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**THE RISKS OF TECHNOLOGY IN THE LAW
CLASSROOM: WHY THE NEXT GREAT
DEVELOPMENT IN LEGAL EDUCATION MIGHT BE
GOING LOW-TECH**

NIKOS HARRIS[†]

INTRODUCTION

What comes to mind when one conjures up a picture of a modern law school classroom? The first image is likely that of uninterrupted rows of laptops behind which students are typing more information than they could record by hand and seamlessly using the Web to access the cases and statutes being discussed. An accompanying image is that of a professor on the other side of the silver wall, with his or her own laptop projecting notes onto large screens viewable from every seat in the wired amphitheater. The professor has also made lecture summaries electronically available to students to allow them to focus their attention on listening to the lecture, discussing policy, and solving hypothetical problems.

And what images come to mind when we enter a dated law school classroom? Students taking notes with pen and paper, struggling to write down material from a lecture delivered without accompanying text slides or online course notes. We might attribute these circumstances to a professor

[†] Instructor and Director of Experiential Learning at the Peter A. Allard School of Law at the University of British Columbia. The author would like to thank Allard Law students Gabe Boothroyd and Alexei Paish for their excellent research and editing assistance. The author would like to also thank the many colleagues who provided very helpful ideas and support for this article, including Isabel Grant, Jocelyn Stacey, Lachlan Caunt, Ben Berger, Craig Jones, Carol Liao, and Darlene Johnston. Finally, the author would like to thank the anonymous reviewers for their insightful feedback and ideas.

who has stubbornly refused to keep up with the times and has forced his or her students to be a part of this antiquated learning experience.¹

However, there is also a developing body of literature which speaks to the significant benefits of a dated classroom, creating a strong case that it fosters an optimal learning environment. This research, particularly that which has emerged over the past five years, not only provides evidence of significant pedagogical benefits flowing from traditional lecturing and note-taking techniques, but also sets out that these advantages are critically important to the content and objectives of a legal education.

The focus of this article is on the risks posed by the use of laptops and certain types of instructor-provided notes in the law classroom. It does not seek to speak to the risks of using technology generally in legal education, and further does not attempt to settle the debate about whether these two technologies are on the whole more beneficial or detrimental to learning. Indeed, there is literature supporting the benefits of the technology used in the prototypical “modern” classroom, and many law professors teach very successfully with such tools.² These studies provide evidence that students can effectively take notes on laptops and that use of course slides can assist in comprehension. Electronic notes can be searched for specific content and are easily integrated into related notes from different lectures. Hand writers usually cannot take as fulsome notes as a typist, and handwritten notes can be lost and are not easily backed up. A full record of the content of a lecture captured by a typist, or available through a professor’s course notes, may also assist students in later learning material which they were unable to fully

¹ See James B Levy, “Teaching the Digital Caveman: Rethinking the Use of Classroom Technology in Law School” (2016) 19:1 *Chapman L Rev* 241 (noting that “[e]ducators see the influence of new technologies on popular culture and worry that if they do not quickly embrace them as well, they will seem out of date, and their students will get left behind” at 243). In his insightful article, Professor Levy not only challenges the notion that broad use of technology is useful in the law classroom, but also sets out the historical pattern of new technologies being added to classrooms without established evidence that they improve learning outcomes.

² See e.g. Kristen E Murray, “Let Them Use Laptops: Debunking the Assumptions Underlying the Debate over Laptops in the Classroom” (2011) 36:1 *Okla City UL Rev* 185; Deborah J Merritt, “Legal Education in the Age of Cognitive Science and Advanced Classroom Technology” (2008) 14:1 *BUJ Sci & Tech L* 39 at 50–54.

process during the lecture.³ It can also be argued that developing digital skills, including how to effectively use laptops, is essential for future legal practice.⁴

The modest contribution of this article is to review recent social-science literature documenting the risks posed by laptops and text-heavy course slides to the core aspects of a legal education. These articles and studies collectively provide a reasonable basis for making an informed choice to limit the use of these technologies in law classrooms. This article then discusses some practical approaches for attempting to bring about a low-tech revolution in the law classroom.

THE OBJECTIVES OF LEGAL EDUCATION

The goals and methods of legal education have been, and continue to be, the subject of much analysis and debate. Studies and commentators have called for law schools to cultivate numerous competencies, including practical legal skills, various areas of substantive legal knowledge, certain character traits, and the development of a professional identity.⁵ However, it is broadly recognized that an essential component of a legal education is teaching students to engage in critical analysis and develop creative problem-solving skills. These skills require students to consider issues from

³ See Dung C Bui, Joel Myerson & Sandra Hale, "Note-Taking with Computers: Exploring Alternative Strategies for Improved Recall" (2013) 105:2 J Educational Psychology 299; Murray, *supra* note 2; Merritt, *supra* note 2 at 54; Simon Canick, "Infusing Technology Skills into the Law School Curriculum" (2014) 42:3 Capital UL Rev 663 at 682.

⁴ See e.g. Canick, *supra* note 3 at 682.

⁵ See e.g. William M Sullivan et al, *Educating Lawyers: Preparation for the Profession of Law* (San Francisco: Wiley, 2007); Roy Stuckey, *Best Practices for Legal Education: A Vision and a Road Map* (USA: Clinical Legal Education Association, 2007); Federation of Law Societies of Canada, "Task Force on the Canadian Common Law Degree: Final Report" (October 2009), online: <flsc.ca/wp-content/uploads/2014/10/admission8.pdf>; Institute for the Advancement of the American Legal System, "Foundations for Practice: The Whole Lawyer and the Character Quotient" (July 2016), online: <iaals.du.edu/sites/default/files/reports/foundations_for_practice_whole_lawyer_character_quotient.pdf>.

different philosophical and academic perspectives and to have an adeptness with policy analysis.⁶ Anthony Kronman describes how legal education seeks to develop the “moral imagination”;⁷ a process that results in students possessing “a broad familiarity with diverse and irreconcilable human goods coupled with an indefatigable willingness to enter the fray, hear the arguments, render judgment, and articulate the reasons that support it, even when all hope of moral certainty is gone.”⁸ In the well-known introduction to *The Canon of American Legal Thought*, David Kennedy and William Fisher describe how thinking like a lawyer requires being “comfortable with multiple, overlapping modes of analysis” and requires a “voracious interdisciplinary appetite of legal analysis, importing all manner of arguments from neighbouring disciplines, often deploying them in unfamiliar ways.”⁹

As Professor Harry Arthurs persuasively argues, the importance of law schools fostering critical analysis and engaging with the varied areas of knowledge that students will need to become “artisans of legal change”¹⁰ is increasing, rather than decreasing, with the rapid changes occurring in both the legal profession and society as a whole. Professor Arthurs concludes that:

The future of law schools, then, is to embrace their vocation as knowledge communities, to embed their JD and other educational programs within their larger mandate of aggregating, critiquing, and disseminating

⁶ See David Kennedy & William W Fisher III, “Introduction” in David Kennedy & William W Fisher III, eds, *The Canon of American Legal Thought* (Princeton: Princeton University Press, 2006) 1 at 11; David Sandomierski, “Training Lawyers, Cultivating Citizens, and Re-Enchanting the Legal Professional” (2014) 51:4 *Alta L Rev* 739 at 757–759.

⁷ Anthony Kronman, “The Socratic Method and the Development of the Moral Imagination” (2000) 31:4 *U Tol L Rev* 647 at 651.

⁸ *Ibid* at 652.

⁹ Kennedy & Fisher, *supra* note 6 at 8.

¹⁰ Harry W Arthurs, “The Future of Legal Education: Three Visions and a Prediction” (2014) 51:4 *Alta L Rev* 705 at 711.

knowledge, and to pay attention to the challenge of rapid and profound changes in society and in law.¹¹

Law professors have the ambitious task of helping students to develop the ability to think critically and to infuse policy into their analyses within the relatively short time period spent in law school classrooms. It is this very ability to engage in deeper analytical reasoning which is put most at risk by the combination of student use of laptops and professor use of extensive electronic notes.

THE LAPTOP

One side of a low-tech revolution for law classrooms is replacing the use of laptops with handwritten notes. There is mounting evidence indicating that this change can increase student comprehension, support analytical reasoning, facilitate class discussion, and create a much more connected learning environment by avoiding the many distractions that stem from the combination of widespread laptop use and the availability of Wi-Fi in law school classrooms.

RAMPANT NONCOURSE USE

Internet and smartphone addiction in our society is not only being increasingly documented,¹² but is also on display in almost every facet of our

¹¹ *Ibid* at 713.

¹² See e.g. Hilarie Cash et al, "Internet Addiction: A Brief Summary of Research and Practice" (2012) 8:4 Current Psychiatry Reviews 292; Larry D Rosen, "This Is the Real Reason You Can't Stop Checking Your Phone", *Psychology Today* (14 July 2015), online: <www.psychologytoday.com/blog/rewired-the-psychology-technology/201507/is-the-real-reason-you-cant-stop-checking-your-phone>; Larry D Rosen, "The Anxiety Epidemic", *Psychology Today* (18 June 2017), online: <www.psychologytoday.com/blog/rewired-the-psychology-technology/201706/the-anxiety-epidemic>. As author Andrew Sullivan points out in his powerful account of his struggle with online addiction, "Every minute I was engrossed in a virtual interaction I was not involved in a human encounter. Every second absorbed in some trivia was a second less for any form of reflection, or calm, or spirituality. 'Multitasking' was a mirage. This was a zero-sum question. I either lived as a voice online or I lived as a human being in the world that humans had lived in since the beginning of time": Andrew Sullivan, "I Used to Be a

day-to-day lives: a person crossing the street with a screen glued to his or her face; a cafe full of people staring into screens; a dinner guest busily tapping away at the table; an evening wasted by hours of meaningless Web surfing. A recent study found that people “tapped, swiped and clicked” their phones an average of 2,617 times a day, with the top 10% of the group doing so over 5000 times.¹³ Teenagers are now spending an average of nine hours a day using phones and computers for various nonschool purposes.¹⁴ Is there any reason to think that students in law school classrooms are immune to this reality? Does the significant expense of a legal education and the prospect of entering one of the most important and complex professions in our society result in students giving social media or online shopping a pass for an hour or two during a law school lecture? Unfortunately, the evidence suggests no. The anecdotal evidence gathered by individual professors¹⁵ is now being documented with alarming results.

The first of many risks of laptop use in the law classroom is that they are routinely, and sometimes almost entirely, used for noncourse activities. Laptops not only provide instant access to the Internet, but also bombard the user with instant notifications of new messages or comments on social media to further tempt a resisting note taker.¹⁶ While most professors assume that some portion of their students are engaged in nonclass activities, two studies provide clear evidence of the extent of the problem.

Human Being”, *NYMag* (18 September 2016), online: <nymag.com/selectall/2016/09/andrew-sullivan-my-distraction-sickness-and-yours.html>.

¹³ Michael Winnick, “Putting a Finger on Our Phone Obsession” (16 June 2016), *dscout* (blog), online: <blog.dscout.com/mobile-touches>.

¹⁴ See Common Sense Media, “Common Sense Census: Media Use by Tweens and Teens” (3 November 2015), online: <www.commonsensemedia.org/the-common-sense-census-media-use-by-tweens-and-teens-infographic>.

¹⁵ My own experiences include seeing a wave of internet shopping sites when I have been sitting in the back of a lecture hall, having students chuckle at their screens while I am describing something such as a horrific crime or complex statutory provision, and reports from visiting high school students that, while they were attentively listening to the lecture, many of my actual students were involved in online activities such as buying clothing or used appliances.

¹⁶ See Levy, *supra* note 1 at 282.

Critically, neither of these studies relied on students to self-report noncourse use of laptops.¹⁷ Instead, both collected direct evidence of how students used their computers in the classroom.

In the first study, Professor Jeff Sovern placed observers at the back of six law classrooms to document the laptop activities of those students choosing to use laptops.¹⁸ The study found that, in upper-year classes, a stunning 58% of students were engaged in noncourse activities on their laptops for at least half of each class, on average.¹⁹ Another 29% were using their laptops for noncourse purposes for more than five minutes but less than half the class. In sum, 87% of upper-year students were distracted by their laptops for more than five minutes each class. The statistics were only slightly less concerning for first-year classes: in the two first-year classes observed, just under a third and a quarter of students were using their laptops for noncourse purposes for between five minutes and half of the class.²⁰

Professor Sovern also found that noncourse use of laptops increased in three key circumstances: when student questions were asked and answered, during policy discussions, and when the class was working through “problems and hypotheticals”.²¹ It appears that students who were resisting

¹⁷ Direct evidence is more reliable because students may significantly underreport their noncourse use of laptops. See e.g. James M Kraushaar & David C Novak, “Examining the Affects [sic] of Student Multitasking with Laptops During the Lecture” (2010) 21:2 *J Information Systems Education* 241 (spyware placed on students’ laptops showed substantially greater noncourse use compared to students’ self-reports). *Contra* Susan M Ravizza, Mitchell G Uitvlugt & Kimberly M Fenn, “Logged In and Zoned Out: How Laptop Internet Use Relates to Classroom Learning” (2017) 28:2 *Psychological Science* 171 (students’ self-reports of noncourse internet use were found to strongly correlate with actual student use tracked through a proxy server).

¹⁸ Jeff Sovern, “Law Student Laptop Use During Class for Non-Class Purposes: Temptation v. Incentives” (2013) 51:3 *U Louisville L Rev* 483 at 483.

¹⁹ See *ibid* at 492, 518.

²⁰ See *ibid* at 494–95, 523. Descriptions of the two first-year classes observed in this study can be found at 486–487.

²¹ *Ibid* at 499. See *ibid* at 524–28. This data heavily accords with my own teaching experience, which spans the pre-laptop and post-laptop eras. I now regularly find that my upper-year classes have far fewer engaged students than first-year courses, and it is

distraction found these circumstances to be opportune moments to join the rest of the students already engaged in social media, shopping, or messaging. Given that the development of policy analysis and problem-solving skills are centrally important to a legal education, this distraction has serious implications for the law classroom.

In the second study, Professor Susan Ravizza and her co-authors documented both the extensive noncourse use of laptops in a university classroom and its link to lower academic performance.²² For the study, students in a psychology class voluntarily logged into a server which tracked their laptop use during the class.²³ Students spent a median of 37 out of every 100 minutes of class time using the Internet for noncourse purposes, spending “the most time using social media, followed by reading e-mail, shopping, watching videos, chatting, reading news, and playing games”.²⁴ The study then compared the rate of internet use and class grades, and, unsurprisingly, found a significant correlation between extensive noncourse laptop use and lower performance on the course exam.²⁵ This correlation remained even when the researchers controlled for student motivation, interest, and prior academic performance measured through college entrance exam scores. The study further found that use of laptops for accessing course materials during class was not linked to better exam performance.²⁶

In both the Sovern and the Ravizza studies, the authors noted that their results were largely consistent with other research that has examined

increasingly difficult to generate policy discussions in any class. In the pre-laptop era, I did not experience anywhere near the same level of nonengagement in upper-year classes, and policy discussions would regularly take significant portions of classes with students passionately arguing different sides of issues. I also now routinely find that key course content which was delivered in response to a student question is commonly not referenced in exam answers.

²² Ravizza, Uitvlugt & Fenn, *supra* note 17.

²³ See *ibid* at 172–73.

²⁴ *Ibid* at 174 [footnotes omitted].

²⁵ See *ibid* at 175–78.

²⁶ See *ibid* at 177.

levels of noncourse activity on student laptops and its links to poor academic performance.²⁷

The costs of this extensive noncourse use of laptops in a classroom are widespread. First, when students are directly engaged in noncourse activities, lecture material cannot enter students' short-term memory, a necessary first step in the learning process.²⁸ Second, studies have indicated that multitasking during a lecture on platforms such as Facebook and chat applications leads to reduced comprehension of information throughout the lecture.²⁹ Further, and with obvious relevance to legal study, multitasking makes it particularly difficult to learn new and complex material, or to process knowledge in a way that permits longer retention and analytical use of the information.³⁰ As Professor Shailini George sets out in her insightful article, “[a]t the heart of learning is attention.”³¹ Multitasking creates distractions that “interfere with memory and the reasoning process.”³² She notes that the greatest reductions in the ability to accurately process information during multitasking occur where “the task

²⁷ See Ravizza, Uitvlugt & Fenn, *supra* note 17 at 171; Sovern, *supra* note 18 at 513 n 181. See also Arnold L Glass & Mengxue Kang, “Dividing attention in the classroom reduces exam performance”, (2018) *Educational Psychology*, online: <<https://doi.org/10.1080/01443410.2018.1489046>>; Kevin Yamamoto, “Banning Laptops in the Classroom: Is it Worth the Hassles?” (2007) 57:4 *J Leg Educ* 477 at 498–501; Levy, *supra* note 1 at 282–83.

²⁸ See Levy, *supra* note 1 at 256–64.

²⁹ See Eileen Wood et al, “Examining the Impact of Off-Task Multi-Tasking with Technology on Real-Time Classroom Learning” (2012) 58:1 *Computers & Education* 365 at 371–72.

³⁰ See Eric A DeGross, “The Dynamics of the Contemporary Law School Classroom: Looking at Laptops Through a Learning Style Lens” (2014) 39:2 *U Dayton L Rev* 201 at 211–15. See also L Mark Carrier et al, “Causes, Effects, and Practicalities of Everyday Multitasking” (2015) 35 *Developmental Rev* 64 at 68–72; Levy, *supra* note 1 at 260–61.

³¹ Shailini Jandial George, “Teaching the Smartphone Generation: How Cognitive Science Can Improve Learning in Law School” (2013) 66:1 *Me L Rev* 163 at 173.

³² *Ibid* at 177

switches involved intellectually demanding work like reading, reasoning, and problem solving.”³³

Noncourse use of laptops also creates collateral damage. Attempting to focus on a lecture while screens surrounding you are flashing with videos and images is challenging in any context, but particularly so in the context of the daily introduction of new and complex material in a law classroom.³⁴ Studies have shown that having students who are multitasking in their line of sight can lead to reduced comprehension of lecture material for students seated nearby.³⁵ A recent study found that subsequent exam performance of university students was considerably lower in classes where electronic devices were permitted, both for students who used and *did not use* the devices for non-course activities.³⁶ In addition, researchers have found a “spreading effect” whereby one student’s noncourse laptop use makes surrounding students more likely to also begin multitasking.³⁷

MINDLESS TRANSCRIPTION OVER ENGAGED NOTE TAKING

The second significant danger that the laptop poses to learning in the law classroom occurs when the device *is* used for course purposes. The manner in which a student takes notes is critical to the learning and retention of information. Note taking impacts learning at both the production and

³³ *Ibid* at 179.

³⁴ See Yamamoto, *supra* note 27 at 497–99. See also Wood et al, *supra* note 29 at 367; Levy, *supra* note 1 at 282.

³⁵ See Faria Sana, Tina Weston & Nicholas J Cepeda, “Laptop Multitasking Hinders Classroom Learning for Both Users and Nearby Peers” (2013) 62 *Computers & Education* 24 at 29.

³⁶ Glass & Kang, *supra* note 27 at 10.

³⁷ Nancy M Aguilar-Roca, Adrienne E Williams & Diane K O’Dowd, “The Impact of Laptop-Free Zones on Student Performance and Attitudes in Large Lectures” (2012) 59:4 *Computers & Education* 1300 at 1306, citing Tomas Lindroth & Magnus Bergquist, “Laptops in an Educational Practice: Promoting the Personal Learning Situation” (2010) 54 *Computers & Education* 311 at 318.

review stages,³⁸ and “there is a strong correlation between the quality of notetaking and course performance.”³⁹ There is mounting evidence that notes taken by hand lead to significantly better comprehension of material than notes made on a laptop.

Storing and retrieving information requires it to be “encoded” in our brains.⁴⁰ Information can be encoded at shallow, intermediate, or deep levels. Deeper encoding allows for longer and more detailed memory. Further, deep encoding allows a person to analyze and interpret the material in order to perform tasks such as drawing inferences from it, understanding its implications, and applying it to different contexts.⁴¹ In order for information to be stored in the brain long term, it needs to be captured into “short-term memory” and then transferred into longer-term memory, where it can be used for analytical purposes such as problem solving and comparison.⁴²

Note taking by hand has been linked to better comprehension and deeper encoding of lecture material because the hand writer cannot write quickly enough to make verbatim notes.⁴³ The hand writer is instead forced to summarize, use his or her own language, and extract important points from the lecture. This “translation” of the material compels the hand writer to actively learn the material in real time. It also leaves the student with his or her own summary of the lecture material. A quick typist, on the other hand, is able to make near-verbatim notes without having to translate or summarize the material. This production of a transcript requires only

³⁸ See Michael C Friedman, “Notes on Note-Taking: Review of Research and Insights for Students and Instructors” (2014) Harvard Initiative for Learning and Teaching, online: <hilt.harvard.edu/files/hilt/files/notetaking_0.pdf> at 5.

³⁹ Debra L Worthington & David G Levasseur, “To Provide or not to Provide Course PowerPoint Slides? The Impact of Instructor-Provided Slides Upon Student Attendance and Performance” (2015) 85 *Computers & Education* 14 at 15.

⁴⁰ See Yamamoto, *supra* note 27 at 496–97.

⁴¹ See *ibid.*

⁴² See Levy, *supra* note 1 at 257–59.

⁴³ See Pam A Mueller & Daniel M Oppenheimer, “The Pen is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking” (2014) 25:6 *Psychological Science* 1159 at 1159–60.

minimal encoding of the information, resulting in lower comprehension and recall of the material as compared to hand writers.⁴⁴

Pam Mueller and Daniel Oppenheimer carried out a highly significant study on the importance of the mode of note taking to learning. This study is documented in their widely cited article “The Pen is Mightier Than the Keyboard: Advantages of Longhand Over Laptop Note Taking.”⁴⁵ Their series of experiments involved showing university students a video lecture on a topic and asking them to take notes on the material. One group of students took notes by hand and the other with laptops not linked to the Internet. When tested directly after viewing the material, the two groups scored similarly on factual questions, but the hand writers did significantly better on conceptual questions. In testing that occurred a week after viewing the video and after giving students the opportunity to review their notes, hand writers scored better than laptop users on both factual and conceptual questions.⁴⁶

The key to the lower performance of the laptop users in the Mueller and Oppenheimer study was the students’ tendency to take verbatim notes, which engages a process of “mindless transcription”.⁴⁷ The study found that, independent of the note-taking medium, verbatim notes were negatively associated with performance on conceptual questions. Laptop users were more likely to take more verbatim notes,⁴⁸ even when instructed to make

⁴⁴ See *ibid* at 1166; Friedman, *supra* note 38 at 7–8. See also Karen S Duran & Christina M Frederick, “Information Comprehension: Handwritten vs. Typed Notes” online: (2013) 12 Undergraduate Research J for Human Sciences. <www.kon.org/urc/v12/duran.html>; Steven Eisenstat, “A Game Changer: Assessing the Impact of the Princeton/UCLA Laptop Study on the Debate to Ban Law Student Use of Laptops During Class” (2015) 92:2 U Det Mercy L Rev 83; Levy, *supra* note 1 at 298–303.

⁴⁵ Mueller & Oppenheimer, *supra* note 43.

⁴⁶ See *ibid* at 1165–66.

⁴⁷ *Ibid* at 1162, 1166.

⁴⁸ See *ibid* at 1161. The researchers measured the degree of verbatim note taking through a statistical analysis of the number of three-word “chunks” that were common to both the lecture and students’ notes.

their own summaries of the material and not to try to write down every word.⁴⁹

The link between use of laptops and lower comprehension in the university setting was further supported in a recent Massachusetts Institute of Technology study carried out at the United States Military Academy at West Point.⁵⁰ For the study, a large number of students taking an introductory economics course were randomly placed into three different classroom environments for an entire semester: one group had no access to technology and students had to take notes by hand; the second group was allowed general use of laptops and tablets; the third was permitted use of tablets, but students were required to place them flat on their desks so that the instructor could see if they were being used for noncourse purposes.⁵¹ In comparing the final exam scores of the students, the researchers concluded that computer devices in the classroom negatively affected academic performance and “can reduce student’s knowledge of the material gained during the semester.”⁵² Both the monitored and nonmonitored groups of computer users had lower overall marks than the hand writers.⁵³ This suggests that poor performance did not stem solely from the ability to be distracted by the Internet but was likely also linked to factors such as the reduced effectiveness of note taking on computers. As this study measured students’ actual performance on course exams, it provides important in-class validation of Mueller and Oppenheimer’s findings.

In sum, there is a strong evidentiary basis for the conclusion that laptops can create substantial barriers to learning when being used for both noncourse and course purposes. The most pronounced of these risks is an

⁴⁹ See *ibid* at 1163.

⁵⁰ See Susan Payne Carter, Kyle Greenberg & Michael Walker, “The Impact of Computer Usage on Academic Performance: Evidence from a Randomized Trial at the United States Military Academy” (2017) 56 *Economics Education Rev* 118.

⁵¹ See *ibid* at 120–21.

⁵² *Ibid* at 128.

⁵³ See *ibid*. See also Aguilar-Roca, Williams & O’Dowd, *supra* note 37.

inability to develop a deeper conceptual understanding of material, a proficiency which lies at the heart of a legal education.⁵⁴

COURSE SLIDES AND NOTES

The second part of a low-tech revolution for the law classroom is reducing access to prepared notes during and outside of class. It is often assumed that the use of text slides assists student learning by highlighting important material and giving students guidance in note taking. Surveys of students indicate that they are strongly of the opinion that use of text slides improves their learning and course performance.⁵⁵ However, there is cogent evidence that extensive use of detailed text slides, inside and outside of class, does not improve learning and, in fact, may impede comprehension.

In his article, “The Neuroscience of PowerPoint”, Jared Horvath reviews numerous studies which have linked use of text slides in lectures to poorer comprehension.⁵⁶ This counterintuitive notion stems from the fact that similar pathways in the brain are used to process oral and written stimuli.⁵⁷ When both forms of information are presented simultaneously, there is competition for attentional resources, which leads to performance deficits. As a result, comprehension of oral information can be significantly decreased when it is accompanied by text slides. Critically, use of text slides during a lecture not only tends to decrease comprehension of what is stated orally, but has also been linked to an overall decrease in retention of information compared to an oral lecture without slides. By contrast, the use of slides with fewer words, graphics, or images, appears to decrease the competing processing and can assist in the learning process.⁵⁸

⁵⁴ See Eisenstat, *supra* note 44 at 98; Levy, *supra* note 1 at 245; DeGroff, *supra* note 30 at 210; George, *supra* note 31 at 175–79.

⁵⁵ See Andrea Hill et al, “I’m Ambivalent about It’: The Dilemmas of PowerPoint” (2012) 40:3 Teaching Sociology 242 at 246.

⁵⁶ Jared Cooney Horvath, “The Neuroscience of PowerPoint” (2014) 8:3 Mind Brain & Education 137. See also Merritt, *supra* note 2.

⁵⁷ See Horvath, *supra* note 56 at 137–38.

⁵⁸ See Merritt, *supra* note 2 at 51; George, *supra* note 31 at 186–87.

The negative learning impacts of text-heavy slides may also flow from the fact that students tend to focus on copying the exact wording of slides into their notes, leading to minimal encoding of the information. In a survey of students from sociology classes where text slides were used, it was found that “the overwhelming majority of students (82 percent) answered that they focus on copying projected words into their notes. Although transcribing information requires students to focus to a certain degree, this type of attention can be mindless, unreflective, and even counterproductive.”⁵⁹

On the other hand, old school use of a chalkboard or whiteboard can assist in the retention and comprehension of lecture material. A professor hand writing information during a lecture “more closely follows the natural rhythm of a conversation between teacher and students”⁶⁰ and can assist students in better processing information as compared to textual material appearing on prepared slides.⁶¹ Further, because the lecturer is writing limited information on the board, students are still required to translate most of the lecture material into their own words.

There is also evidence that providing text slides or course notes to students outside of class does not improve learning outcomes. In a study where students were divided into groups which either did or did not have access to course slides prior to class, it was found that access to the slides did not impact student performance.⁶² This study further found that students bringing slides with them to class to assist in note taking negatively impacted learning.⁶³ The study concluded:

any academic effect attributable to [instructor-provided] slides [available to students outside of class] is likely to be associated with less learning rather than more learning. . . . [W]hen instructors turn to computers to upload copies of course slides and when students turn to computers to download

⁵⁹ Hill et al, *supra* note 55 at 251.

⁶⁰ Levy, *supra* note 1 at 290.

⁶¹ See *ibid* at 285–91.

⁶² See Worthington & Levasseur, *supra* note 39 at 17, 20.

⁶³ See *ibid* at 21.

these slides, their effort is unlikely to boost student learning. Sometimes old “tried and true” pedagogical lessons trump new ways of deploying classroom technology.⁶⁴

One of the reasons that access to course notes and slides does not appear to enhance student learning is rooted in the importance of making one’s own notes. Not only is the process of note taking critical to the encoding process, there is also evidence that students gain more from reviewing their own notes than those made by others.⁶⁵ Further, access to course notes outside of class may lower the already minimal barriers to students engaging in noncourse activities during a lecture. In his study, Professor Sovern noted that, when law students were aware that lecture notes were available outside of the class, there were more instances of noncourse laptop use during lectures.⁶⁶

THE TWO TECH HAVES CREATE A DISCONNECTED WHOLE

Laptop use by students, and extensive use of text slides by professors, can negatively impact the classroom beyond lower student comprehension and test scores. These technologies can also contribute to lower engagement between professors and students, which has profound consequences for the law classroom learning environment.

First, use of laptops impacts the quality of class discussions. The many students who are engaged in noncourse activities have no interest in, or ability to, engage in dialogue on lecture material. Indeed, as the Sovern study indicates, policy discussions and questions from students cause a spike in those fleeing to the Internet.⁶⁷ Even for those paying attention, the use of a laptop to take verbatim notes may lead to limited engagement

⁶⁴ *Ibid* at 21.

⁶⁵ See Friedman, *supra* note 38 at 16.

⁶⁶ Sovern, *supra* note 18 at 499.

⁶⁷ See *supra* note 21 and accompanying text.

with the material,⁶⁸ which is insufficient to meaningfully debate its broader social implications.

Further, students are much more likely to pay attention and learn material when they have a strong connection to their professor.⁶⁹ As Professor Merritt notes in her article “Legal Education in the Age of Cognitive Science and Advanced Classroom Technology”:

Researchers have determined that professors who display immediacy in the classroom significantly boost their students’ interest in a subject. Students engage more enthusiastically with the material when they feel connected to the professor, and their increased motivation may improve learning. Cultivating classroom immediacy, therefore, is an important goal.⁷⁰

How is a strong connection established between a professor and his or her students? Through measures such as regular eye contact, use of gestures, and a lecture delivered in conversational style.⁷¹ Yet, these very behaviours are inhibited through the combination of laptops and extensive use of text-heavy slides. Where students are focussed on their screens (either on social media or attempting to write down every word of a lecture) and the professor is constantly referring to projected course notes, direct professor-student eye contact and interaction is significantly limited.⁷² Lack of direct eye contact also inhibits the professor’s ability to gauge students’ comprehension of material by detecting signals from students’ facial expressions.⁷³ A class heavy with text slides can also lead to a more formal presentation of material where the lecture follows a “predetermined path established by slides. This preplanned organization inhibits instructor

⁶⁸ See Eisenstat, *supra* note 44 at 88. See also Peter Sankoff, “Taking the Instruction of Law Outside the Lecture Hall: How the Flipped Classroom Can Make Learning More Productive and Enjoyable (For Professors and Students)” (2014) 51:4 *Alta L Rev* 891 (where the author discusses the lack of engagement which often occurs in traditional law lectures with students using laptops throughout the class).

⁶⁹ See Levy, *supra* note 1 at 269–73.

⁷⁰ Merritt, *supra* note 2 at 49 [footnotes omitted].

⁷¹ See *ibid* at 48–49.

⁷² See Levy, *supra* note 1 at 290; Merritt, *supra* note 2 at 59.

⁷³ See Eisenstat, *supra* note 44 at 86. See also Levy, *supra* note 1 at 273, 290.

digressions, anecdotes, and creativity—moments that often inspire student questions that are so vitally important for effective learning”.⁷⁴

As Miya Tokumitsu sets out in her essay “In Defence of the Lecture”, the most impactful lecture is one which leaves room for variation based on students’ reactions to the material:

The best lectures draw on careful preparation as well as spontaneous revelation. While speaking to students and gauging their reactions, lecturers come to new conclusions, incorporate them into the lecture, and refine their argument. Lectures impart facts, but they also model argumentation, all the while responding to their audience’s nonverbal cues. Far from being one-sided, lectures are a social occasion.⁷⁵

These critical social elements of a lecture, which foster discussion and analysis of the material, are difficult to achieve with students glued to their screens and professors tied to a detailed set of text slides.

IMPLEMENTING A LOW-TECH REVOLUTION

Bringing about a low-tech revolution is much easier on one side of the law classroom than the other. A professor has the option of deciding not to make course notes available outside of class and limiting the use of text-heavy slides in class. Such decisions should be accompanied by a number of measures to ensure that students have the opportunity to make their own notes, including: having assigned readings that are accessibly written and of a reasonable length that permit students to familiarize themselves with the relevant material before class; lecturing at a moderate pace to allow students to make sufficient notes; periodically reviewing complex points; and providing time for, and encouraging, questions and comments to ensure that students are developing a strong understanding of the material, as well as the capacity to challenge it. It may also be helpful for a professor to briefly explain the pedagogical reasons and research supporting the decision to not provide extensive text slides or course notes in order

⁷⁴ Hill et al, *supra* note 55 at 244. See also Levy, *supra* note 1 at 251–52.

⁷⁵ Miya Tokumitsu, “In Defense of the Lecture” *Jacobin* (26 February 2017), online: <www.jacobinmag.com/2017/02/lectures-learning-school-academia-universities-pedagogy>.

to avoid the impression that the professor is simply uncomfortable with using technology.⁷⁶

The laptop part of the low-tech solution is much more difficult to implement. One option is banning laptops altogether, with the exception of students who have university accommodations that allow the use of a laptop in class.⁷⁷ A laptop ban may be particularly helpful for students who are aware that noncourse use of laptops negatively affects their grades but are unable to control their behaviour.⁷⁸ However, a mandatory ban is likely to engage significant opposition from law students. Most law students now take notes by computer and have likely been doing so throughout their university education.⁷⁹ Some may claim that their handwriting skills are so diminished that taking notes by hand is not a viable option.⁸⁰ A laptop ban would also make students with academic accommodations to use a computer highly visible in the classroom,⁸¹ which the University of Washington School of Law notes “would be tantamount to our disclosing to our disabled students’ classmates a disability that they might not wish to be made public.”⁸²

⁷⁶ See Levy, *supra* note 1 at 243. See also Merritt, *supra* note 2 at 40.

⁷⁷ See e.g. Susan Dynarski, “Laptops Are Great. But Not During a Lecture or a Meeting,” Editorial, *The New York Times* (22 November 2017), online: <www.nytimes.com>. Professor Dynarski also provides a helpful overview of recent studies highlighting the dangers to learning posed by laptops in the classroom.

⁷⁸ See Ravizza, Uitvlugt & Fenn, *supra* note 17 at 176 (students who reported that laptops disrupted their learning had exam scores that were negatively correlated with noncourse laptop use during lectures, indicating that “students may have been aware that their Internet use was disruptive but could not inhibit this behavior”: *ibid* at 178).

⁷⁹ See Jana R McCreary, “The Laptop-Free Zone” (2009) 43:3 Val U L Rev 989 at 1011.

⁸⁰ Sandra Sulzenbrud et al, “The Death of Handwriting: Secondary Effects of Frequent Computer Use on Basic Motor Skills” (2011) 43:3 Journal of Motor Behaviour 247 at 250.

⁸¹ See Tracy L McGaugh, “Laptops in the Classroom: Pondering the Possibilities”, online (2006) 14:3 Perspectives at 165 <<https://info.legalsolutions.thomsonreuters.com/pdf/perspec/2006-spring/2006-spring-10.pdf>>.

⁸² University of Washington School of Law, “Laptop Computer in Classroom Policy”, online: <www.law.washington.edu/students/academics/laptoppolicy.aspx>.

Further, as is noted at the outset of this article, the evidence is not universal concerning the impact of laptops on classroom learning and some students may have learning styles which are more suited to laptop use.⁸³ Professor Murray argues that, because of the heavy cognitive demand of translation note taking, some students may be “better served by recording as much material as they can during the lecture and processing it at some later point.”⁸⁴ While the emerging evidence suggests that laptops pose a substantial risk to learning in the law classroom, the fact that the evidence is not universal makes it difficult to justify a policy which prevents all nonaccommodated students from note taking with computers.

However, there are a number of options which can assist in reducing the negative impacts of laptops in the law classroom without a mandatory ban.

EDUCATION

Instructing students not to use laptops for noncourse purposes and recommending that they not take verbatim notes appear to have little or no effect.⁸⁵ Further, students may not be convinced to exchange their laptops for pen and paper based on evidence of the depth of the “encoding process” or the lesser value of verbatim notes. However, the growth of specific studies linking handwriting to higher exam scores⁸⁶ provides a renewed opportunity to motivate student change through education. If there is one common attribute of law students, it is an understandable concern, not just about grades generally, but about small deviances in grades. The difference of a few points in a student’s grade average can impact whether a student gets an interview at a certain firm, has the opportunity to do a judicial clerkship, or is accepted into a graduate program. Most law schools offer

⁸³ See Murray, *supra* note 2 at 203–06; Bui, Myerson & Hale, *supra* note 3 at 307; Canick, *supra* note 3.

⁸⁴ Murray, *supra* note 2 at 202.

⁸⁵ See Mueller & Oppenheimer, *supra* note 43 at 1163; Sovern, *supra* note 18 at 507–08.

⁸⁶ See e.g. Mueller & Oppenheimer, *supra* note 43; Ravizza Uitvlugt & Fenn, *supra* note 17; Carter, Greenberg & Walker, *supra* note 50; Aguilar-Roca, Williams & O’Dowd, *supra* note 37. See also Horvath, *supra* note 56.

popular seminars and peer tutoring services to help students develop effective study and exam-writing skills.

In this context, presenting students with evidence that specifically links the use of laptops to lower test scores and the diminishment of skills that are critical to law exams, including the ability to deal with material conceptually, may have some real impact. Indeed, students can be informed that the connection between electronic distraction and lower grades may be especially relevant in a law school context. A 2018 study published in *Educational Psychology* found that the use of internet linked devices in the classroom negatively impacted grades due to a reduction in longer term retention of class material "... and the effect on retention was largest at the largest retention interval, on the final exam."⁸⁷ Many law courses base a significant portion of student grades on a single final exam, and many first-year law courses have a final exam which covers an entire academic year of class material. While a number of law students will continue to be convinced that they will be the exception to these risks, providing specific evidence to students that their grade averages could be improved through taking notes by hand and avoiding the Internet during class is likely to win some recruits to the low-tech revolution.

LAPTOP-FREE ZONES

Another strategy for addressing the detriments of laptops in the classroom is creating laptop-free zones. These zones are reserved for hand writers and can either be set out at the front of the classroom or in one front-to-back portion of a lecture hall.⁸⁸ These zones attempt to minimize the serious learning distractions that can result from having persons multitasking on their computers in a student's line of sight.⁸⁹ Such zones may be especially

⁸⁷ Glass & Kang, *supra* note 27 at 10.

⁸⁸ See Aguilar-Roca, Williams & O'Dowd, *supra* note 37 at 1302; McCreary, *supra* note 79 at 1038; Levy, *supra* note 1 at 280. The use of a front-to-back zone, as opposed to having hand writers sit at the front of the class, could have the advantage of not forcing computer users, including those who use them for accommodative reasons, to sit at the back of the class.

⁸⁹ See Sana, Weston & Cepeda, *supra* note 35 at 29.

important given that at least one survey of law students found that those most likely to be distracted by other students' noncourse use of computers are those who are handwriting.⁹⁰ This survey further found that a laptop-free zone lowered distractions for students not using computers and was viewed by students as a good balance between preserving the freedom to choose how to take notes and minimizing distractions for hand writers.⁹¹ Conversely, the authors of another study of laptop-free zones did not find a difference in course performance between hand writers who sat in laptop-free zones and those who did not.⁹² However, they did find that "zoning had a positive impact on the class environment and on student attitudes."⁹³ Further, this study once again found that hand writers scored significantly higher on exams than those using laptops.⁹⁴

A laptop-free zone may also have the positive effect of creating a visible community of hand writers in the classroom. Use of laptops is so prevalent in the modern university classroom that a mistaken impression can be formed that no students hand write. Hand writers are easily hidden if they are interspersed among the many laptop users. Some students do make the decision to change their note-taking method to minimize the inevitable distractions of laptops.⁹⁵ Collecting the hand writers together in a group might assist in raising the visibility of this option.

NONCOURSE USE POLICY

One of the greatest drawbacks of technology in the classroom is the use of laptops for noncourse purposes. It results in students not learning certain material in the classroom at all, having shallower understanding of all the lecture material, and in the distraction of surrounding students. Furthermore, engaging in activities like shopping or gaming during a law

⁹⁰ See McCreary, *supra* note 79 at 1030.

⁹¹ See *ibid* at 1039.

⁹² See Aguilar-Roca, Williams & O'Dowd, *supra* note 37 at 1307.

⁹³ *Ibid*.

⁹⁴ See *ibid* at 1306–07.

⁹⁵ See McCreary, *supra* note 79 at 1039.

class is disrespectful to peers, faculty, the legal profession, and the public, who are paying for a portion of students' legal education. Students who work in clinical programs during law school, or enter the legal profession after graduation, will immediately be tasked with assisting clients who face complex legal problems involving serious implications for both the individual and the broader community. Competently serving these clients requires strong substantive knowledge of law and policy and well-developed analytical- and problem-solving skills. These are the very skills which are negatively impacted through noncourse use of laptops during classes. Legal work requires "the ability to shut out distractions and focus on the task at hand."⁹⁶ Maintaining focus for the 15–18 hours a week that most law students spend in class is a necessary first step.⁹⁷

A tool that can help address the temptation to be drawn into the web of the Web is simply putting a laptop on "airplane mode" during a lecture or using one of the widely available apps that make one's laptop capable only of note taking for a set amount of time.⁹⁸ However, noncourse use of laptops is one area which justifies a mandatory rather than voluntary approach. While students should arguably retain control over how to take notes, there is no justification for a right to scroll through Facebook or check "likes" on Instagram during class.

Instituting a mandatory ban on noncourse use of laptops is complex. Attempting to block all Internet access in a classroom is both technically difficult and possibly illegal, depending on the methods used.⁹⁹ While

⁹⁶ Levy, *supra* note 1 at 284–85.

⁹⁷ Many students who enter the legal profession will be working 60-plus-hour weeks, where the volume and complexity of the work will simply not permit Web surfing and steaming videos while at work.

⁹⁸ See e.g. "Overview", *SelfControl*, online: <selfcontrolapp.com>; *Freedom*, online: <freedom.to>; Graeme Gott, "FocusWriter", *Gott Code*, online: <gottcode.org/focuswriter>; Cold Turkey Software Inc, *Cold Turkey*, online: <getcoldturkey.com>; Brad Jaspat, *Focus*, online: <heyfocus.com>.

⁹⁹ See McCreary, *supra* note 79 at 997. Attempts to jam all signals in a classroom can create legal issues. See Government of Canada, "Jamming Devices are Prohibited in Canada: That's the Law" (July 2011), online: <www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10048.html>; Chris Matyszczuk, "Science Teacher Suspended for Using Jammer to

policies regarding noncourse use of laptops may not provide a strong deterrent,¹⁰⁰ I believe it is important for law schools to adopt a faculty-wide policy¹⁰¹ banning noncourse use of laptops in the classroom. Such a policy could be highlighted at the outset of law school orientation where students are educated about other core expectations around student behaviour. Further, the rule would be uniform for every class, as are rules on issues like plagiarism, eliminating any confusion about its applicability. While such policies are difficult to monitor, it would at the least send a message that noncourse use of laptops is not normal or acceptable behaviour.¹⁰² Law schools simply cannot be okay with students spending half their time on social media during law school classes. A faculty-wide policy prohibiting such conduct is at least a recognition of the seriousness of the issue.

Shut Up Students' Cell Phones" *CNET* (3 June 2015), online: <www.cnet.com/news/science-teacher-suspended-for-using-jammer-to-shut-up-students-cell-phones>.

¹⁰⁰ See *Sovern*, *supra* note 18 at 507–08.

¹⁰¹ See e.g. St. John's University School of Law, *Student Handbook: 2017-2018*, online: <www.stjohns.edu/sites/default/files/law/student_handbook_17-18_kgs_revised_8_17_17.pdf> ("Except with the instructor's permission, during class students are not permitted to compose, review, receive, or send e-mails or instant messages or access the Internet. . . . The use of computers during class is a privilege, not a right, and may be revoked for failure to comply with this policy": *ibid* at 59); University of Washington, *supra* note 82 ("faculty members who are concerned with the misuse of laptop computers by students may issue policies designed to regulate, but not to prohibit, their use by students" including mandating that students "may only use laptop computers to take notes and not for any other purpose."); University of Toronto Faculty of Law, "Technology Use in Classrooms and Examinations" (April 2007), online: <handbook.law.utoronto.ca/policies/faculty-law-policies#Technology> ("Avoiding inappropriate use of technology in the classroom is a matter of respect, both for the professor and for the learning experience at the faculty. Disregard for these guidelines or repeated actions which are inconsistent with these guidelines may lead to appropriate consequences. While Professors may incorporate internet use in classroom teaching, the use of laptops during class for personal internet activity, messaging, email, or games is inappropriate.").

¹⁰² The existence of an official policy would also provide the faculty with the ability to warn or discipline students who routinely breach this rule.

THE FLIPPED CLASSROOM

Another strategy to minimize the negative impacts of laptops is to use a “flipped classroom” which significantly changes the focus of student activity during class time. In the flipped format, prior to class students watch instructional videos prepared by the professor which outline the key legal concepts for each component of the course.¹⁰³ The video format allows students to view the lecture multiple times while learning the material. It also allows students to watch the videos later in the course for review purposes. The time in class can then be used for engaged activities such as analyzing how the legal concepts would apply to various hypothetical fact patterns and assessing nuances in the law. This form of active learning, which can often be done in a group format, frees students from their keyboards and promotes significant student participation during the class. As Professor Sankoff notes, a flipped classroom “enables the professor to engage in non-traditional teaching methods”¹⁰⁴ which promote student engagement during class time, while avoiding standard lectures where students taking notes on computers are “‘checking out’ from time to time into the wireless universe.”¹⁰⁵

Even if one does not flip the classroom, use of interactive class exercises and a variety of assessment techniques can increase engagement and improve learning by drawing students away from their laptops and giving them less opportunity to multitask with noncourse activities.¹⁰⁶

EXPERIENTIAL LEARNING

A low-tech revolution can also intersect with the growth of experiential learning programs in law schools, including competitive moots, clinical work, externships, and advocacy courses. Experiential learning provides students with the opportunity to learn substantive material and numerous skills in a hands-on context, while working closely with faculty supervisors

¹⁰³ See generally Sankoff, *supra* note 68.

¹⁰⁴ *Ibid* at 899.

¹⁰⁵ *Ibid* at 896.

¹⁰⁶ See George, *supra* note 31 at 186–89.

and members of the profession.¹⁰⁷ Many clinical programs also provide access to justice to persons who would otherwise be unrepresented and educate students about the complex barriers and struggles that marginalized persons face, both in the justice system and outside of it.¹⁰⁸

One of the overlooked benefits of experiential education is that it is carried out in circumstances where students do not have the option of prolonged Web surfing and educators cannot resort to prepared course slides. Competitive moots, for example, involve extensive research on unique legal issues where students are not bound by precedent and must use a combination of jurisprudence and policy to argue their positions. Moot work is carried out in a team environment that involves regular one-on-one or small-group engagement with coaches, and numerous oral practices in front of faculty, counsel, and judges. Clinical work similarly involves frequent one-on-one meetings with supervising lawyers and numerous tasks that require students' complete focus, including client meetings, witness interviews, court appearances, and drafting and reviewing documents. It is simply impossible to perform much of this work while surfing the Internet and impracticable for supervisors to assist students through a series of prepared text slides. Particularly for upper-year students, whom the Sovern study indicates are more likely to disengage in classes,¹⁰⁹ experiential learning can provide an opportunity to avoid the many learning barriers which flow from the extensive use of laptops and course slides.

¹⁰⁷ See David IC Thomson, "Defining Experiential Legal Education" (2015) 1:1 J Experiential Learning 1; Elizabeth A Keys, David C Koelsch & Alejandro Posadas, "Clinical Legal Education: A (Brief) Comparison of the Evolving Structures and Pedagogy in Mexico, Canada and the United States" (2015) 3:2 U Det Mercy L Rev Online 1; Yvonne Marie Daly & Noelle Higgins, "The Place and Efficacy of Simulations in Legal Education: A Preliminary Examination" (2011) 3:2 All Ireland J Teaching & Learning in Higher Education 58.1.

¹⁰⁸ See Sarah Buhler, "I Am Not a Caped Crusader?: Clinical Legal Education and Professional Identity Formation" (2016) 49:1 UBC L Rev 100.

¹⁰⁹ See *supra* note 18 and accompanying text.

CONCLUSION

While technology can bring many advantages to individuals and society, certain forms of it come with significant risks. Author Andrew Sullivan points out that our high-tech society “lulls us into the belief that there are no downsides. It’s all just more of everything. Online life is simply layered on top of offline life”.¹¹⁰ He sets out that we are only beginning to recognize the immense costs of the “distraction sickness” caused by laptops and cell phones.¹¹¹ One arena where those risks are prominently present is the law classroom.

Noncourse use of computers and electronic slides not only pose risks to learning in any classroom, but pose a particular risk to the deeper analytical reasoning which is a core aspect of a legal education. Accordingly, there is now a broad foundation of recent cogent evidence that makes a low-tech classroom a reasonable and justifiable choice for law professors. Though that choice may be impacted by a number of factors, including the size of the class, the subject matter of the course, and the teaching approach of the professor, the evidence that certain technologies may impede students’ ability to learn, understand, and apply complex material cannot be ignored.

¹¹⁰ *Supra* note 12.

¹¹¹ See *ibid.*