Law Schools and Technology: Where We Are and Where We Are Heading

Michele Pistone

I. Introduction

For many years, the question of how to use technology to teach the law has been a minor concern of the legal academy.[1] That era of general indifference to developments in learning technologies is now coming to an end. There are many reasons for the change. Law schools are facing such a host of difficulties—declining enrollments, declining job prospects for graduates, reduced public funding, and understandable concerns about cost and debt—that sometimes it seems the only debate is over whether the situation is best described as a "tsunami" or "a perfect storm." Against this backdrop, technology offers the attractive possibility of making legal education both more efficient and more effective.

This article has two main aims. First, in Part II, it discusses some of the conditions that will push law schools to incorporate more learning technologies into our teaching methodologies in the coming years. Part III provides an overview of some of the learning technologies that have gained prominence, as well as at least limited usage, in law schools in recent years.

II. Conditions Propelling Use of Technology in Legal Education

Technology skeptics correctly note that many prior efforts to use new technologies to deliver education have amounted to very little. For example, when radio appeared as a new technology, many educators responded with great optimism and enthusiasm,[2] and the arrival of the television age stimulated

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1.   Tamar Lewin, *Law School Plans to Offer Web Courses for Master's*, N.Y. Times (May 8, 2012), *available at* http://www.nytimes.com/2012/05/09/education/law-school-plans-to-offer-web-courses-for-masters.html (noting that "[l]egal education has been slow to move to online classes.").

2.   Michael G. Moore & Gregg Kearsley, Distance Education: A Systems View of Online Learning 29 (3d ed. 2012). Indeed, one can go back further in time, to the early 1900s, when the University of Chicago offered correspondence courses in which learning materials were sent back and forth between students and teachers via postal mail. *See* Kathryn Kennedy & Leanna Archambault, *Offering Preservice Teachers Field Experience in K-12 Online Learning: A National Survey of Teacher Education Programs*, 63 J. of Tchr. Educ. 185 (2012). These correspondence courses were made possible in large part because a new technology at the time–the spread of railway networks–allowed for cheap and reliable postal services. Moore & Kearsley, *supra* at 24.

a similar interest,[3] but neither technology did much to change the educational landscape. In the 1980s, distance education was again looked at anew as teleconferencing technologies became more widespread—advocates noted that this new technology would facilitate a better form of distance learning because it allowed for group dialogue among students and teachers in real time as opposed to one-on-one exchanges through postal mail or receive-only radio or television transmissions.[4] Again, however, the results were disappointing, as educational teleconferencing never gained more than a fringe following.

Still, there are substantial reasons for believing that, with respect to the Internet and computer technologies of the present, history will not repeat itself. In part, this is a result of the technologies themselves: What is available now is simply better than the educational technologies of the past. In addition, the new technologies are more relevant to law students. Radio and television were and are passive mediums that do not require or even allow for creative engagement—the "boob tube" turns us into "couch potatoes" as we "veg out" before it. In contrast, today's new technologies make possible a much higher level of active engagement, which the students of today and, surely even more, the students of tomorrow have or will come to expect as the norm. Further, the innovative technologies of the past, such as radio and television, were themselves rarely relevant to one's work. That is not true of the technology of today; the demands of modern law practice make it imperative that students master a range of new technologies and communications methods. The remainder of Section II elaborates upon all these points.

A. Technological Developments

What makes the Internet different from all the earlier technological innovations to influence education before it?

The principal difference is related to the scope and breadth of change to society effected by the Internet. Elizabeth Eisenstein, a renowned historian on the impact of the printing press on society, has explained that invention "[..]opened new horizons in education and in the communication of ideas. Its effects were sooner or later felt in every department of human activity."[5]

The Internet is the printing press of today. It holds the same transformational powers. Its impact is already evident for newspapers, magazines, television, travel agencies, movie and music delivery, shopping, and many other parts of our lives. Sooner or later, like the printing press, the Internet will affect every department of human activity as well.

Higher education is not immune to the disruptive reach of the Internet. Since the Internet started to be widely used in the 1990s, online learning in

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3.   *See* Moore & Kearsley, *supra* note 2, at 30-31.

4.   S*ee* Moore & Kearsley, *supra* note 2, 35-36.

5.   1 Elizabeth L. Eisenstein, The Printing Press as an Agent of Change 28 (1979) (quoting Myron P. Gilmore, The World of Humanism 186 (1952)).

general has continued to gain popularity.[6] In large part, the growth of interest in online learning is related to the fact that the power, speed and convenience of online learning technology far exceeds that of prior technologies used for distance education.[7]

This increase in computing power has already transformed the way that society interacts with computers. The technological advances made possible by Moore's Law propelled ubiquitous computing[8] on mobile devices such as iPads, iPhones and Androids, which allow access to the Internet at almost anytime from almost anywhere. Moreover, advances such as cloud storage, networked sensors, and voice commands have created an environment in which the vision of the physical desktop or laptop computer as the main location for computing is rapidly becoming obsolete; instead, connected computing power is flowing around us through vast wireless networks and computing is happening from handheld devices everywhere.[9] As a result, mobile data traffic is expected to increase 11-fold between 2013 and 2018.[10] These advances have increasingly cut the costs of computing, while simultaneously speeding up the rate at which an ever-increasing amount of data can be collected and shared. For example, the first decade of the Internet did not see much video data being created, stored or viewed online, because the Web could not support the large data files required by video. Now, the world watches 6 billion hours of YouTube videos every month,[11] and some predict that by 2018, video Internet traffic will constitute 79 percent of all Internet traffic.[12]

These changes in computer speeds, processing power and storage capacity have resulted in a refocus on technology as a tool to assist in education. Over the past few years, interest in the intersection of education and technology

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6.   Kennedy, *supra* note 2, at 187.

7.   Stemming from a 1965 prediction by the co-founder of Intel, Gordon Moore, Moore's law holds that the computing power of a semiconductor chip will continue to double every 18 months to two years.

8.   Peter Nowak, *We Live Inside the Machine Now: The Arrival of Ubiquitous Computing* (Mar. 15, 2013, 4:26 PM), http://www.theglobeandmail.com/technology/tech-news/we-live-inside-the-machine-now-the-arrival-of-ubiquitous-computing/article9834737/?page=all. Although ubiquitous computing has a flexible definition, the most common meaning is being "able to access the Internet or computer networks from virtually anywhere at any time, through digital devices" like mobile phones, wireless-ready laptops, iPads, etc. *See* Steve McCarty, *Ubiquitous Computing and Online Collaboration for Open Education*, in Proceedings of the 5th International Malaysian Educational Technology Convention 2011 194, *available at* http://waoe.org/steve/Malaysia_keynote.pdf.

9.   *See* Nowak, *supra* note 8.

10. *Cisco Visual Networking Index: Forecast and Methodology, 2013-2018* (June 10, 2014) http://www.cisco.com/c/en/us/solutions/collateral/service-provider/ip-ngn-ip-next-generation-network/white_paper_c11-481360.pdf [hereinafter *Cisco Forecast*].

11. S*tatistics*, YouTube, https://www.youtube.com/yt/press/statistics.html (last visited Feb. 12, 2015).

12. *Cisco Forecast*, *supra* note 10.

("edtech") has been growing exponentially across all aspects of education, from preschool to higher education to corporate training. Researchers and educators note that technological innovations are not only changing the ways that students learn, communicate, and interact, but they are also allowing educators to do things that were not possible without technology—such as to customize learning for individual students and to provide feedback and assessment contemporaneously with learning. As a result of these changes, many educators are rethinking the role of the teacher, such as how a teacher might best use face-to-face time with students, and are also reconsidering what to teach.

Together with this growing movement to consider how technology can assist with teaching and learning, in recent years there has been a surge of interest and investment in technological innovations in the edtech space. According to CB Insights, in the first quarter of 2014 alone, investment in this growing sector exceeded $559 million, representing nearly 45 percent of total funding ($1.25 billion) in the sector in 2013.[13] Innovations in the edtech space include MOOCs and online distance learning programs, products that blend online and in-class instruction (such as flipped classrooms), online assessments, adaptive learning, apps for learning, tutoring marketplaces, online educational (serious) games, customizable online casebooks, and more.

B. Skills Needed for Success as a 21st-Century Lawyer

Technological innovations are also influencing the practice of law.[14] Consequently, lawyers and law students will need to develop new skill sets in order to thrive professionally. Unfortunately, corporate clients are finding that many lawyers, including recent graduates, lack skills in the more sophisticated uses of technology for lawyering and law practice.[15]

One example of technological developments that significantly affect the practice of law is "big data" analytics.[16] Indeed, while keyword searching brought big changes to e-discovery, its limitations are beginning to become

13.   *Global Ed Tech Financing Hits Record in Q1 2014*, CB INSIGHTS (Apr. 5, 2014), https://www. cbinsights.com/blog/ed-tech-venture-capital-record/.

14.   *See generally*, John O. McGinnis & Russell G. Pearce, *The Great Disruption: How Machine Intelligence Will Transform the Role of Lawyers in the Delivery of Legal Services*, 82 FORD. L. REV. 3041, 3043 (2013) (describing "five areas in which machine intelligence will provide services or factors of production currently provided by lawyers: discovery, legal search, document generation, brief generation, and prediction of case outcomes.").

15.   D. Casey Flaherty, *Could You Pass this In-House Counsel's Tech Test? If the Answer is No, You May be Losing Business*, A.B.A.J. (Jul. 17, 2013, 1:30 PM), http://www.abajournal. com/legalrebels/article/could_you_pass_this_in-house_counsels_tech_test; Martha Neil, *Asked to Demonstrate Computer Skills, 0 out of 9 Law Firms Passed In-House Hiring Test*, A.B.A.J. (May 23, 2013, 12:40 PM), http://www.abajournal.com/mobile/article/ in-house_lawyer_tests_biglaw_firms_for_computer_skills_before_hiring_them.

16.   Nolan Goldberg & Micah Miller, *The Practice of Law in the Era of 'Big Data'; with Big Data Tools, the Focus Turns From Managing the Burden of Large Amounts of Information to Leveraging its Value*, NAT'L L.J. (Apr. 11, 2011).

well understood.[17] As a result, experts predict that e-discovery will be overtaken by the technology-assisted review referred to as predictive coding, which:

> utilizes computer pattern-matching algorithms to identify and index not just the keywords within documents, but their conceptual relationships as well. Conceptual indexing allows the index engine to recognize patterns in text and relate them to each other, so that it can draw an inference, for example, that the concept "cat" is related to the concept "feline." In this manner, documents can be compared not only for similarities in the exact word patterns used, but also in the meaning of the words.[18]

As I have noted in another article, in computer-guided predictive coding,

> a senior-level lawyer familiar with the case essentially teaches the computer how to think by carefully reviewing "a 'seed set' of documents for responsiveness, privilege, and any other tagging fields that the litigation may require. Once this 'seed set' of a few thousand documents has been coded," the computer begins its work of searching through the electronic files. Then, after "the engine has generated its predictions, random sampling of documents [by the attorney] is used to check the technology's accuracy." The process is then repeated and, after a few checks of random samples and appropriate iterations to the computer algorithm based on the attorney's checks, the computer can be left to code the rest of the document corpus. This new form of mass customization of document review is substantially "cheaper for clients, less time consuming for attorneys, and typically more accurate than traditional manual review and keyword searches." The promise of predictive coding is so great that judges not only have authorized its use in cases, but have done so even over the objection of one party and, in at least one case, even in the absence of a request by any party.[19]

Contrast this process to document reviews 20 years ago. When I was a junior associate I worked on a transaction that involved reviewing thousands of pages of documents. For about two months I spent six days a week, approximately 10 hours a day, reading the documents, taking handwritten notes of its content, and compiling it for the more senior lawyers on the deal to review. My firm used an hourly billing system, so all the time it took for me to review the documents was charged to our clients. Using today's technologies, the job that took me 500 billable hours over two months could be completed in days by computers, with the help of one legal assistant to collate and scan

17.   Jason R. Baron, *Law in the Age of Exabytes: Some Further Thoughts on 'Information Inflation' and Current Issues in E-Discovery Search*, 17 Rich. J.L. & Tech. 9, 11 (2011) (noting "a growing cottage industry of case law, commentaries and research, acknowledging the limitations of keyword searching," and citing numerous examples of each).

18.   Gary Weiner, *Technology-Assisted Review: What Is It and Why Should You Care?* 50 The Houston Lawyer. 24, 25 (2012). *See also* Baron, *supra* note 17, at ¶ 7 (describing predictive coding as a three-step process).

19.   Michele Pistone & John Hoeffner, *No Path But One: Law Schools in the Age of Disruptive Technology*, 59 Wayne L. Rev. 193, 249 (2013) (citations omitted).

the documents and one lawyer to provide feedback on the predictive coding, and to review and interpret the relevant documents.

C. Teaching 21st-Century Law School Students

In addition to changes in technology and the practice of law, law students themselves are also changing as a result of technology. Students in college now—and in law school soon—have been using the Internet since they were in preschool.[20] This generation and the generations coming after them are and will be digital natives, born into a world that has embraced technology. Having had access to the Internet since shortly after birth, computers and the more networked and connected lives that the Internet has facilitated affect most aspects of how they live their lives.[21] Digital natives get their news from blogs rather than newspapers; they meet each other online before they meet in person (if they ever meet in person); they share ideas and information readily through Facebook, Instagram, Twitter, etc.; and they acquire and listen to music online (Question: What's a record store? Answer: I don't know. What's a record?).

These cultural shifts will impact the coming generations as students. As more and more online educational technologies are used in K-12 and undergraduate institutions, law students will themselves demand changes in how law is taught.

In 2012, 7.1 million college students reported taking at least one course online.[22] And many more will have used online learning technologies during their K-12 education. Having experienced the benefits that online learning offers in terms of customization and convenience, it is likely that students will come to law school with an expectation that such technologies will also be used in law school. The next section provides an overview of how learning technologies have been incorporated into legal education and some ideas about areas for growth.

III. Learning Technologies Used in Legal Education

This section surveys how technology is being deployed in legal education. Section A discusses the various forms of online instruction that have gained prominence, as well as at least limited usage, in law schools in recent years. Section B provides an overview of instructional materials, such as online

20. David I.C. Thomson, Law School 2.0: Legal Education for the Digital Age 26-27 (2009) (noting that between 2000 and 2002, the largest group of first-time Internet users were between 2 and 5 years old).

21. John Palfrey & Urs Gasser, Born Digital: Understanding the First Generation of Digital Natives (2008).

22. University of Denver, Strategic Issues Panel on Higher, Education, Unsettling Times: Higher Education in an Era of Change, Strategic Questions for College and University Leaders 21 (2014), *available at* http://www.du.edu/issues/media/documents/higheredreport.pdf.

tutorials, apps, adaptive learning programs and online ebooks, which are beginning to be used by law schools and other legal educators. Finally, Section C looks at other technological initiatives, such as online professional development for law professors and online mentoring for law students, that are facilitated by online technology.

Before beginning to discuss specific technologies that are or may be used in legal education, allow me to make two general points. The first point is definitional: I am excluding from the discussion technologies that are already universally used by law school to administer or teach courses. Accordingly, there will be no discussion, for example, of email, computerized research or learning management systems ("LMS"), such as Blackboard or TWEN.

The second point is broader, and will undoubtedly garner a lot of attention in the coming years. Every technological innovation carries with it cultural implications.[23] The dominant model for legal education, for example, has always been a "sage on the stage," a lone professor armed only with a mastery of the course material and the power of speech. This model places a premium on a professor's preparation for class, but that exercise of self-discipline generally is entirely within the professor's hands, as is his or her performance in class. In some cases, technological innovation could change this by requiring substantial collaboration with technical experts on matters that law professors may know little about. Such dependence may fit uncomfortably with current notions of professorial autonomy and of the appropriate distribution of power within a law school. If a technological innovation is regarded as upsetting the cultural apple cart, it may be opposed for reasons having little to do with educational merit, narrowly defined.[24] Having raised this extremely significant topic, I will say no more about it here, except that it is something to think about as one encounters new technologies and considers their use for legal education.

A. Online Instruction

By far the most widely adopted technological innovation in law schools has been online instruction. New York Law School has provided online courses for over a decade, and, for almost as long Thomas Jefferson Law School has offered courses in international tax law and Vermont Law School has offered courses in environmental law. Within the last few years, many other law

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23.   Edgar H. Schein, Organizational Culture and Leadership 284 (4th ed. 2010).

24.   *See id.* at 77, 104, 301. Schein notes that consultants to organizations are often puzzled when seemingly well-founded recommendations are rejected. *Id.* at 77, 104. They should not be, explains Schein, because "every group, organization, and occupation develops norms around the distribution of influence, authority, and power," *Id.* at 104, and those norms are likely to be strongly defended. *Id.* at 77, 301. Innovations that challenge existing law school norms regarding the authority and power of the law professor as the person in charge of what happens in his or her classroom are exactly the type of innovations that may be rejected because "people simply [cannot] comprehend or accept the changes." *Id.* at 301. This general phenomenon, by the way, is true to every organization; there are always limits on which "recommendations are feasible, given an organization's assumptions about itself." *Id.* at 77.

schools have begun to use online learning technologies to teach courses. In some cases, entire degrees can be completed online.[25]

Starting in 2015, William Mitchell College of Law will offer the first ABA-accredited J.D. degree program that incorporates a substantial online learning component.[26] The program will incorporate both on-campus and online learning. According to William Mitchell, plans are for students to spend one week each semester on campus for intensive experiential learning activities, such as simulations and role plays.[27] Online coursework will teach foundational doctrine and skills.

In addition, several law schools across the United States are working toward creating course sharing for online J.D. courses. The Blue Paper report by the Working Group for Distance Learning in Legal Education, titled *Distance Learning in Legal Education: A Summary of Delivery Models, Regulatory Issues and Recommended Practices,* details some of the first steps in this regard.[28]

Distance learning can take many forms: synchronous, asynchronous, massive open online courses, and blended, which combines online and face-to-face instruction. Below is a summary of each form.

1. Synchronous Model of Distance Learning

The synchronous model of online education resembles traditional classroom instruction. Under a synchronous model, all the participants in the course, including all students and the teacher, participate in the course at the same time, albeit from different locations. Thus, the participants are together in time, but not together in space.

Synchronous distance learning usually requires special equipment and support on both ends of the communication—the school and the students. As to the school, the professor typically broadcasts his or her lecture live

25. For example, the graduate tax law programs at Georgetown Law, NYU, Villanova, and Boston University each have an online program. Indeed, the graduate tax program at Alabama is entirely online. In 2012, Washington University Law School in St. Louis started a fully online master's degree program in U.S. law. Steve Kolowich, *Legal Education and the Web*, Inside Higher Ed (May 8, 2012), http://www.insidehighered.com/news/2012/05/08/ washington-u-law-school-offer-fully-online-degree. Florida Coastal College of Law has offered an online degree since 2010, while the New York University Law School and the Loyola University of Chicago School of Law offer fully online programs that target specific areas of U.S. law. *Id.*

26. Lorna Collier, *New Partially Online Degree May Open Door to Similar Programs*, U.S. News & World Rep. (June 25, 2014, 8:30 AM), http://www.usnews.com/education/online-education/ articles/2014/06/25/new-partially-online-law-degree-may-open-door-to-similar-programs; *ABA Approves Variance Allowing William Mitchell to Offer 'Hybrid' On-Campus/Online J.D. Program*, Wm. Mitchell C. of L. (Dec. 17, 2013), http://web.wmitchell.edu/news/2013/12/william- mitchell-to-offer-first-aba-accredited-hybrid-on-campusonline-j-d-program/[hereinafter Wm. Mitchell].

27. *See* Wm. Mitchell, *supra* note 26.

28. http://www2.stetson.edu/atc/wp-content/uploads/2013/11/Distance_Learning_in_ Legal_Ed.pdf (last visited Feb. 12, 2015).

to students from a special studio or classroom, equipped with recording equipment, lighting and backdrops to capture the audio and video recordings. The students also need equipment from which to participate live in the class, including a computer with access to a high-speed Internet connection, a webcam and microphone, and appropriate software. If live participation is expected, the students also need a quiet location that will allow them to orally participate without disturbing anyone nearby. Best practices also suggest that there be live technical support available before and during the class in the event that there is a glitch in the technology on either end.

Synchronous classes can be delivered in ways that allow for either real-time interaction between the professor and the students or holding comments in a queue until the end of the presentation. While the available technology continues to improve, the best-quality two-way interactions are made possible through "high definition, and expensive two-way interactive conferencing systems [that] provide close video and audio feeds of students and faculty . . . [which] can show even nuanced expressions." On the other end of the spectrum are low-cost options such as Wimba Classroom,[29] which enables real-time document sharing, whiteboarding, and instant polling of students, and free technologies that allow two-way interactions, such as Google Hangout, GoToMeeting, and Skype.

Synchronous distance learning technologies are currently being used by Washington University in St. Louis for its online L.L.M. program in U.S. law.[30] That program uses streaming videos in which all students participate simultaneously in online class meetings. Students can "meet" online for class discussions, study groups and office hours with a professor.[31] In addition to the synchronous class meetings, the program also includes teacher-designed coursework and highly produced video content, which students can access on their own time and at their own pace, to supplement what they learn in class.[32] Outside of regularly scheduled classes, students can chat, join, and study with classmates virtually 24 hours a day through a LMS or social media platform.[33]

2. Asynchronous Models of Distance Learning

Asynchronous distance learning involves the separation of participants in time and space. Professors record their presentations and students watch them from anywhere in the world; indeed, the asynchronous model encourages a geographically dispersed student body, for it does not place students in

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29. *WimbaClassroom for Higher Education*, Wimba, http://www.wimba.com/solutions/higher-education/wimba_classroom_for_higher_education (last visited Feb. 12, 2015).

30. Lewin, *supra* note 1.

31. Wash. U.L., *Law School Goes Online with L.L.M. in U.S. Law*, http://law.wustl.edu/news/pages.aspx?id=9182 (last visited Feb. 12, 2015).

32. *Id.*

33. *Id.*

faraway time zones at a disadvantage. Asynchronous online education also allows students to review the materials as often as they need to for mastery.[34]

While synchronous online learning can closely mirror a traditional classroom experience, asynchronous classes offer opportunities to use different teaching techniques to achieve different learning outcomes. Teachers may utilize experts in instructional design to effectively employ these different teaching techniques. An "unbundling" of the teaching workload may result. For example, professors may focus on developing the pre-recorded teaching modules and grading. Instructional designers, on the other hand, may focus on developing the attended aspects of the course, such as the learning outcomes, written materials, assignments and grading mechanism. Asynchronous courses also typically include methods for students to interact among themselves and with the professors, through active discussion boards, wikis, and other online technologies.

3. Massive Open Online Courses (MOOCs)

Massive open online courses (commonly referred to as MOOCs) provide examples of asynchronous distance learning in which large numbers of students simultaneously take an online course. MOOCs, which first began to be offered in 2012, are being adopted at many undergraduate institutions.

In 2013-14 some law professors began to experiment with MOOCs.[35] Georgetown Professor Philip Schrag predicts, in his recent article in the Villanova Law Review, that online law school education will continue to grow in influence and that within 10 years it will overtake many traditional place-based law schools.[36] Indeed, he laments that only a handful of law schools may survive.

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34. In the law school realm, for example, Vermont Law School currently offers courses in environmental law using asynchronous technologies, and many externship programs offer asynchronous learning for students in remote externship placements. In addition, the Center for Law Practice Technology at Florida Coastal Law is in the process of developing a series of one-credit courses on law practice technology, all of which will be offered using asynchronous distance learning technologies. *See Coastal Law to Open Center for Law Practice Technology*, Fla. Coastal Sch. Law, http://www.fcsl.edu/story/2013/08/08/coastal-law-open-center-law-practice-technology (last visited Feb. 12, 2015). Other law schools are also developing similar distance learning courses using asynchronous technologies.

35. Karen Sloan, *Massive, Free Online Classes Catch on With Law Schools*, Nat'l L.J. (Sept. 10, 2013). Examples include Case Western Reserve Professor Michael Scharf's course on international criminal law; Harvard University Professor William Fisher's course on copyright law; Yale University Professor Akhil Amar's course on constitutional law; a course by Northwestern University professors Esther Barron and Steve Reed on law and entrepreneurship; a course on environmental law by University of North Carolina Professor Don Hornstein; and a course on acquisition agreements by Drexel Law School Professor Karl Okamoto. As has been the case in other MOOCs, Professor Okamoto's course includes supplemental assignments mediated through technology, combining "online lectures with four interactive simulations allowing students to submit videos of themselves counseling hypothetical business clients." *Id.*

36. Philip G. Schrag, *MOOCs and Legal Education: Valuable Innovation or Looming Disaster?* 59 Vill. L.

Some may question this prediction, pointing to stories of how MOOCs often experience higher rates of failure and lower rates of completion than traditional face-to-face courses.[37] But these perceived downsides are not, by themselves, very significant. MOOCs are often offered free or for very little cost; therefore students are not as committed to them as they are to courses for which they pay tuition and take for credit. Moreover, MOOCs are often taken for reasons other than to gain academic credit, such as to learn a specific topic covered in a larger course, particularly by "non-students"—that is, adult learners who, for reasons of professional need or personal edification, have a keen interest in some aspects of a course but have no interest in receiving a good grade or even any academic credit.[38] For example, an employment lawyer handling disparate impact cases may need a background in statistics but may not have the time or the need to take an entire course on it.

While it is unlikely that MOOCs will evolve into a substitute for face-to-face teaching, the data being collected on MOOCs show that they can in some cases be more effective than traditional classroom lecturing. For example, a recent study by researchers from MIT, Harvard and Tsinghua universities found that students learned more from an "introductory mechanics course offered on a massive open online learning platform . . . than [they did] in the traditional lecture-based course."[39] Further, as technology continues to improve and experiences using online learning teach educators how online learning can best be used by adult learners, more and more courses are expected to blend online learning technologies with face-to-face instruction.

Rev. 83 (2014).

37. D. Yang et al., *Turn on, Tune in, Drop out: Anticipating student dropouts in Massive Open Online Courses*, NIPS Data-Driven Education Workshop (2013), http://lytics.stanford.edu/datadriveneducation/papers/yangetal.pdf *but see Engagement and Distance at the HILT*, Harvard Magazine (Sept. 17, 2014), *available at* http://harvardmagazine.com/2014/09/hilt-conference-addresses-engagement-and-distance.

38. Indeed, a study by Harvard and MIT of students in the first year of its MOOC found that "[w]hile the completion rate is low . . . students are focused more on learning certain elements of a class and less on completing what has traditionally been considered a module or unit of learning." MIT Task Force, Institute-wide Task Force on the Future of MIT Education, Final Report 13 (July 28, 2014), http://web.mit.edu/futurereport/TaskForceFinal_WithoutAppendices.pdf. As a result, MIT is re-evaluating its MOOCs and has shifted its focus from creating entire online courses. Instead, MIT is encouraging its faculty to develop shorter modules, "which can be studied in sequence or separately." *Id*.

39. Lauren Landry, *Online Learning is Just as Effective as Traditional Education*, According to a New MIT Study, Bostinno (Sept. 24, 2014, 3:59 PM), http://bostinno.streetwise.co/2014/09/24/mit-study-how-do-online-courses-compare-to-traditional-learning/. In another study, researchers studying the efficacy of lectures for science, engineering and math education found that "failure rates under traditional lecturing increase by 55% over the rates observed in active learning." Scott Freeman, et al., *Active Learning Increases Student Performance in Science, Engineering and Mathematics*, 111 Proc. Nat'l Acad. Sci. 8410, 8410 (2014), *available at* http://www.pnas.org/content/111/23/8410.full.pdf+html.

4. Blended Learning: Flipping the Law School Classroom

Flipped learning involves blending some elements of online instruction with face-to-face instruction.[40] In typical flipped-learning settings, instruction in foundational or background information is delivered online through short videos that students review outside of class. By migrating some of what might otherwise be delivered through lecture to the Web, flipped learning frees up face-to-face class time between professors and their students for active learning, including Socratic dialogue, drafting exercises, problem solving, simulations, small group discussions and role plays.[41] These in-class activities can be designed to reinforce what students learn through readings and video.

Several models are available to blend online and in-class instruction, and many educators are currently experimenting to determine their efficacy in the law school environment.[42] A Department of Education meta-analysis of online learning in other areas of higher education found that a method of instruction that combines both online and face-to-face instruction was more effective than either online or face-to-face alone.[43]

40. *See generally* Clayton Christensen, et al., Clayton Christensen Institute for Disruptive Innovation, *Is K-12 Blended Learning Disruptive? An Introduction to the Theory of Hybrids* (May 2013), http://www.christenseninstitute.org/publications/hybrids/.

41. *See* MicheleR. Pistone,*Flipping the Law School Classroom*, *available at* https://vimeo.com/73490873; Michele R. Pistone, *How Can Flipped Learning be Used in Legal Education?, available at* http://legaledweb.com/online-learning/. For a discussion of flipped learning and other ways to blend online and in-class instruction in K-12 education, *see generally*, Christensen, *supra* note 40; Jonathan Bergmann & Aaron Sams*, Flip Your Classroom: Reach Every Student in Every Class Every Day* (2012). Also visit the Flipped Learning Network website to see how K-12 teachers are flipping their classrooms, http://flippedlearning.org/site/default.aspx?PageID=1 (last visited Feb. 13, 2015). When used in law schools, flipped learning is not characterized as "distance education" under either the current or proposed ABA accreditation standards if "two-thirds or more of the course instruction consists of regular classroom instruction." 2014-2015 ABA Standards and Rules of Procedure for Approval of Law Schools Standard 306 interp. 306-3. "That means…videos can be assigned for up to one-third of the time allocated for regular classroom instruction (including first year courses) without being characterized as distance education. Using [online] videos in this way (as a substitute for up to 1/3 of classroom teaching) would also be consistent with New York State Rule of Court 520.3, (subsection (c)(6) prohibits credits for courses offered principally by asynchronous means, where the professor and students are separated by time and place)." *LegalED and Online Learning*, LegalED, http://legaledweb.com/online-learning/ (last visited Feb. 13, 2015).

42. Some law professors who are experimenting with blended learning presented at the Igniting Law Teaching conference on April 4, 2013, at American University Washington College of Law. Videos of their talks are available on the LegalED website, http://legaledweb.com/teaching-pedagogy-1/ (last visited Feb. 13, 2015). *See also* Alex Berrio Matamoros, *Answering the Call: Flipping the Classroom to Prepare Practice-Ready Lawyers*, 43 Cap. U. L. Rev. (forthcoming 2015), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2357594.

43. Barbara Means et al., U.S. Dep't Educ., Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies (Sept. 2010), *available at* http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf.

One possible advantage of blended learning is that law professors can make use of educational videos prepared by other law professors and lawyers, in the same way that they now use casebooks prepared by others. A number of sources for such videos are available, including, for example, the LegalED project.[44] The LegalED website, which I developed with a group of law professors, hosts a collection of educational videos, each on a discrete topic, to be used in legal education.[45] The video content is curated by experts, much as editors review and revise the content of books. The University of Utah's thefirstyear.org is a similar online repository for video content on subjects typically taught in the first year of law school.[46] It also plans to add assessment tools in the near term. In light of these and other developments, the availability of legal educational videos is very likely to increase in the future.

B. Instructional Materials

Legal publishers are beginning to migrate online the material usually found in printed and bound casebooks. In addition to traditional casebook material, other online instructional materials also have been developed.

1. Online Tutorials

The Center for Computer-Assisted Legal Instruction ("CALI"), a nonprofit consortium of law schools, has been a pioneer in digital legal education. Its website hosts over 950 online interactive tutorials in more than 35 subject areas, a collection that it has been growing for years.[47] Faculty can create links to lessons within their LMS and view student results at the CALI website.

More recently, Carolina Press introduced the Core Grammar for Lawyers program, which uses online technologies to assess and then teach basic grammar to law students so that students can maximize their learning in legal writing courses. Students use the program to assess their grammar proficiency early in law school. Those who do not exhibit competency in certain areas of grammar then take individualized, interactive, online tutorials for any areas in which they need remedial help. By migrating the non-law-related writing activities online, this program allows legal writing faculty to use class time to focus on skills specifically relevant to *legal* writing while still providing students help in more generally applicable writing skills.

2. Online Collaboration

In addition to online tutorials, some publishers have created programs that facilitate online collaboration among students. One example is LexisNexis

44.   LegalED, http://legaledweb.com (last visited Feb. 13, 2015).

45.   *Id.*

46.   The First Year, http://thefirstyear.org (last visited Feb. 13, 2015).

47.   S*ee About CALI*, CALI, http://www.cali.org/content/about-cali (last visited Feb. 13, 2015). [hereinafter CALI].

Social Studies, a Facebook app that helps students participate in online study groups, as well as share and edit documents.

3. Adaptive Learning Material

Some publishers are experimenting with adaptive learning in relation to legal education. By using adaptive learning technologies, computers are able to track an individual student's answers to questions and work on specific tasks that are completed online to determine how the individual student learns and what he or she understands or still needs to master. Then, using specially designed algorithms, the computer adapts the presentation of educational materials to meet the particular learning needs of each individual student. Kaplan is a leader in adaptive learning, and uses it in its LSAT preparation courses. BarBri AMP is also using adaptive learning software to provide customized feedback to students. Lexis is also beginning to experiment with adaptive learning. Its new Interactive Citation Workstation tests a student's proficiency with the Bluebook form of legal citation through online assessments.

4. Apps for Learning

CALI offers Access to Justice Author ("A2J Author"), a computer program designed to assist lawyers in creating self-help legal resources for unrepresented individuals.[48] Lawyers, including clinic students and legal aid organizations, use the computer template to create a step-by-step online questionnaire that collects relevant information and then uses the information to complete legal forms. Once the questionnaires are developed, they are then made available online for unrepresented individuals to use, pro se, in filling out relevant legal forms.

CALI is promoting the expanded use of A2J Author in law schools, especially clinical courses.[49] When students in clinical courses are tasked with using A2J Author to develop questionnaires, they are applying their knowledge of the relevant law and of the client population in a real-life situation. Essentially, the initiative focuses on student-created apps that provide "useful legal work" to both law students and the public.[50] The program aims to teach law students core skills while providing lower-income individuals with broader access to legal information.[51]

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48. *See* CALI: A2J Author, http://www.cali.org/content/a2j-author (last visited Sept. 29, 2013).

49. *See Apps for Justice Wins Future Ed Contest*, IIT Chicago-Kent College of Law (Apr. 20, 2011), http://www.kentlaw.iit.edu/news/2011/apps-for-justice-wins-future-ed-contest.

50. S*ee* Ron Staudt*, Thought Leaders Series: Apps 4 Justice*, C. L. Prac. mgmt. (Jan. 23, 2012), http://collegeoflpm.org/thought-leaders-series-apps-4-justice/.

51. *See id.*

5. Online Casebooks and Textbooks

Professor Jonathan Zittrain and his colleagues at Harvard University's Berkman Center for Internet & Society, in collaboration with the Harvard Law Library, recently introduced the H2O project, a Web-based platform that allows teachers to customize their own written teaching materials for their individual courses.[52] Using the platform, professors can aggregate materials from a broad collection of teaching materials for their individual classes. H2O is based on an open-source, crowd-sourcing model, in which assigned reading materials are not limited by what is printed in a particular casebook. By collecting the materials online, they can be remixed in any combination to meet the needs and preferences of individual professors.

The H2O project has the potential to reinvent the legal casebook. In addition to allowing for an endless combination of teaching materials, the technology also permits students to read collaboratively with their classmates and others using the site. Through the online platform, students can share questions, edits, and annotations to their readings, further improving their learning outcomes.

Another similar initiative is spearheaded by CALI. CALI's eLangdell Press pays law professors to write casebooks that CALI then distributes as ebooks in multiple formats, free, under a Creative Commons license. The eLangdell project publishes ebooks that can be read online, printed, or downloaded to ereader devices, such as Kindles, iPads or smartphones. Faculty members can also customize the version of the ebook their students use by simply downloading the Microsoft version of the ebook and making relevant edits to that version, which is then redistributed to the faculty member's students. Moreover, law students can use the eLangdell ebook as their note-taking template.

An increasing number of law professors are using self-publishing services to deliver critical core content to students.[53] Indeed, one such initiative comes from professors Lydia Pallas Loren and Joseph Scott Miller. Under their leadership, Semaphore Press publishes law school casebooks, and students can choose the price that they would like to pay to download the book.[54]

6. Serious Games and Learning

Online games are also being used with much success in education.[55] Games succeed by adjusting to the skill level of the gamer, thus enticing the learner

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52.   http://cyber.law.harvard.edu/research/h2o (last visited Feb. 13, 2015).

53.   Eric Goldman, *Self-Publishing a Legal Casebook: An Ebook Success Story*, Forbes (Sept. 18, 2013, 11:39 AM), http://www.forbes.com/sites/ericgoldman/2013/09/18/self-publishing-a-legal-casebook-an-ebook-success-story/.

54.   Semaphore Press, http://semaphorepress.com/ (last visited Feb. 13, 2015).

55.   Former Supreme Court Justice Sandra Day O'Connor's project using gaming to teach civics to middle school and high school-aged students is a good example, *see* iCivics, http://www.icivics.org/ (last visited Feb. 13, 2015).

to try, and try again, at increasingly advanced levels.[56] Well-developed games provide constant feedback and a sense of satisfaction and accomplishment at the advancement and improvement in the player's skill level.

Although this same potential to engage and enhance learning is also possible in legal education, the potential remains largely untapped. But pioneering models do exist; for example, "Estate Quest" teaches basic estate-planning principles.[57] Players see the consequences on family and loved ones that arise from failing to properly plan an estate, and then take a "time machine" to correct the consequences.[58] Additionally, "Foreclosure Game" allows participants to take the perspective of a lender attempting for foreclose on a homeowner.[59] Through interactive levels, participants learn generally about the foreclose process, including how to avoid scams and where to find valuable resources.[60] Other law school learning apps, such as "Contracts are a Beach!," "Evidence Challenge," and "Law Dojo" have also been developed for law students.

This is an area that is ripe for experimentation and development. Law is full of challenges and conflicts that could provide the raw materials for great games. Indeed, it is entirely likely that games will play a much larger role in legal education in the years ahead.

C. Other Technological Initiatives

1. Online Instruction for Professors

Law professors have also begun to use the internet to share material intended to enhance the professional development of law teachers. While professors have used email-based list serves to share materials for years, technological innovations are making new forms of sharing possible. A confluence of several factors–including steep reductions in the cost of storage capacity, along with the development of products that facilitate videotaping and production of explanatory videos–have made it possible to collect teaching materials in new ways. For example, the University of Denver spearheads a consortium of law schools from around the country, Educating Tomorrow's Lawyers ("ETL").[61]

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56.   James Paul Gee, WHAT VIDEO GAMES HAVE TO TEACH US ABOUT LEARNING AND LITERACY 65 (2003).

57.   *See* Stephanie Kimbro, *Virtual Law Practice: Connecting a Mobile Game to Real World Legal Services*, STEPH KIMBRO (Jul. 2, 2013), http://virtuallawpractice.org/2013/07/connecting-a-mobile-game-to-real-world-legal-services/.

58.   S*ee* Stephanie Kimbro, *Virtual Law Practice: Games*, STEPH KIMBRO (Aug. 18, 2013), http://virtuallawpractice.org/games/. Upon passage of each level, participants earn rewards in the form of discounted legal services, provided by branded networks that sponsor each game level.

59.   *Id.*

60.   *Id.*

61.   http://educatingtomorrowslawyers.du.edu/about-etl/about-our-consortium/ (last visited

ETL has collected materials about teaching for law professors who are interested in professional development. Its online video modules on teaching are designed to share teaching innovations with the larger legal education community in an effort to reach law professors who are looking to include more training in practical lawyering skills and professional values into each law school course.

LegalED is also creating an online collection of professional development videos. The collection is based on talks given live at conferences that are videotaped and archived for online viewing.[62] The collection also includes short videos on teaching pedagogy along with teaching materials prepared by law professors and made available for adoption by other professors.

2. Online Mentoring Programs for Students

Some law professors have begun to use then Internet to expose students to legal expertise residing outside of the legal academy. For example, LawWithoutWalls is a part-virtual legal education forum founded by Professor Michele DeStefano of the University of Miami School of Law.[63] This program matches law students with lawyer/entrepreneur mentors to develop business plans to address major issues facing legal education and practice.[64] The goal is for the team of students and mentors to develop law-related projects while honing problem solving, teaming, technology, cultural competency, project management, and entrepreneurial and social networking skills, all while working on projects with students from law schools around the world.[65]

In order to advance each project, teams use various social networking tools including Skype, Google Drive and Google Plus.[66] The digital medium offers students and mentors the opportunity to meet and collaborate virtually, in real time.[67] Classes focus on trends, needs and new innovations in legal education and practice, as well as the practical skills required of today's attorneys.[68]

LawMeets is a Web-based program created by Professor Karl Okamoto of the Drexel University's School of Law. It provides "practical learning

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Feb. 13, 2015).

62. LegalED's first conference was held in April 2014 at American University Washington College of Law. Videos of the talks given at the conference, on topics including flipping the law school classroom, using active learning in legal education, learning theory, and legal education, are available online on the LegalED website. *See* LegalED, http://legaledweb. com (last visited Feb. 13, 2015).

63. Law Without Walls: About, http://www.lawwithoutwalls.org/about/ (last visited Feb. 13, 2015).

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

exercises to hundreds or thousands of students with peer review and interaction with experts."[69] Students are given fact patterns and roles in a business transaction.[70] Over a period of time, students hold conferences, draft and exchange documents, and eventually negotiate a deal.[71] Throughout the process, practitioners and judges mentor the students, providing feedback on each student's performance. The program ends with the students learning through watching "the pros" address the same problem.[72]

IV. Conclusion

The technological and cultural changes discussed in this article provide one reason those of us in the legal academy feel so uncertain about the future. Our current, long-standing educational system, designed for a former era, now seems ripe for change, but the particulars of its replacement remain vague. One thing we do know, however, is that technology will play an increasing role in the future of legal education. Law professors can try to slow such change, but change is coming nonetheless, and there is no doubt in my mind that actively involved law professors are best-positioned to decide how the power of online technology can enhance legal education without endangering its strengths.[73]

As I've noted elsewhere, however, while "[m]aintaining the best parts of the past while managing change is a worthy goal, . . . the goal is likely to prove elusive unless a critical mass of legal educators immerse themselves in the technologies and usages noted above. In the end, the ultimate best practice regarding the use of technology for legal education is to welcome new approaches while being rigorous in measuring learning outcomes under these new approaches."[74] Ideally, over the next decade a growing number of administrators will encourage and reward innovation in legal education, and a growing number of law professors will engage deeply with technologies that enable innovation. In this way, a culture of educational experimentation might take hold, whereby innovations are valued not only for their immediate pedagogical value, but also for how they might shape and influence paths of future experimentation. Indeed, today's greatly accelerated pace of

69. Terry Carter, *You Know About Moot Court–But Karl Okamoto Wants Students to Practice Moot Deals*, A.B.A.J. (Sept. 4, 2013,2:05 PM)*,* http://www.abajournal.com/legalrebels/article/2013_legal_rebel_profile_karl_okamoto/.

70. *Id.*

71. *Id.*

72. *Id.*

73. *See* Clayton Christensen & Henry Eyring, *How to Save the Traditional University, From the Inside Out*, Chron. of Higher Educ. (July 24, 2011), *available at* http://chronicle.com/article/How-to-Save-the-Traditional/128373/ (indicating that it would be best if the inevitable disruption of higher education were led by the higher education community).

74. Michele Pistone & Warren Binford, *Effective Teaching With Technology to Enhance Legal Education, in* Building on Best Practices: Reflections on Transforming Legal Education in a Changing World (Deborah Maranville et al. eds.) (forthcoming 2015).

technological change places a premium on this latter consideration, for every experimental "success" might be only one technological advance away from obsolescence, and every experimental "failure" only one technological advance away from success.