in the United States have a computer on or near their desk. Ten years ago almost none of the country's lawyers had a computer in their offices. We are approaching the day in the relatively near future when every lawyer will be equipped with a personal computer. Surveys of small firms and solo practitioners,²² mid-sized firms,²³ large law firms²⁴ and cor-

21. Harry served on the first advisory board for the Chicago-Kent Center for Law and Computers in 1983. He was its chairman for two years. He provided countless insights into the use of computers in law practice. In March, 1992, Harry died of a sudden heart attack.

22. AMERICAN BAR ASSOCIATION, LAW OFFICE AUTOMATION STUDY: REPORT OF FINDINGS ii, 4-6, 9-10, 43, 53-54, 91 (1989) (results of 1988 survey of technology use of 747 sole practitioners and 528 small firms).

23. LEGAL TECHNOLOGY RESOURCE CENTER, AMERICAN BAR ASSOCIATION, AUTOMATION IN MIDSIZED LAW FIRMS: SURVEY REPORT vi-x, 3-17, 20-21, 25-38 (1992) (survey of law firms with 20 to 100 lawyers).

24. For an overview of law office automation trends derived from an analysis of the

porate law firms²⁵ over the past eight years consistently echo this trend.

Since 1985 the Chicago-Kent Center for Law and Computers has conducted an annual survey of the 500 largest law firms in the United States to monitor their use of technology. In 1986 there were workstations, mostly terminals, on the desks of only 1423 of the 20,390 lawyers in the firms responding to our survey. In 1992 there were 17,633 workstations on lawyers's desks representing 70% of the 25,212 lawyers in the reporting firms.²⁶ A continuation of this trend will produce universal desktop computing for lawyers within the next few years. (See Appendix, Table 1).

B. Computational Advances in Law Practice

Computers entered the large law office in the 1970s through the back office: time accounting, billing, and payroll were the first automated systems. Automated litigation support systems were prevalent only in very large lawsuits involving tens of thousands of documents. Word processing was a back office function separate from the lawyer/secretary working units. Large law firms started to use LEXIS in the seventies on large desk-sized "deluxe" terminals situated in the firm libraries.

Chicago-Kent Large Firm Surveys from 1985 through 1991, see Ronald W. Staudt, *Law Office Automation Approaching the Millennium*, 1 OXFORD INTL. JOUR. OF LAW AND INFO. TECH. 57 (1992); see also RONALD W. STAUDT & ROSEMARY SHIELDS, CHICAGO-KENT 1992 LARGE FIRM SURVEY AND STATISTICAL ANALYSIS 73 (1993) (on file at Chicago-Kent College of Law, Center for Law and Computers); RONALD W. STAUDT, 1991 IIT CHICAGO-KENT LARGE FIRM SURVEY AND STATISTICAL ANALYSIS § 1, 9-20 (1992) (same); RONALD W. STAUDT & VALERIE FRIBLEY MAYER, 1990 IIT CHICAGO-KENT LARGE FIRM SURVEY AND STATISTICAL ANALYSIS § 1, 6-22 (1990) (same); RONALD W. STAUDT & WAN L. HWANG, 1989 IIT CHICAGO-KENT LARGE FIRM SURVEY AND STATISTICAL ANALYSIS § 1, 6-12 (1989) (same); RONALD W. STAUDT, 1988 IIT CHICAGO-KENT LARGE FIRM SURVEY AND STATISTICAL ANALYSIS xxv-xxvi (1988) (same); Ronald W. Staudt & Bernard J. Farber, *Computer Technology in Large Firms Today: A Perspective Based on the 1985 IIT Chicago-Kent Large Firm Survey* 6-12, 15-20 (1985) (same); Ronald W. Staudt, *IIT Chicago-Kent College of Law 1987 Large Firm Survey: Summary & Review*, 1986 PROC. THIRD ANN. PERS. COMP. STRATEGIES FOR LAW. 27; Ronald W. Staudt, *Lawyers and Computers Today: A National Profile of Computer Use in Large Firms*, 1986 PROC. SECOND ANN. PERS. COMP. STRATEGIES FOR LAW. 21.

25. See *Survey of Automation in Corporate Legal Departments*, in A.B.A. TECHSHOW PROC. (1993).

26. The typical lawyer in a large law firm in 1992 had a powerful 80386 microcomputer with 4 megabytes of random access memory and a color VGA screen. Only rarely did these lawyers report that they used an Apple computer. See RONALD W. STAUDT & ROSEMARY SHIELDS, CHICAGO-KENT 1992 LARGE FIRM SURVEY AND STATISTICAL ANALYSIS 89-90 (1993).

Through the decade of the eighties, computers became smaller, less expensive and less reclusive. More and more lawyers used computers in their own offices as part of their day-to-day work. In the eighties, lawyers who tried cases were more likely to use computers than transaction lawyers. The exceptions to this rule were those transaction practices, like tax and estate planning, where back office word processing and repetitive document assembly had a strong presence. These document intensive practices have had almost identical computer penetration to the lawyers' desktop as litigation.

Today, almost every large law firm is using computers to support litigation. For the last three years more than 90% of the large firms report using computers to keep track of documents and transcript testimony in litigated matters. Automated litigation support was once the exclusive province of the mainframe computer, outside support vendor, and mega-case. Today microcomputers, owned and operated by the firms themselves, are the equipment of choice for litigation support. Because these computers are inexpensive and widely available in the firms, automated litigation support is used for smaller and smaller cases.

Over the past five years an increasing percentage of firms report that they used computers to automate the transaction practice with document assembly systems of varying sophistication. (See Appendix, Table 2). Some of these systems were simple libraries of "fill-in-the-blank" word processing forms. Other large firms purchased or built more powerful systems that mimic attorney decisions using automated document preparation tools containing "if-then" rules that guide the computer in selecting clauses based on varying client information.

When we began to study the use of computers by lawyers in large firms, I expected to see dramatic changes in the practice as the technology grew in importance. In the early 1980s, it seemed that artificial intelligence and expert systems had the greatest potential to change the profession. Roberta Ramo and other leaders of the ABA Law Practice Management Section preached the benefits of systems in the law office.²⁷ They argued that lawyers were hand crafting documents, even advice that could be routinized and streamlined by data processing. In divorce, workman's compensa-

27. See GARY A. MUNNEKE, *LAW PRACTICE MANAGEMENT: MATERIALS AND CASES* 308-16 (1991); KLINE D. STRONG & ARBEN O. CLARK, *LAW OFFICE MANAGEMENT* 81-134 (1974).

tion, personal injury, estate planning, tax, residential real estate, collections and other repetitive practices, lawyers would be able to use computers to produce document sets in seconds. The documents would be more accurate and better looking if they were produced by a computer. The computer would be able to keep track of client information, lawyer time and expenses, and even sort out difficult questions of law using conceptual maps of the statutes and the rules inherent in cases.

In reviewing the past ten years, some of these predictions came true and some are emerging realities. For example, before the Sears corporate counsel's office purchased a computerized system from Price Waterhouse to handle corporate tax returns, there were 16 lawyers and eight secretaries in the tax unit. After the system was installed, the number of lawyers dropped to nine and there is only one secretary left. Every lawyer has a computer, and the tax business of the corporation is done more quickly and with greater accuracy than ever.

There are enormous gains to be achieved using automated practice systems and other electronic tools to improve the efficiency of repetitive services. The major form book publishers have been working on their libraries of forms with an eye toward electronic distribution. Several attempts to publish automated practice systems have been launched, and others are in the works. Bar associations and even courts have studied this technology to find opportunities to increase the quality of legal services and reduce its cost. Word processing software will eventually contain more tools to permit casual users to make simple automated systems when they prepare boilerplate documents. The growing use of simple expert systems in law firms today has reduced the time and increased the quality of repetitive document drafting.²⁸ But even

28. Automated practice systems and work product systems are clearly part of the competitive forces now working to allocate the supply of legal services. For example, a letter of three middle-aged partners of a large Chicago law firm sent to announce their new estate planning boutique said:

We have established a new computer system which will enable us to efficiently provide estate planning documents, tax returns and tax projections. Because of this increased efficiency and lower overhead costs than in our present firms, we are able to offer lower hourly rates. In addition, we will, wherever possible, offer fixed rates for all standard estate planning documents and plans at very competitive rates.

Letter from Laurence J. Kline, Partner, *Carroll, Kline & Wall* 2 (Feb. 2, 1993) (announcement of new firm) (on file with author).

when a massive system like the Price Waterhouse corporate tax system is installed, the corporate tax department did not eliminate all lawyers.

There has been a significant amount of research to determine if the use of artificial intelligence can support the lawyer and judge. Because of the rule-like nature of law (which may be more of an illusion than a reality) artificial intelligence researchers have been using legal domains to explore the ability of machines to think.²⁹ Artificial intelligence systems designed to deliver sophisticated legal analysis directly to consumers of legal advice who are not themselves law trained are apparently difficult or impossible. To date, the use of artificial intelligence to mimic the decisional process of judges or lawyers has not been achieved; it may never be achieved.³⁰

Artificial intelligence will make dramatic gains over the next ten to twenty years, but it does not appear that it will replace the work of lawyers who do sophisticated legal analysis and argument. Artificial intelligence, like the electronic course kit described in part I, will serve as a tool to enhance the capability of the human lawyer. The advances will improve lawyers' ability to capture thoughts through speech recognition and optical character recognition. Artificial intelligence applications in these areas will reduce the need for secretarial support and increase the capability of computers to store and retrieve the work product of the law office.

Mathematical pattern matching tools are being used today to locate relevant legal authorities.³¹ The most recent splash by artificial intelligence is the WIN searching system launched by West Publishing Company for its WESTLAW service in 1992. The sys-

29. See, e.g., ASSOCIATION FOR COMPUTING MACHINERY, THE THIRD INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND LAW, (1991); KEVIN D. ASHLEY, MODELING LEGAL ARGUMENT: REASONING WITH CASES AND HYPOTHETICALS (1990); ASSOCIATION FOR COMPUTING MACHINERY, THE SECOND INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND LAW, (1989); RICHARD E. SUSSKIND, EXPERT SYSTEMS IN LAW: A JURISPRUDENTIAL INQUIRY (1987); ANNE VON DER LIETH GARDNER, AN ARTIFICIAL INTELLIGENCE APPROACH TO LEGAL REASONING (1987); ASSOCIATION FOR COMPUTING MACHINERY, THE FIRST INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND LAW (1987); L. Thorne McCarty, *Artificial Intelligence and Law: How to Get There from Here*, 3 *RATIO JURIS* 189 (1990).

30. See Edwina L. Rissland, *Artificial Intelligence and Law: Stepping Stones to a Model of Legal Reasoning*, 99 *YALE L. J.* 1957, 1965, 1979-81 (1990); GARDNER, *supra* note 29, at 6-16, 24, 31-32, 37.

31. See RONALD W. STAUDT & JAMES I. KEANE, *LITIGATION SUPPORT SYSTEMS* § 2:14, 29-36 (2d ed. 1992).

tems that have already produced new efficiencies tend to operate automatically on language, images, or databases of text looking for linguistic relationships that can be mathematically defined. There has been less success with projects that attempt to model the law itself in the computer system or which require a significant investment of lawyer time to formulate, store, and maintain the rules and other forms of legal expertise in the system.

Artificial intelligence systems that will be built to assist practicing lawyers in sophisticated legal analysis are best characterized as finding aids. An artificial intelligence system that says "Your client wins!" or even "There is a 47.3% chance that your client will win!" is almost useless. Lawyers want to make arguments and weigh the strength and weakness of various legal positions as they apply to the facts of their client's situation. Lawyers will find artificial intelligence systems useful when they can locate the ten cases that are most favorable for their position and the ten that are most damaging, or help suggest three approaches to the problem that might meet the client's need and display the statutes, regulations, and cases that best illustrate those legal theories. During the coming decade, artificial intelligence software will mature to be able to provide more sophisticated research assistance to help lawyers find primary sources that bear on client problems. Similar tools will improve the recall and precision of searches in litigation support databases and improve the capability of work product retrieval systems in large firms.³²

The communications advances described next will connect more than a million law trained professionals in a vast electronic network in this country alone. That same network will offer a channel for distribution of electronic texts written, annotated and modified by any of this hoard of lawyers. Law students and pre-law students at one end and clients at the other, may also have access to this electronic system.³³ Artificial intelligence systems that find needles in the electronic haystacks of information available to the profession over the networks will become more and more valuable.³⁴

32. *Id.*

33. This is not nearly as draconian as it might sound. We already have one such system in place in our telephone network. Theoretically, any pre-law student or potential client could call any lawyer on any day. There are some obvious differences. Voice communication is usually handled in a linear fashion, one conversation at a time. Electronic communication can work in parallel. In seconds, the Internet can deliver a message to hundreds of thousands of network nodes.

34. The Langdellian notion of the law library as a laboratory takes on new dimension

C. Communications Technology: The Key to the Future

The advances in the use of litigation support databases, expert systems, automated practice systems and artificial intelligence are developments of computation power. There are indications that communications capabilities of the computer will be more important in changing the practice of law during the next ten to twenty years. The growing number of computers on the desks of lawyers are not simply word processors and research machines. They are communications machines connected to one another in networks.

In 1985, when the Large Firm Survey was first conducted, only 7% of the lawyers had workstations on their desks. Of the 7% of lawyers with such equipment in their offices, half had a terminal connected to a minicomputer or a mainframe and the other half had a personal computer. Most of the personal computers in the early years were isolated from the other equipment in the law office. As the 1990s began, the vast majority of workstations on lawyers's desks were personal computers, but these computers were connected. In the 1992 study, 14,323 personal computers, 88% of the total lawyers' machines were connected to local area networks. More remarkable, 75% of the firms report that the lawyers in the office can call into the office computer network from home or "on the road." Over 53% of the firms, totalling 81 respondents, said that wide area networks linked multiple offices. Wide area systems in these 81 firms tied together 465 offices in electronic networks. (See Appendix, Table 3).

Firms use networks to give convenient desktop access for all of the lawyers to high quality printers, LEXIS/NEXIS and WESTLAW at very high speeds, and time keeping and billing data. Networks make it more convenient to use clerical support where it is most needed by allowing secretaries to call up documents wherever their offices are located. The automated practice systems described in the preceding section are more efficiently used if the lawyers, paralegals, and secretaries all use networked computers. Large complicated systems can be maintained on one computer and shared by the entire firm. Successive drafts of the documents produced by the systems can be revised by teams of professionals with accurate version control and tracking of the

when the electronic library contains, not a subset, but all of the court decisions and statutory material, the vast majority of secondary sources *and* access to the authors of those texts as well.

source of various changes to the document. With wide area networks, groups of lawyers who practice in distant cities can work together on client problems by revising documents on the network.

Networks support the growth of an institutional memory within law firms and more effective use of prior work product by the lawyers of the firm. Sophisticated automated practice systems are not necessary to reap most of these benefits. In fact, the more difficult it is to capture and classify the historical work product, the less likely it is that lawyers will consistently use such systems. The best systems gather up the relevant information as a natural by-product of the process of creation of the documents needed for current clients. Some firms have found that the core network function is a firm wide document management system that keeps track of every document in every office.

In addition to the convenience and efficiency offered by networks in sharing work product, printers, and access to electronic research, networks help lawyers to communicate with each other, with the supporting staff, and with clients. Electronic mail has already been the most revolutionary of the currently available technologies for lawyers and law schools. This endorsement is based on personal reaction to the medium as it has evolved and on my observations of colleagues.

Electronic mail is the first computer innovation that has been embraced with enthusiasm and even affection by colleagues who are not interested in computers. When everyone in an enterprise like a law firm or a law school is connected to electronic communication, there are cultural changes. Electronic mail supplants some communications that previously occurred by visit, telephone, and memoranda. Electronic mail increases the total amount of communications, adding to the interpersonal interaction of the enterprise.³⁵

While electronic mail has been accepted within law firms that have installed the necessary equipment and software, lawyers have not been eager to use computers to communicate outside their law firms. Firms have used facsimile machines to communicate to clients, adversaries, and even courts. The simplicity of the fax machine may have slowed the spread of electronic mail systems for lawyers. The American Bar Association has struggled to support a

35. See Barry Anderson, *Hand Write Your Last Memo*, LAW OFFICE COMPUTING, Dec.-Jan. 1993, at 87.

computer communication and services network for its members for almost ten years. While the present fate of ABA/net is uncertain, it has not been a great success. Three different information services providers have formed sequential partnerships with the ABA to provide electronic mail and document services to lawyers. While Chicago-Kent computer survey statistics continue to show aggressive investments in computer hardware for lawyers, ABA/net has not grown with the other electronic services used by the firms.³⁶ (See Appendix, Table 4).

In the academic world, there is a very different story. Internet, the education and research network formed of the connection between universities and research centers, is growing at an astonishing rate. Observers say that Internet grows at the rate of 15% a month. Millions of computers and multiple millions of scholars and researchers now use the Internet.³⁷ While the Internet is arguably less user friendly than ABA/net, there is one significant difference that could explain its rapid growth in the face of ABA/net's decline. The Internet is cost free to the academic end users. Their educational institutions pay annual flat fees for connections, but there is no message charge or connect fee that professors must pay or budget.

To sum up part II, the statistical studies of law firm technology show trends that are compatible with the need to stress the human qualities of lawyering. A review of artificial intelligence indicates that computers are poised to assist, not supplant, legal analytical work. Computer communication advances point to a greater need for interpersonal skills, even if those skills are exercised on the remote networks. In the final section, I offer some forecasts about law practice, education, and the impact of the technology trends described in part II.

36. Survey responses show that LEXIS/NEXIS and WESTLAW are available in virtually every large firm today. ABA/net is languishing below 50% of the firms and has a much lower penetration among the individual lawyers in firms than the leading research databases. See STAUDT & SHIELS, *supra* note 24 at 122.

37. See BRENDAN P. KEHOE, *ZEN AND THE ART OF THE INTERNET* 5 (1992) (presenting a broad, practical overview of the vast Internet applications); Cheryl Gerber, *Booming Commercial Use Changes Face of Internet*, INFOWORLD, Apr. 12, 1993, at 1, 38; DANIEL P. DERN, *Plugging into the Internet*, BYTE, Oct. 1992, at 149, 149; Rick Boucher, *The Challenge*, EDUCOM REVIEW, Sept.-Oct. 1992, at 30; James J. Duderstadt, *An Information Highway*, EDUCOM REVIEW, Sept.-Oct. 1992; cf., Albert Gore, Jr., *The Information Infrastructure and Technology Act*, EDUCOM REV., Sept.-Oct. 1992, at 27 (describing the far-reaching benefits of government funding of computer technology through the High-Performance Computing Act).

III. LEARNING AND LAWYERING IN CYBERSPACE³⁸

Predictions about the future of law teaching and law practice are common. My overview of the emerging future is based on glimpses of success in using computer and communication technology to teach law. The dizzying array of advanced software and equipment and fiber optics and wireless communications makes it difficult to keep in mind the importance of the human qualities of teaching and practice. My own experience with a technology intensive law course points to the enduring power of the live classroom, as well as the energy and enthusiasm for classroom learning that technology can generate. While some of the humanity of teaching can be replicated on the network with multimedia or virtual reality, I am convinced that some components of teaching and practice require face to face meetings. However, I have not yet identified the precise components. Despite these blurred limitations, I offer the following picture of legal education and practice in the year 2001.

A. *Pervasive Computing and Connectivity*

Obviously, this future environment will offer pervasive computing and pervasive digital communications. All lawyers and all students and teachers of the law will have computers and all will be connected by wires, fiber optics, and wireless communications to networks of data and to one another. In the early years of the computer revolution the most astounding technological phenomenon was the rapid increase in power and the simultaneous precipitous decline in the cost of computing. The predictions from the computer science and electrical engineering fields now point to a cycle of 10 to 24 months during which computing doubles in power and halves in price.³⁹ We are becoming accustomed to this wild ride and find it exciting but not unexpected. The predicted growth in the ability of fiber optics to reduce the cost and increase the capac-

38. See Ethan Katsh, *Law in a Digital World: Computer Networks and Cyberspace*, 38 VILL. L. REV. 403, 414 (1993) (defining cyberspace as a "mature electronic culture" and providing an insightful exploration of the implications of this emerging culture on law and lawyers); see also ETHAN KATSH, *ELECTRONIC MEDIA AND THE TRANSFORMATION OF LAW* (1989). Another eye opening set of predictions about the changes that communications technology will have on information industries is found in Gregory J. E. Rawlins, *The New Publishing: Technology's Impact on the Publishing Industry Over the Next Decade*, 3 PUB. ACCESS COMPUTER SYS. REV. 5 (1992).

39. See John Gantz, *Advanced Technology: Where Is It Leading Us*, NETWORKING MGMT. May 1990, at 33, 33-35.

ity of the communications networks is a potentially shocking development.⁴⁰

The literature is filled with dramatic scenarios of the effects of expected advances in communication technology on the fabric of society, entertainment, business, and the economy. In a celebrated article in *Forbes Magazine*, George Gilder predicts that advances in fiber optics will make information communications incredibly inexpensive:

Within 10 years, the all-optical network will be millions of times more cost-effective than electronic networks. Just as the electron rules in computers, the photon will rule the waves of communications.

The all-optical ideal will not immediately usurp other technologies. Vacuum tubes reached their highest sales in the late 1970s. But just as the IC [integrated circuit] inexorably exerted its influence on all industries, the all-optical technology will impart constant pressure on all other communications systems. Every competing system will have to adapt to its cost structure. In the end, almost all electronic communications will go through the wringer and emerge in glass.⁴¹

Gilder's predictions add fuel to the fire of those who stress communications rather than computation as the most important contribution of computers to the law profession. Even without the mind-numbing expansion of communications power that he predicts, we will have enormous new capabilities to transmit data.

Motorola, in conjunction with Sony Corp., Philips Telecommunications, N.V., and Matsushita, is planning for the communications age by preparing small hand-held devices that it hopes to use to replace the telephone, the beeper, the appointment book, the notebook computer, the fax machine, and perhaps other functions. Apple Computer, Inc. produces personal digital assistants with some of these functions under the brand name "Newton." Motorola plans to launch 66 low level communications satellites covering every spot on the globe with a space-based digital link. As wireless telephones become coordinated, each of us will buy our own personal telephone number that will travel with us; we will soon be

40. See George Gilder, *Into the Fibersphere*, *FORBES ASAP*, Dec. 7, 1992, at 111, 111.

41. *Id.* at 124.

constantly available for voice and data communications, wherever we are.⁴²

The enormous capacity of the coming network infrastructure points toward the merger of text, graphics, sound, and video in complex digital information packets. The network structures now used by lawyers are largely text based. LEXIS/NEXIS and WESTLAW will soon offer some crude graphics communications. Both systems have more attractive local graphics on the lawyers' computers to make use of the systems more pleasant and intuitive. The new capabilities will add charts and graphs to court opinions and pictures of the evidence as well. Electronic mail traffic on the Internet is dominated by text today, but text messages are frequently used to serve as envelopes for graphic information. Occasionally, multimedia information is transferred over the Internet. Michigan State University put up a database of the presidential debates in the fall of 1992 that included sound files with the captured voices of George Bush and Bill Clinton.

In the next few years the networks will carry more and more multimedia information. Computers will make use of sound and video for emphasis and clarity and entertainment. All of this multimedia will be digitized and capable of network exchange when the speed and capacity of the national networks increase. William Zachmann and others find this set of developments to be incredibly powerful:

We may see nothing less than the total destruction of the educational system that has dominated human learning since the earliest days of civilization.

This far-reaching change in our educational process could be the most dramatic impact of information technology on human life in nearly three thousand years. Such a far-reaching change could radically alter not only how we learn but also what we learn.⁴³

Zachmann thinks that cheap and accessible multimedia in the hands of educational software entrepreneurs will establish a huge market for education as entertainment. He sees this set of developments as sowing seeds for the destruction of educational institutions. Even if the premises of his analysis are correct, I think that

42. See *supra* notes 1-2.

43. William F. Zachmann, *Education: The Final Frontier*, PC MAG., Aug. 1991.

he underestimates the importance of the grandmother effect. Students will always find stimulation in the careful educational nurturing of the human teacher. But pervasive digital multimedia may make many of the human characteristics of the classroom teacher accessible over the network. Virtual reality makes that possibility even more likely. Some aspects of the grandmother, perhaps nurturing and sage advice, may be able to make the transition from the live classroom to be distributed over the network. Professors from a variety of schools might be available on the network. A virtual panel of torts professors or contracts professors might interact with students from many different schools in a national first year of law school.

The new capabilities will shrink the building, the block, the city, the country and the globe. New structures for education and law practice will emerge that leverage the accessibility of communications among students, and teachers and among lawyers and clients. Opportunities to draw practicing lawyers into the academy through electronic communications will challenge law professors and deans to improve the instructional offerings of our law schools. Students and professors will extend the classroom with electronic discussions that include lawyers chosen to offer practice perspective on the issues addressed in the classes. That same phenomenon will offer the lawyers inexpensive and convenient access to the intellectual ferment bubbling in the law schools.

B. Collaboratories of Lawyers and Law Schools⁴⁴

In medicine the finest teaching hospitals offer the unique combination of superb research facilities, excellent theoretical faculties, and the premier practice environments. In law, the best law practices are not located within law schools. The communications technology emerging as we approach the turn of the century will offer an opportunity to solve this problem. Law firms and law schools will be able to form "virtual teaching hospitals" for lawyers. Law firms and law schools will form collaboratories made up of "advanced distributed infrastructure that would use multimedia information

44. Marc Lauritsen used the term "collaboratory" in a slightly different way in a paper that he and David Johnson presented at the 1992 ABA Chicago-Kent TECHSHOW. In their paper, Lauritsen and Johnson combined the notion of universal communications within the law profession with sophisticated graphical visualization of legal concepts. See Marc Lauritsen & David Johnson, *Re-envisioning Law Practice with Computers: Collaboration and Visualization*, in 1992 A.B.A. TECHSHOW PROGRAM BOOK at Tab. G.

technology to relax the constraints on distance, time and even reality . . . [to] support and enhance intellectual teamwork in [law.]”⁴⁵ If the prestige law firms are uninterested in this intellectual exchange, the boutique firms and individual lawyers will reconnect to their alma maters in electronic networks. An educational cooperative of excellent lawyers from top law firms and the law schools formed over the network adds to the law student’s menu the human judgment and reactions and wisdom of the real world.

C. *Computers, Competency, CLE and Certification*

Continuing education will be delivered to the lawyers’ desktops with the same multimedia sophistication. The desktop computer, or even the hand-held personal digital assistant, will be able to display the lectures and panels and other traditional presentations that are now common in continuing education courses. Distributing these educational materials over the network will add several advantages. It will become easier to account to the authorities who monitor compliance with mandatory legal education. More importantly, computer-based lessons delivered over the network will make it possible to certify minimum competency for practicing lawyers and lawyer specialties. The lessons will include (over strenuous objections, I assume) electronic tests to ensure that those who take the courses have mastered the material. These electronic on-line tests will demonstrate that the course was, in fact, viewed by the lawyer, but also that the lawyer learned something. In this way continuing education will become competency education insuring that the professionals in our discipline keep up their mastery of legal knowledge and analytical effectiveness.

D. *The Electronic Marketplace for Clients and Law Firms*

Lawyers and clients will communicate electronically; they will find each other electronically as well. The opening effort toward demonstrating that electronic mail can serve as a marketplace for legal services is Counsel Connect. This special subscription electronic network is open to corporate counsel and lawyers in firms that serve large corporations. Counsel Connect is designed to reduce the cost and time needed to get the right lawyer with the right expertise and experience together with corporate clients needing those talents.⁴⁶

45. Duderstadt, *supra* note 37, at 40.

46. See David Johnson et al., *An Electronic Marketplace for Legal Services*, CORP.

In its early weeks of operations Counsel Connect had signed up the general counsel for 120 large corporations. A number of large law firms were also participating in the early efforts to establish this electronic marketplace for legal information and services. The organizers of the service had gathered legal memoranda and informational newsletters that the law firms distributed to their clients to inform them of new developments in specialty areas of the law. Briefs from interesting cases were also available on the system. A number of acknowledged experts have agreed to moderate on-line discussions of specific legal topics or office management issues. When the Supreme Court issued a new tax decision, the service opened a discussion item about its effect, and firms rushed to post their "instant" analysis of the business implications of the case. Prospective clients were able to get the advantage of several perspectives within a day or two of the change in the law. Because the system is interactive, a corporation could follow up the law firm posting with a question, or forward the initial analysis to someone else in the corporation with a comment or append the memo to a "virtual file."

Counsel Connect has built some safeguards into its system to prevent abuse or problems for the lawyers involved. Everyone in the system is a lawyer and all agree that no privileged information will be disclosed and no attorney client relationship will be formed by participation. The literature describing the system suggests that the corporate members are free to hire the participating law firms but that those arrangements are separate.

While it makes sense to assume that some of the communications between lawyers and clients who find each other on-line will continue to be electronic, clients will always seek the reassurance of human contact when they face important problems in new uncharted areas. The judgment that Harry Holmes offered his clients required his special combination of intelligence, experience, humor and intuition. Even if Harry would deliver that advice over an electronic network to a client that found him electronically, there would still be a bit of the grandmother in his professional effort.

LEGAL TIMES, March 1992, at 14; Ronald W. Staudt, *A Skeptics Reservation About the Electronic Marketplace*, CORP. LEGAL TIMES, March 1992, at 16; see also David R. Johnson, *Building a Facility Lawyers Want to Use*, COUNS. CONNECT (Counsel Connect, Inc., New York, N.Y.) Mar. 1993, at 2, 2; David R. Johnson, *On the Path to Electronic Collegiality*, COUNS. CONNECT (Counsel Connect, Inc., New York, N.Y.) Mar. 1993, at 1, 1.

APPENDIX

Table 1

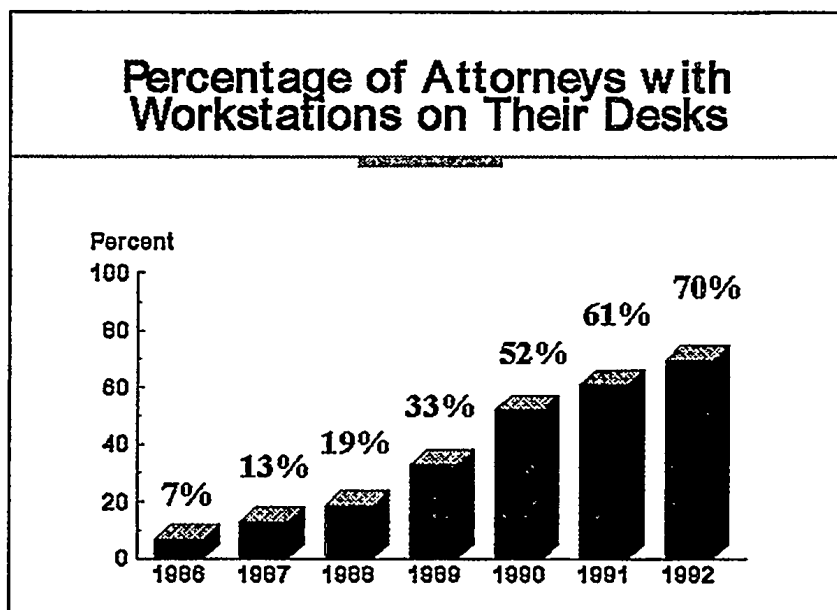


Table 2

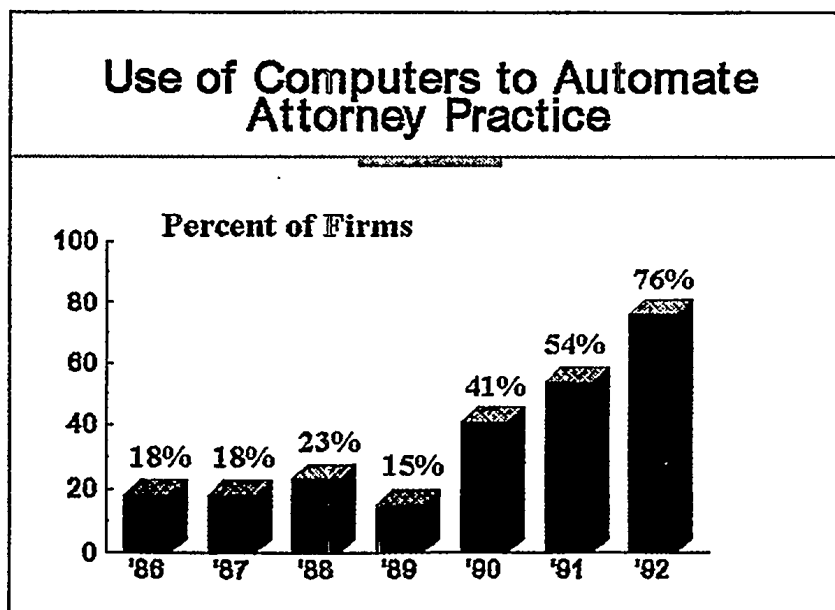


Table 3

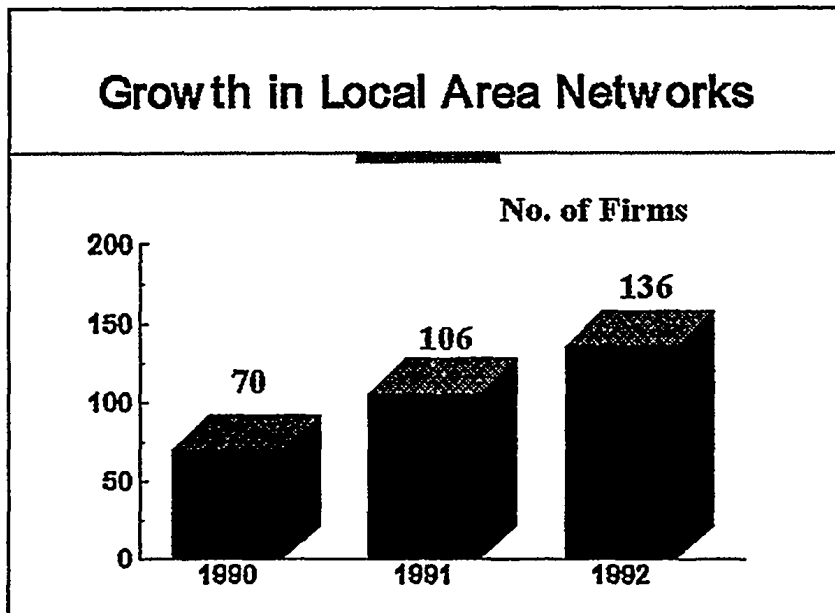


Table 4

