
Policy Paper

# E-Learning in K-12 Schools

## The Prospects for Disruptive Innovation

**Paul W. Bennett**

**Director, Schoolhouse Consulting, Halifax, Nova Scotia**

*Halifax, Nova Scotia*

*May 2016*

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287 Lacewood Drive, Suite 204,
Halifax, Nova Scotia, Canada B3M 3Y7

Telephone: (902) 429-1143

 aims@AIMS.ca

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### By Paul W. Bennett

Director, Schoolhouse Consulting, Halifax, Nova Scotia


## Table of Contents



### About the Author

**Paul W. Bennett, Ed.D.,** (OISE/Toronto) is Founding Director of Schoolhouse Consulting and Adjunct Professor of Education at Saint Mary's University, Halifax, Nova Scotia. Over a career spanning four decades and three provinces, Dr. Bennett has served as a secondary school history teacher, academic head, public school trustee, and the headmaster of two of Canada's leading independent coeducational day schools, Lower Canada College and Halifax Grammar School. He has written or co-authored many academic articles, policy papers, and eight books, including *The Grammar School: Striving for Excellence in a Public School World* (2009), and *Vanishing Schools, Threatened Communities: The Contested Schoolhouse in Maritime Canada, 1850 -2010* (2011), and *The Last Stand: Schools, Communities and the Future of Rural Nova Scotia* (2013).

Today Paul is primarily an education policy analyst and commentator, producing regular columns and book reviews for *The Chronicle Herald* and articles for *Progress Magazine* and a variety of publications. His most recent academic articles have appeared in *Acadiensis, Historical Studies in Education,* and the *Royal Nova Scotia Historical Society Journal.* Over the past five years, he has produced major policy papers for the Atlantic Institute for Market Studies, the Society for Quality Education, and the Canadian Accredited Independent Schools Association. He specializes in K-12 educational policy, education history, educational standards, school governance, teacher education, and special education services.


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# Overview

## Disruptive innovation from the schools-up

In April 2014, an upbeat discussion paper entitled "Shaping a New Vision for Public Education in Nova Scotia" came down from the highest echelons of the Nova Scotia school system. Prepared by the Nova Scotia School Boards Association (NSSBA), in consultation with some twenty-six education leaders, it embraced the Canadian version of what is widely known across North America as "21st Century Learning" (NSSBA 2014). The paper issued an urgent call for "a new discussion" about how to prepare young people for the shift to a "more globally robust economy" based upon "new knowledge and technology." Yet the Nova Scotia paper created barely a ripple.

Six months later, the Nova Scotia Minister's Panel on Education ignored the call to action in its report, *Disrupting the Status Quo: Nova Scotians Demand a Better Future for Every Student* (Nova Scotia 2014). Nor did the NSSBA paper register in the eventual *Three Rs Education Reform Plan,* released in January 2015 (Nova Scotia 2015). Like most top-down education initiatives, the 21st Century Learning paper merely *floated above the schools.* Without support from frontline teachers, the venture went into hiatus, with an uncertain future.

While provincial educational leaders were toying with 21st Century Learning visions, the "Flipping the Classroom" movement was gaining ground among North American teachers committed to e-learning *in the schools.* Inspired largely by U.S. technology-in-education advocate Salman Kahn, founder of Khan Academy, Flipping the Classroom effectively turns the normal classroom routine on its head. Students are instructed to watch short videos or study recorded material outside class time as homework, and come to class prepared to discuss what they have learned and apply their knowledge to relevant problems in the regular classroom (Bergmann and Sams 2012).

Over the past three years, the spread of the Flipped Classroom model has turned Khan's massive series of free, online instructional videos into the best-known and most widely used of such resources among students and parents. It has spawned a whole series of Flipped Classroom edTech resource books, webcasts, and modules used by increasing numbers of teachers everywhere except in the Maritime provinces (Bergmann 2014; Bretzman 2013).

The failure of Nova Scotia's Flipped Classroom pilot project was not an isolated instance of resistance to e-learning and disruptive innovation in the region's schools. Atlantic Canada's leading educators are leery of the pan-Canadian movement promoting 21st

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Century Learning and technology-driven education. In neighbouring New Brunswick, a bold, top-down initiative to introduce 21st Century Learning also capsized five years ago.

Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador have been slow off the mark to seize e-learning's potential to promote higher levels of student engagement. How Atlantic Canadian school systems lost the e-learning initiative, why they have yet to embrace e-learning, and what can be done to change the policy trajectory are the questions this report addresses.

Skepticism about passing educational fads is healthy and perhaps understandable, but structural barriers and resistance to technological innovation in the schools are now holding Atlantic Canadian students and teachers back (see Bennett 2012b; Christensen, Horn, and Staker 2013; Walsh 2012). Top-down initiatives branded with the 21st Century Learning label rarely succeed in winning over regular teachers or penetrating the school classroom. Yet e-learning's potential can be unleashed only if such initiatives win the support of teachers and mobilize them from the school level up.

What is needed is a strategic, longer-term plan to spark "disruptive innovation" in our school systems in order to introduce new learning techniques that benefit students. Such a strategy, initially built around supporting core innovation teams in each school, would include demonstrating the effective use of blended learning activities, introducing the "A La Carte" model of school courses, lifting provincial restrictions on online classes, establishing reliable measures of learning competencies, and transforming our one-size-fits-all school system into a community or "portfolio" of schools that offer the full range of face-to-face, online, and blended programs.

Students and teachers yearning for more stimulating, engaging quality instruction deserve better from our region's schools. The following nine recommendations — fully explained at the end of the report — would significantly advance the state of e-learning in Atlantic Canada's school systems.

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## Recommendations

**Recommendation 1:** Support early adopters committed to initiating blended learning programs, combining face-to-face instruction and online digital learning.

**Recommendation 2:** Strengthen and expand existing self-directed online learning programs and "seed" new ones.

**Recommendation 3:** Focus on building the A La Carte model of blended learning programs in junior and senior high schools.

**Recommendation 4:** Clear away current structural barriers and regulatory constraints, such as Article 49 of the Nova Scotia provincial teaching contract.

**Recommendation 5:** Build school leadership capacity in e-learning, change management, and disruptive innovation.

**Recommendation 6:** Develop and test more reliable measures of the effectiveness of e-learning program innovations, utilizing competency-based assessment methods.

**Recommendation 7:** Broaden the range of e-learning innovation policy initiatives, so as to embrace expanded school program choices, greater teacher autonomy, more flexible staffing formulas, expanded student learning time, and accredited, autonomous virtual high schools.

**Recommendation 8:** Foster the development of more agile, flexible, and adaptable alternative schools, including incubator (e-learning) schools.

**Recommendation 9:** Transform traditional top-down school management systems into "communities of schools" that provide face-to-face, online, and blended learning program choices, starting with one major urban district in each province.

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> *[Our grade 7 Math online math pilot project] is a huge opportunity to leverage resources to bootstrap our whole public education system.*
>
> *— Jim Spatz, CEO, Southwest Properties,*
> Chronicle Herald *(Halifax), June 26, 2013*

> *It's really awesome to know that you're going to be getting one of these devices to own for the school year and bring home after-school and in the evening.*
>
> *— Jacob Beaton, grade 6 student,*
> *Oxford School, Halifax, June 25, 2013*

## Flirting with learning innovation

Halifax property developer Jim Spatz caught the "Flip the Classroom" bug after encountering one of its initiators, Salman Khan, founder of Khan Academy, at a Harvard University management seminar in the spring of 2013. Kahn's deceptively simple, cleverly produced and enticing online instructional videos and their potential for igniting "self-paced learning" appealed to North American students and parents as well as to businessmen concerned about declining student mathematics scores. Much of the explosive growth in Khan Academy online course registrations consisted of students and parents looking to supplement classroom instruction or to understand mathematics and science concepts that eluded them in the regular classroom (Khan 2012).

Together with prominent seafood businessman John Risley, Spatz secured an audience with then Nova Scotia premier Darrell Dexter, proposed introducing the Khan model into the province's public schools, and pledged $500,000 in seed money to kick-start the venture. By late June 2013, Spatz was giving media interviews about the exciting possibilities of Flipping the Classroom and the wonders of tablet technology to engage more students in mastering mathematics and the sciences (CBC News Nova Scotia 2013; Fairclough 2013).

Like many North American business entrepreneurs, Spatz embraces "big ideas" and sees taking the odd risk as the gateway to what American change management guru Clayton Christensen has termed "disruptive innovation" (Christensen, Horn, Staker 2013). He was also aware that e-learning initiatives, blending online and face-to-face

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instruction, showed the best potential for virtually revolutionizing the traditional "teacher-talk" model practised in standard bricks-and-mortar schools.

Coming out of a phase of provincial education budget reductions, injecting much-needed dollars into a classroom technology initiative looked appealing. So the province announced, on June 25, 2013, that $1 million would be allocated, under a public-private funding partnership, to provide three hundred tablet computers in a pilot project ostensibly to improve grade 7 mathematics and science classes in four different schools: Halifax's Oxford Street Public School, Chester Area Middle School. Central Kings Rural High School, and Whitney Pier Junior High School (Ruskin 2013).

In hindsight, however, it appears the premier and the Department of Education were more interested in acquiring classroom technology than in introducing Khan Academy-inspired Mathematics and Science lessons. The Flip the Classroom tablet computer initiative was abandoned a year after the announcement. Without notice or a publicly disclosed assessment, the venture disappeared. The four schools got to keep $644,000 worth of hardware and $152,000 invested in Wi-Fi installation, while $230,000 expended on student and staff training produced, at best, mostly residual educational benefits. Only one of the four school districts, Annapolis Valley Regional School Board, elected to purchase tablets for grade 7 incoming students.

For the two Atlantic Canadian businessmen, it was a powerful lesson. What started out as a plan to introduce the Khan model ended up merely a means for a few schools to acquire tablet computers. Openly opposed by Nova Scotia Teachers Union president Shelley Morse as a sign of privatization, stalled by education staff consultants, and contained by school-level regulations, practices, and behaviours, it never stood a chance (CBC News Nova Scotia 2015; NSTU 2013; Ruskin 2013).

Today the extraordinary promise of e-learning remains largely unfulfilled in Nova Scotia and neighbouring Atlantic Canadian provinces. Although the region was relatively quick to embrace the Internet and an integrated e-communications system like ednet, school authorities and teachers have been slower to accept and embrace learning innovations that deviate from the mainstream approved curriculum (Bennett 2012b; Mills 2009). That said, innovative educators such as Kent Avery and Carolyn Huggan, grade 11 teachers at Charlottetown Rural High School, continue to experiment with Flipping the Classroom after being encouraged to do so by their education studies program at the University of Prince Edward Island (Russell 2016). Further afield, enterprising teachers in the Toronto region and in Regina have also reportedly tested the idea in their classrooms (CBC News Toronto 2014, CBC News Saskatoon 2015).

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Flipping the Classroom has caught on more quickly and extensively in U.S. schools. With the active support of the Flipped Learning Network (FLN) and Sophia.org, the concept is far better known and more widely in use. In October 2015, a FLN survey reported that some 96 percent of 2,358 teachers surveyed in 2014 recognized the term "flipped classroom," up from 73 percent in 2012. Some 78 percent of respondents claimed to have "flipped a lesson," up from 48 percent two years earlier. Among those using the new model, mostly in high schools, nine out of ten reported "improved student engagement" and, most surprisingly, almost half of the early adopters (46 percent) had been teaching for more than 16 years (McWhirter 2015).

Online and blended learning methods — with or without the Flipped Classroom — are not a panacea for what ails teaching and learning in today's schools. Online courses in universities and colleges, particularly Massive Open Online Courses, tend to suffer from relatively lower completion rates (Haynie 2015). At the K-12 school level, U.S. private venture "virtual school" initiatives with expanding online enrolments — most notably K12 Inc. — have not measured up in terms of improving student performance levels (Hensley-Clancy 2015; Saul 2011). The Flipped Classroom, on the other hand, has been shown to be more effective when used by skilful teachers. Making effective use of the Flipped Classroom requires a teacher skilled enough to motivate students and ensure proper intellectual engagement inside and outside class.

Flipping the Classroom can help struggling students, those who miss classes, and others who crave further enrichment. Students who watch the videos come to class prepared and experience higher levels of student-teacher interaction. Teachers talk less in class, provide more individualized instruction, and report fewer class-management issues (Bergmann 2014; Bergmann and Sams 2012; Bretzmann 2013). Those teachers who idealize the 21st Century Learning ideology as cutting edge soon realize that it is far more challenging to make it work in the real world classroom (Walsh 2012).

Blended learning using the Flipped Classroom is proving far superior to online learning programs that are self-paced with little or no teacher-mediated interactions. Students in purely online courses or who are exposed to regular-length online lectures have difficulty sustaining attention, and require interventions to discourage "mind wandering" activities (Schacter and Szpunar 2015, 60-63; Szpunar, Khan, and Schacter 2013). Classes that use shorter recorded material, such as introductory statistics or Khan Academy videos — broken up with periodic quizzes — tend to improve student engagement and produce better learning outcomes. A study of forty-eight high school age students suggests that video watching interspersed with short tests helps to counter "overconfidence" induced by watching the videos and tends to improve student memory recall and performance (Szpunar, Jing, and Schacter 2014). In the

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hands of good teachers, blended learning strategies such as the Flipped Classroom promote much higher levels of student engagement and enhance the quality of student learning.

The world has gone digital almost everywhere except for Canada's distinctly old-school education system. Technology is transforming the everyday life of Canadians, particularly the younger generation, but the implementation and growth of digital learning remains uneven in K-12 schools, not just in the Atlantic provinces but across Canada. Official statistics on the growth of e-learning are hard to find, but they are indicative of patterns and trends. Leading online learning expert Michael K. Barbour estimates that, in the 2013-14 school year, some 332,000 Canadian students were enrolled in one or more distance education courses — 6.2 percent of the total 5.3 million K-12 student population, and double the portion reported three years earlier (Barbour and LaBonte 2014). That number is dwarfed by the figure in the United States, where Ambient Insights estimates that the number of students accessing online learning doubled from 2 million to 4 million from 2010 to 2011, to some 5.3 million in 2014 (Allen and Seaman 2015).

In Canada, the e-learning leaders are British Columbia and Alberta, which together account for 46 percent (152,900) of student online enrolments in approximately 99 "public distributed learning schools." More than 12 percent of these students take one or more online courses, compared with 2.6 percent in New Brunswick, 2.2 percent in Nova Scotia, 1.3 percent in Newfoundland and Labrador, and a paltry 0.5 percent in Prince Edward Island (Barbour and LaBonte 2014). From the data one can surmise that the relative growth of online learning in both countries is broadly uniform, but that Atlantic Canada has fallen behind other parts of Canada and the United States.

Nova Scotia is flirting with e-learning and only beginning to engage with the pan-Canadian movement promoting 21st Century Learning and technology-driven education. In early July 2015, the acting executive director of innovation in the province's Education Department, Sue Taylor-Foley, hosted a Canadian e-Learning Network (CANeLearn) symposium titled "Toward Flexible Learning Solutions in Canada." The program focused mostly on British Columbia's and Alberta's bolder ventures into blended learning integrating online and classroom-based instruction. The province used the session to promote its own Nova Scotia Virtual School (NSVS) (CANeLearn 2015). A follow-up CANeLearn online session in January 2016 offered by Nova Scotia technology consultant Sarah Hainsworth simply showcased NSVS, a province-wide portal staffed by 16 teachers and reaching about 500 of the province's 118,000 public school students. Much of the session also focused on Article 49 of

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the Nova Scotia teachers' contract, which limits online classes to between twenty-two and twenty-five students and confines instruction to regularly scheduled school times.

Together with the aborted Khan Academy initiative, the pattern is clear: the province's approach to e-learning remains firmly committed to minimizing the potential for "disruptive innovation" in the public schools (Hainsworth 2016). Flexible learning experiences for Nova Scotia students and teachers do not appear to be coming soon. Student and teachers yearning for greater access to the latest technology for learning deserve better.

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> *Surface changes in education will not equip students for the 21st century. Change is needed at the core of educational practice … Insights from complexity theory can help leaders think outside the box of the traditional system to inspire and spread positive changes. Change is inevitable, transformation is possible.*
>
> *– Penny Milton, "Shifting Minds 3.0 (C21 Canada 2015)"*

> *Technology is the new normal in Ontario schools and the life of students. … While the potential for technology to improve learning is real, particular trends or products still run considerable risks of being oversold and "underused."*
>
> *– Bodong Chen, Kelly Gallagher-Mackay, and Annie Kidder, "Digital Learning in Ontario Schools" (People for Education 2014)*

## The big picture:

## The state of online learning in Canada

Distance or online learning is growing modestly in Canada, although it continues to represent a tiny proportion of total Canadian school enrolment. Over the past decade, however, online resources such as e-learning courses and programs as well as virtual schools have either spread or popped up in Canada's remarkably diverse provinces and territories (Barbour 2010, 2014). At the elementary and secondary school levels, regular brick-and-mortar schools have acquired computer hardware and software, connected them to the Internet, installed wireless networks, and offered in-service training in information and communication technologies (ICT) to novice and experienced teachers. Across Canada, the infrastructure in most schools now enables Internet access, student portals, digital libraries, and networks that support laptops and handheld and other portable devices (Mills 2009). Among Canadian educational authorities and teachers, there is a growing realization that "digital literacies" are becoming essential in preparing students to participate fully in the emerging post-industrial knowledge society of the 21st century (Chen, Gallagher-Mackay, and Kidder 2014).

The first generation of ICT for the classroom was, as Larry Cuban aptly noted, "oversold and underused" in North American schools (Cuban 2003; see also Jensen, Taylor,

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and Fisher 2010). Today's students are far more cyber-savvy, and hunger for more sanctioned opportunities to use technology inside the schools. Popular books such as Don Tapscott's *Growing Up Digital* (1997) and Howe and Strauss's *Millennials Rising* (2000) have gone so far as to suggest that the net generation (born to baby boomers) and the millennials (most of today's students) have turned the "generation gap" into a "generation lap," so far ahead of us are they when it comes to the mastery of technology. Such broad generalizations about generational differences might well be exaggerated and, as the University of Georgia's Tom Reeves has shown, the technical fluency and knowledge of today's students run far broader than deep (Reeves 2008). The new generation of learners might inhabit a "digital world," but they are also hobbled by a strain of selfie-ism and dogged by the legacy of "parental perfectionism." Introducing technology alone in schools has not proven enough without active teacher support and engaged, motivated students (Barbour 2009).

Mobile learning technology has been adopted almost *en masse* by the net generation and by today's so-called screenagers. Although the innovative use of online technologies has gradually penetrated into the publicly funded school system over the past ten years, the availability of, and access to, these technologies has not kept pace with student demand or expectations. Some schools across Canada still prohibit the free use of mobile devices outside designated rooms or access points (Hutchison, Tin, and Chao 2008). An Ontario study identifies the "ongoing but under-reported disconnect between the massive spending devoted to digital technologies in schools, and their persistent under-use in classrooms, despite claims that the 'next gen' of tech-savvy educators are more inclined to integrate technology into their teaching" (Jensen, Taylor, and Fisher 2010, 5). Some of the underuse of ICT is related to a continuing gap in the systematic implementation of technology integration, both in faculty of education training and in ongoing professional development. Even if classroom teachers are sufficiently prepared, a 2014 Ontario People for Education report finds that they face "significant barriers to integrate ICT," including curricular shortcomings, constraints around access, lack of technical support, and limited preparation time (Chen, Gallagher-Mackay, and Kidder 2014; see also Hixon and Buckenmeyer 2009).

Annual reports on K-12 Online Learning from 2008 to 2015, mostly researched and written by Canadian information technology expert Michael K. Barbour, demonstrate steady and incremental growth in the practice of distance, online, and blended learning. With public education governed by the provinces and territories, accurately assessing the growth of such teaching practices in a country with 5.3 million K-12 students and 15,000 schools remains challenging for researchers. Based upon increasingly reliable annual surveys, however, the number of tracked "distance education students" has

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risen from some 140,000 (2.7 percent) in the 2008-09 school year to 332,000 (6.2 percent) in 2013-14 (Barbour and LaBonte 2014). The use of blended learning is on the rise, even if the reported data are rather patchy. With the 2012 formation of the Canadian e-Learning Network, a national pan-Canadian consortium focused on K-12 online and blended learning, better data might be generated, making tracking much more accurate and reliable for policy analysis and decision making (Barbour 2013 CANeLearn 2015).

Compared with the recent dramatic expansion of digital learning in the United States, online and blended learning in Canada's K-12 public schools have followed a decidedly different pattern of evolution (Barbour 2012; Finn and Fairchild 2012). Much of the online learning in parts of Canada remains an outgrowth of correspondence school education, involving e-format programmed units, audio distance learning, and video conferencing. The primary drivers in provincial and territorial education systems are government authorities, while learning corporations serve as contractors that provide content, learning technologies, and support services to the government-run operations. Despite the tremendous potential for expansion in online learning programs, the free market remains regulated, and private providers are largely absent. Provincial or school district authorities promote a cautious, contained, growth-management strategy in which online and blended learning are considered within the bricks-and-mortar framework as the next evolution of effective technology integration (Barbour 2015).

Among the provinces, New Brunswick was first out of the gate to embrace 21st Century Learning with a proposal on May 14, 2010, by Deputy Minister of Education John D. Kershaw to shift the province's entire public school system to a 21st Century Learning model (ITBusiness 2010). Armed with provincially mandated netbook computers, all anglophone teachers were sent an online communiqué promoting the brand new province-wide e-learning strategy. That visionary three-year plan, entitled *21st Century Learning* (NB3-21C), was launched with a fast-paced and futuristic five-minute video highlighting the rapidity of change bombarding today's younger generation (New Brunswick 2010). In jarring top-down fashion, the department publicly endorsed the so-called CRT2 formula *(creativity, relevance, time, technology).*

The whole 21st Century Learning agenda, and a related August 2010 election promise to follow the State of Maine in equipping all students with laptop computers (CTV News Atlantic 2010), effectively perished with the defeat of the Shawn Graham Liberal government and Kershaw's departure from the scene. Although that initial flirtation with 21st Century Learning proved short-lived, it was eventually revived by Kershaw and transformed into a pan-Canadian movement largely driven by the Council of

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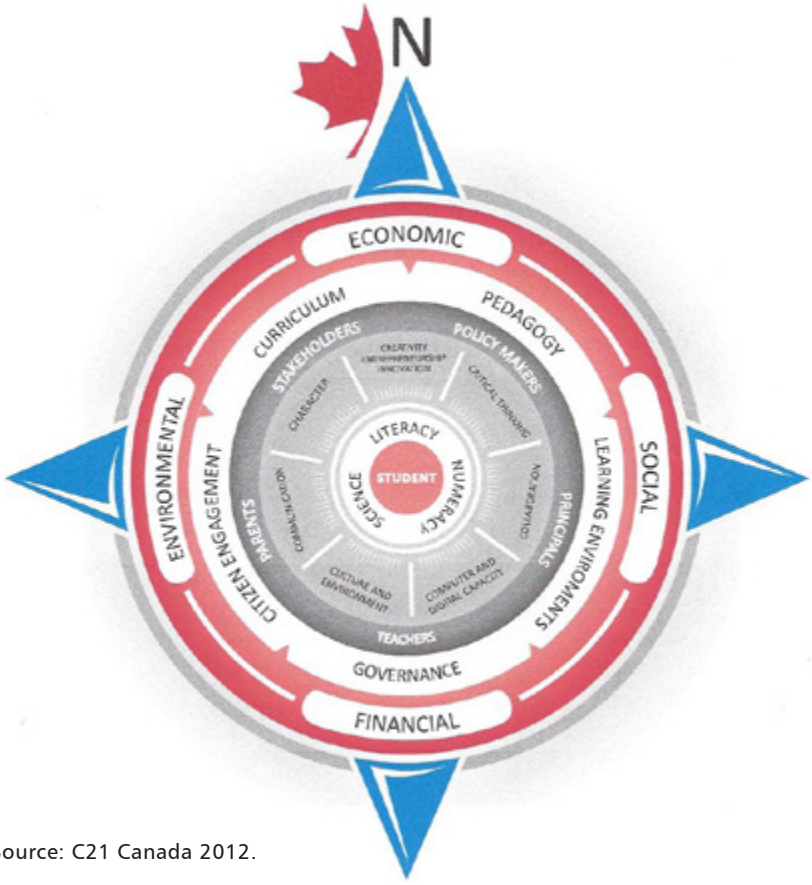
FIGURE 1

**The 21st Century Learning Framework**




Source: C21 Canada 2012.

Ministers of Education and Kershaw's former deputy minister colleagues.

"Twenty-first century skills, technology, and learning" became the official mantra of Canadian education policymakers, signalling, first and foremost, change — defined in terms of meeting the needs of the next generation of learners. A national organization, C21 Canada, emerged in 2011 to promote "new models of public education" in response to "the advent of the knowledge and digital era" (C21 Canada 2015). In May 2012, C21 Canada released a futuristic blueprint, Shifting Minds, that proposed "a go-forward 21st Century learning framework for Canada's public education systems," founded upon a set of seven declaratory principles, endorsing freer access for students, more personalized learning, and support for educational leaders committed to digital learning initiatives (C21 Canada 2012); see Figure 1. Although the policy paper purported to be Canadian in origin, it mirrored the approach of the American Partnership for 21st Century Skills, and was buttressed with mostly U.S. technology-in-education research studies (C21 Canada 2012, appendix).

Working with the Council of Ministers of Education Canada and Canadian branches of international learning corporations, C21 Canada holds regional conferences and attempts to seed 21st Century learning, mainly through provincial and territorial departments of education (C21 Canada 2015). In British Columbia, the BC Learns initiative, first proposed in late 2010 and known as "Personalized Learning," won the support of C21 Canada, and in the 2015-16 school year was piloted in sixteen different elementary schools (British Columbia 2015). Ontario's e-learning initiative from 2011 to 2014 drew, in part, on C21 Canada's work. In other provinces, such as Nova Scotia, the 21st Century learning promoters have secured some regional school

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board support, but have gained little traction with provincial education departments (Nova Scotia 2015).

More recently, Google Apps for Education (GAFE) has begun to make inroads in Canada's K-12 school systems. When it comes to digital learning, Google has enjoyed much more success than Microsoft and smaller players in the growing market for software in elementary and secondary schools. First introduced in 2006, GAFE made its first big breakthroughs in 2012. Public concerns that Google was mining student e-mail accounts for ad-targeting purposes represented a setback, but that problem was addressed in April 2014 with a change in corporate policy. In Nova Scotia, GAFE was piloted during the 2014-15 school year, then approved for a rollout to all four hundred public schools in the province (Julian 2015). By the end of 2015, it was spreading quickly, and teacher training summits had been held or were scheduled to be held in Ontario, Alberta, Quebec, and British Columbia, as well as in Nova Scotia. In schools across the country, it is becoming increasingly essential for students to have access to the Internet in order to be successful — homework, projects, and even information and advice from teachers is now transmitted online (Frost 2015a).

Education is a provincial government responsibility as the country has no national department of education or policy standards. Some coordination is provided by the Council of Ministers of Education, Canada (CMEC), supported by comparative research conducted until 2010 by the Canadian Council on Learning, based in Ottawa. All ten provinces and three territories have established and maintain distance education programs within their K-12 publicly funded school systems, see Figure 2 (page 17). British Columbia and Alberta have the most extensive online presence, in terms of percentage of student participation. The most populous province, Ontario, has experienced the most recent spurt of growth in student enrolments in distance education and blended learning. The smallest province, Prince Edward Island, has the least participation. Three provinces (Nova Scotia, Newfoundland and Labrador, and New Brunswick) have a single, provincially managed online program, while three others (Ontario, Saskatchewan, and British Columbia) have a primarily school district-based program. In Quebec, Manitoba, and Alberta, online programs are a combination of provincial and district based. The three territories (Northwest Territories, Yukon, and Nunavut) along with Prince Edward Island use online programs from other provinces. Provincial regulations for online learning exist in British Columbia and Nova Scotia, but Quebec, Saskatchewan, and Alberta continue to operate with less regulation of distance learning. Flexibility and openness to innovation are bigger factors than regulatory restrictions in explaining the extent of K-12 distance, online, and blended learning activity (Barbour and LaBonte 2014).

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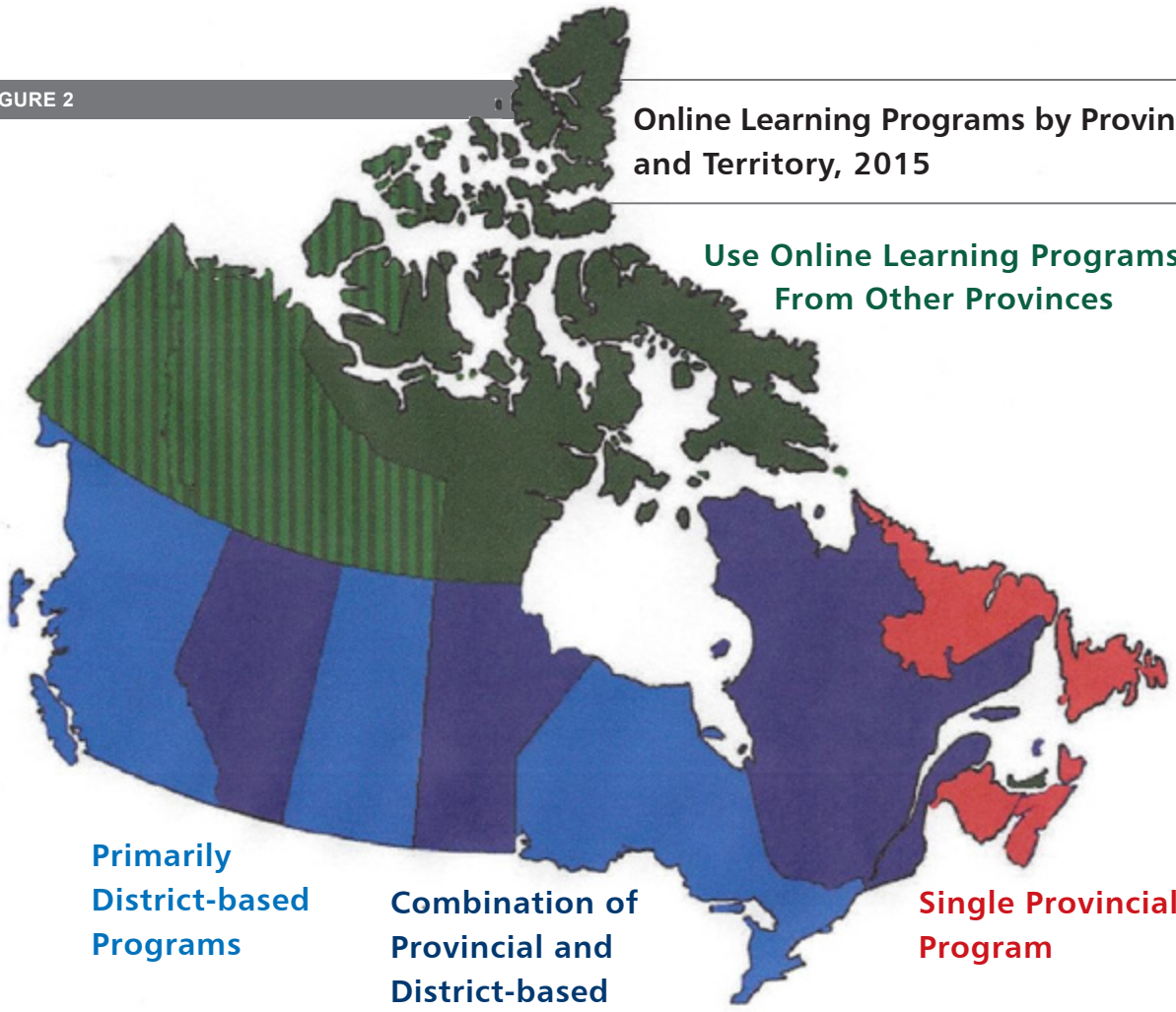
FIGURE 2

**Online Learning Programs by Province and Territory, 2015**




Source: Canadian e-Learning Network.

The shift to online and digital learning has attracted the attention of Canadian teachers' unions, evoking trepidation that varies in degree from one province to another. The Canadian Teachers' Federation (2000) was the first educational organization to begin tracking K-12 distance education participation levels, focusing on the implications for teachers' class loads and working conditions. In British Columbia, distance learning gained earlier and wider acceptance, and the BC Teachers' Federation funded some of the research (Kuehn 2006). From 2013 to 2014, the Alberta Teachers' Association was instrumental in mobilizing a "Stop Distance Education Cuts" movement aimed at sustaining funding through the public school system. "Students need choice and flexibility in their learning opportunities," the association stated. "By cutting funding to schools that use Distance Education, the government is effectively cutting choice and flexibility for students to complete their high school education" (Alberta Teachers' Association 2014).

Provincial regulations governing online learning in Nova Scotia are a response to initial concerns raised by the Nova Scotia Teachers Union (NSTU). When presented

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with innovative online programs, the union's instinctive response was to defend existing teacher contract provisions that limit workload and hours of instruction to those established for classroom-based teachers (Barbour and LaBonte 2014; Bennett 2012b). Another line of defence was and remains to resist online programs, unless and until they can be offered equally to all students. Education school research conducted by Dianne Looker and the Equity and Technology Research Alliance argues that resources should focus on "the inclusion of marginal youth" using information and communication technologies to build upon their "distinctive cultural knowledge" and serve their "economic interests" (Looker and Naylor 2010).

Distance education serves as a supplementary curricular program in most provinces and territories. Until 2014, some provinces continued to deliver distance education in the static form of e-links to web postings of print-based learning materials, but growing numbers of schools are making use of synchronous tools such as traditional video conferencing or virtual classroom software. Across Canada, however, K-12 distance education is often used interchangeably with online learning, even though most such learning does not actually take place online. A survey of the various provincial and territorial programs reveals that distance education provides an attractive alternative when face-to-face learning is not feasible or affordable, or for students who require alternative delivery methods for remediation or course credit recovery (Barbour 2010, 14–16). Without public charter schools pushing at the boundaries of virtual schooling and blended instruction, as in the United States, online learning in Canada primarily exists to provide K-12 courses for students that are not available in the brick-and-mortar school system (Barbour 2015).

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> *While New Brunswick was an early champion of "21st Century Learning," provincial budget restraints from 2010 to 2014 limited the proliferation of ICT across the province … Recent growth in student enrolment in online courses, according to the NB Education Department, is attributable to expanded First Nations language course offerings and meeting Special Education course demands to serve severely learning-challenged students.*

*– Paul W. Bennett, "Digital Learning in Canadian K-12 Schools" (Springer Handbook, 2016)*

> *The … NSTU is heavily involved with distance education. The NSTU contract is by far the most detailed of all the Canadian provinces. Eleven different provisions under Article 49: Distance Education give guidance on how online education should be administered … ensuring that distance education teachers have comparable workloads to their face-to-face counterparts, adequate and regular training … and input on further development of K-12 distance education in the province.*

*– Michael K. Barbour and David Adelstein, "Voracious Appetite of Online Teaching" (BCTF, 2013)*

## The regional situation: The state of e-learning in Atlantic Canada

Canada's public education system can be understood only through the lens of its discrete regions. Following the example of reports by the International Association for Online Learning and CANeLearn, this comparative analysis highlights regional and provincial variations in the current provision of online and digital education (see Table 1, next page).

Nine of the ten provinces have their own K-12 distance education programs (the exception is Prince Edward Island); two provinces (New Brunswick and Newfoundland and Labrador) maintain single, centralized, province-wide systems; Nova Scotia has its own system, built in collaboration with a small number of regional school boards; in Ontario and Saskatchewan, online learning is remarkably decentralized, much of it

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TABLE 1

**Registered Distance Education Students, by Province and Territory (2013-14)**

| Province/Territory | Number of K-12 Students | Number Enrolled In Distance Education | Percent Involvement |
|---|---|---|---|
| NL | 67,436 | 884 | 1.3% |
| NS | 122,643 | ~2,720 | 2.2% |
| PE | 20,131 | 108 | 0.5% |
| NB | 101,079 | 2,615 | 2.6% |
| QC | 1,307,026 | ~70,500 | 5.4% |
| ON | 2,015,411 | 78,095 | 3.9% |
| MB | 200,807 | ~12,000 | 6.0% |
| SK | 172,205 | ~10,000 | 5.8% |
| AB | 616,375 | ~75,000 | 12.2% |
| BC | 635,057 | 77,912 | 12.3% |
| YT | 5,122 | 182 | 3.5% |
| NT | 8,204 | 228 | 2.8% |
| NU | 9,728 | 33 | <0.1% |
| Federal | 106,500 | ~1,800 | 0.1% |
| **TOTAL** | **5,387,724** | **332,077** | **6.2%** |

Source: Canadian e-Learning Network.

delegated to consortia or remote school districts; and in Prince Edward Island and the three territories, online learning might be described as limited in its reach (Barbour and LaBonte 2014). Only British Columbia, Ontario, and Alberta have proved to be fertile ground for private school ventures in the form of virtual or online schools (Barbour 2010, 41; Kuehn 2013). In Alberta, the rise of virtual schooling delivered by "cyber charter schools" has surfaced as a controversial public policy issue. In October 2013, Parkland Institute, a University of Alberta research unit, released an openly hostile report warning of the dangers of "pedagogical innovation" in the form of privatization presented as a way of easing "budgetary constraints" (Clements and Gibson 2013).

The four Atlantic provinces cooperate on joint curriculum projects, given their relative close proximity to one another. Province-wide distance learning programs also exist (again, except in Prince Edward Island) managed by their respective departments of education, but only Nova Scotia has developed a regulatory regime to govern the provision of online education. All online programs are sponsored by the provinces, some in collaboration with district boards serving rural areas.

## Newfoundland and Labrador

In Newfoundland and Labrador, distance education began in the 1988-89 school year

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with the advent of a single advanced mathematics course involving thirteen schools and using a telematics or audio graphics delivery system. A Centre for Distance Learning and Innovation (CDLI) was established in 2001-02, with ten different courses enrolling two hundred students in seventy-six rural schools (Barbour 2005). In its first decade, the CDLI expanded to offer thirty-eight courses with some sixteen hundred course registrations each year. In 2013-14, 884 students were enrolled in 39 different courses, for a total of 1,576 registrations (Barbour and LaBonte 2014). The province's high school program offers synchronous instruction that matches regular school time, and uses *Elluminate* software and asynchronous instruction supported by the *Desire2Learn* course-management system. Some online instructional support is also offered in the lower grades. That province is also home to the Killick Centre for E-Learning Research, a leading online education research centre, at Memorial University of Newfoundland. The Ministry of Education tracks online education delivery and maintains a "K-12 School Profile System"; as of October 2015, however, there were no policies or regulations for distance education beyond those used by the CDLI. Although e-learning was recognized as one of eight "lines of business" of the education ministry, provincial regulations were reportedly only under discussion (Barbour and Mulcahy 2009; Barbour and LaBonte 2014; Crocker 2007).

## Nova Scotia

Nova Scotia has developed its own province-wide online learning program, the Nova Scotia Virtual School (NSVS). It provides a central course-management platform and delegates to the eight school boards the responsibility for providing course content written by practising classroom teachers (Bennett 2012b). The province's French school board, the Conseil scolaire acadien provincial, has a longer history of offering online courses, shared jointly with New Brunswick. Since the Nova Scotia market has tended to lag in providing province-wide high-speed Internet access, concerns about the urban-rural "digital divide" exert considerable influence on educational policymaking in the province (Looker and Naylor 2010, 117–36); for example, in the 2013-14 school year, the province's correspondence studies program was being transitioned to an online delivery format. Although Nova Scotia has no K-12 distance education legislation, provisions in the contract with the NSTU set out the parameters for current and future activity. Combined student enrolment in the NSVS and correspondence courses totalled 2,720 in 2013-14, composed of 970 in the former and 1,750 taking correspondence courses (Barbour and LaBonte 2014, 13).

Nova Scotia's regulatory regime for education is buttressed by the provincial teachers' contract. The eleven specific clauses in the agreement set out the rules of engagement and, in effect, limit the provincial government's freedom of action in providing online

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learning. All online instructors must be certified by teachers, be employed by one of the eight boards, and are covered by provisions limiting their number of instructional days and working hours and guaranteeing personal days as well as dedicated preparation and marking time. Distance education is treated as a regular in-school program, with supervisors, dedicated facilities space, and class groups limited to twenty to twenty-five students. A provincial Distance Education Committee, with teacher union representation (four of eight positions), exists to address "issues surrounding distance education" (Nova Scotia 2011).

The Department of Education and Early Childhood Development is starting to embrace digital learning in close partnership with Google and tethered to Google Apps for Education (GAFE). After piloting the program in a number of schools in the 2014-15 school year, the department decided to make GAFE available to every child and teacher in the province's schools. Twenty thousand of Nova Scotia's 118,000 students are now using free computer software from Google as part of their classroom activities. Provincial education officials expect the use of GAFE to be nearly universal by the end of 2016-17. The cloud-based suite of programs can be accessed on any electronic device with an Internet connection and a web browser. It includes email, word processing, and assignment-management software. Some school boards have chosen to issue students $200 devices called Chromebooks to let them access Google products at school and at home (Julian 2015).

## Prince Edward Island

Prince Edward Island makes minimal provision for distance or online education. Two ministerial directives, issued in 2001 and in August 2008, set out provincial guidelines and authorize, for PEI credit purposes, distance education courses offered by New Brunswick and other provincial jurisdictions. A provincial video conferencing system exists, but it is little used by the Education Department or students in local schools. In the 2013-14 school year, only 108 out of 20,131 students were enrolled in online courses (Barbour 2011; Barber and LaBonte 2014, 14).

## New Brunswick

Two online learning programs are offered in New Brunswick, one in each official language to serve the two linguistic school systems. Although the programs reflect the province's bilingual reality, it is delivered by the Department of Education and Early Childhood Development's learning management system. Enrolment in these programs consists mostly of students who are supplementing their regular in-school studies, and was relatively static or declined slightly from 2007 to 2012 in both the

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anglophone and francophone school systems. New Brunswick was an early champion of 21st Century Learning, but budget restraints have limited its proliferation across the province (New Brunswick 2010; Barbour and LaBonte 2014). From 2008 to 2014, between 2,200 and 2,650 students were enrolled annually in distance education courses. Steadily increasing numbers of students were enrolled in face-to-face courses registered in the learning management system, with teachers using online material to teach the course. In the 2013-14 school year, some 943 anglophone students and 1,511 francophone students were registered in these "blended" learning activities.

Recent growth in student enrolment in online courses, according to the Department of Education and Early Childhood Development, is attributable to expanded First Nations language course offerings and special education courses for severely learning challenged students, offered as self-paced programs outside of class. (Barbour and LaBonte 2014, 15). Indeed, students' mental health and anxiety issues are cited as critical issues in New Brunswick and might well be related to that province's whole approach to special education.

Since 2006, the department has pursued the goal of serving growing numbers of students with complex and severe needs in regular classrooms through "inclusive education." Despite grave concerns raised by the New Brunswick Learning Disabilities Association and a vocal autism group, the provincial government reaffirmed its commitment to "inclusive education" for all in June 2012. The report, "Building a Bigger Tent," published by the Atlantic Institute for Market Studies in 2012 raised a red flag about the incidence of severely learning challenged children, unable to cope in regular classes, "falling out" of the system (Bennett 2012a). Recent reports suggest that more and more struggling students are either being home schooled or served by online learning courses. Teaching assistants employed to support "inclusive education" are now being trained through a wider array of online training offerings (Barbour and LaBonte 2014, 15).

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> *Over time, as the disruptive models of Blended Learning improve, the new value propositions will be powerful enough to prevail over those of the traditional classroom.*
>
> *– Clayton M. Christensen, Michael B. Horn, and Heather Staker, "Is K-12 Blended Learning Disruptive?" (2013)*

> *Seat time [in the brick-and-mortar classroom] does not assure that students will develop the requisite knowledge and skills for success in college and careers. Thus, we need to redesign the foundations of our educational system to learner-centred and competency-based, so students graduate prepared … Proficiency-based diplomas provide an important policy lever [to ensure] meaningful recognition of demonstrated knowledge, skills, dispositions, and abilities.*
>
> *– Dale Frost, "Nine Ways States Can Create Competency-Based Education Systems" (2015)*

## Overall assessment: The present state and future of digital learning

Digital learning is on a growth curve in Canada's school systems, but without the radical variations, free market experimentation, and "disruptive" innovation found in the United States (Christensen, Horn, and Staker 2013; Chubb 2012; Moe and Chubb 2009). Significant gaps still exist in service levels, and barriers stand in the way of expansion into underserviced frontiers, particularly in Atlantic Canada, the North, and First Nations communities. Throughout Canada, including in Alberta, school choice is rationed or limited, learning conditions are carefully state regulated, and "brick-and-mortar" schooling circumscribes the delivery of education. Virtually all Canadian educational systems remain designed around seat time, defined as providing in-school classes of regulated size with a minimum number of instructional hours (Jenson, Taylor, and Fisher 2010; Powell et al. 2015). Some private sector virtual schools have recently been established, and are thriving outside the mainstream system. No full-time online public charter schools exist, even in Alberta, the only province with charter school legislation (Bennett 2012b). Distance education and online learning student enrolment

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continues to grow only incrementally, particularly in "have-not" jurisdictions where expansion is limited by budgetary spending limitations (Barbour and LaBonte 2015).

However, the growth of online learning in Canada might be more significant than reported by provincial and territorial authorities. Although Quebec and New Brunswick reported modest enrolment in distance education in the 2013-14 school year, estimates of the number of teachers who use the curriculum in blended format are much higher. From 2011 to 2014, to cite one example, the Ontario Ministry of Education coordinated an initiative to expand access to blended learning for all K-12 students, which generated almost 240,000 blended learning enrolments in the provincial learning management system during 2013-14. If and when provincial authorities begin tracking the extent of blended learning, the actual rate of growth of online learning will prove higher than in the official statistics (Barbour and LaBonte 2014).

Digital learning has entered the education policy discourse in most provinces and territories. The promotion of skills, technology, and learning for the twenty-first century falls to provincial and territorial education authorities with varying degrees of commitment to technology education reform. The national advocacy group 21C Canada holds some sway over provincial ministers of education (see Milton 2015), but so far the implementation of 21st Century Learning and the explicit teaching of "digital literacies" is very uneven, particularly outside the recognized leaders among the provinces: Ontario, British Columbia, and Alberta (Chen, Gallagher-Mackay, and Kidder 2014).

Blended learning is on the rise, as an outgrowth of the natural evolution of online and face-to-face education from 2008 until 2015. Newer blended learning models, promoted by the Clayton Christensen Institute for Disruptive Innovation (Powell et al. 2015, Horn 2016), are beginning to emerge in the so-called hybrid zone in what might be termed exemplary, or "lighthouse," schools, see Figure 3 (next page). Although British Columbia, Alberta, and Ontario actively promote e-learning, innovation is limited by current structural boundaries, and the education authorities are only beginning to track blended learning enrolment. In 2012-13, British Columbia enacted legislation enabling "flexible learning choices," and, with the support of the BC Distributed Learning Administrators' Association, blended learning and Flipped Classroom practices are becoming more mainstream (Barbour 2013, 61–2). Google Apps for Education has now surfaced as an affordable software option for cost-conscious school jurisdictions. National online education survey reports produced by CANeLearn (Barbour and LaBonte 2015) testify to the steady growth of distance education and online programs, but they also identify the need for better data and

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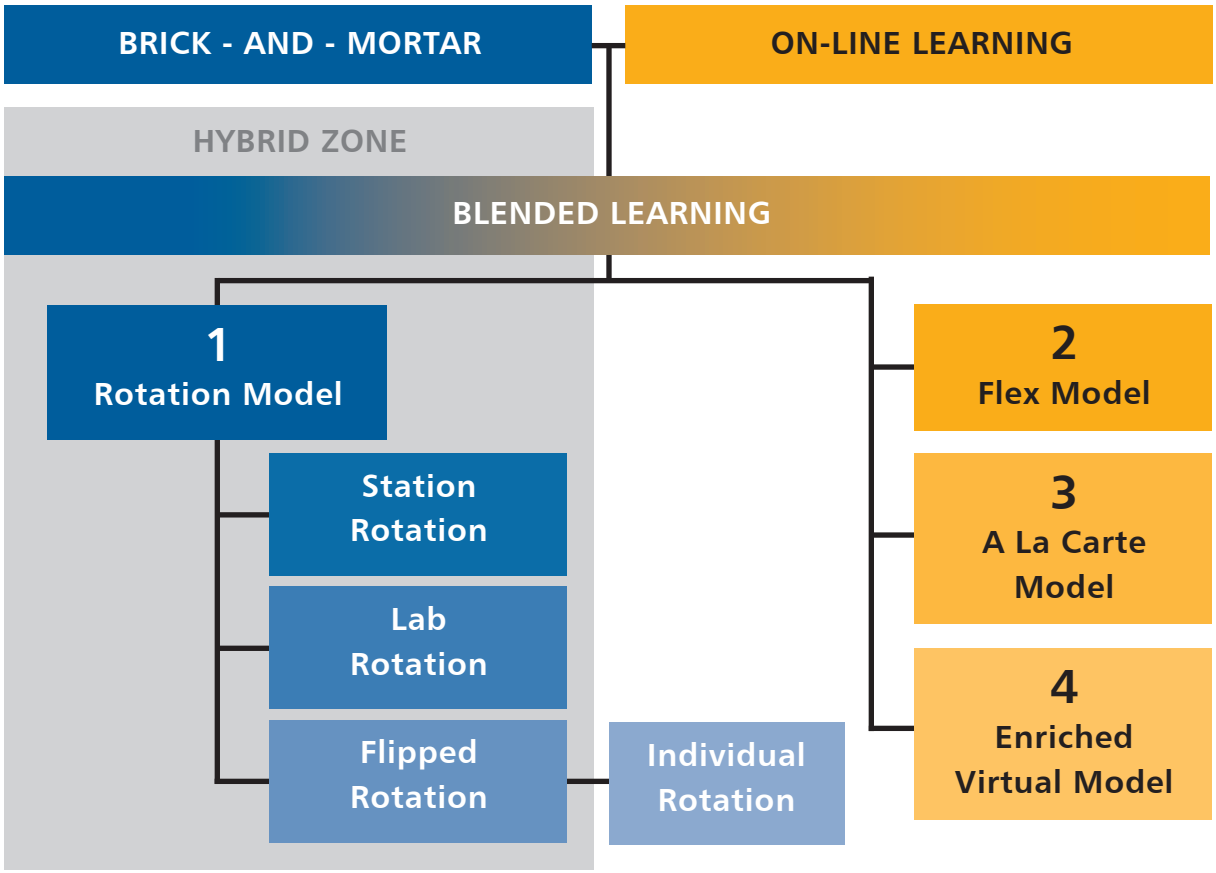
FIGURE 3

The Hybrid Model of Blended Learning




Source: Clayton Christensen Institute.

more evidence of the transition to "competency-based learning" in Canada.

Disruptive innovation is rather bold and messy in the eyes of most Canadian education authorities, particularly in Atlantic Canada. The Disruptive Innovational model touted by Clayton Christensen and his Harvard University team of researchers is not unknown among provincial education policymakers, but remains a mystery to the vast majority of frontline classroom teachers in the region. Provincial technology consultants are familiar with recent trends in e-learning and the gradual transition occurring from strictly online, self-paced learning to blended learning that combines online and face-to-face classroom instruction.

The Theory of Hybrids, applied to K-12 education in a 2012 Christensen Institute white paper, is proving to be an extremely useful taxonomy for explaining the various models of technology integration and Internet connectivity (Staker and Horn 2012). Identifying clearly the four primary models of information technology integration helps to clarify the distinction between traditional (brick-and-mortar) learning and

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online learning and to spell out the alternative models of teaching/learning. The Rotation Model with its four variations — Station Rotation, Lab Rotation, Flipped Classroom, and Individual Rotation — captures well the variety of approaches now available to in-school teachers embracing the potential of learning technologies. New technology has also yielded online learning models. These include the Flex Model (where students move on a customized, fluid schedule across learning modes), the A La Carte Model (where students take one or more online courses along with regular classroom courses), and the Enriched Virtual Model (where students take a full program of fully integrated online and brick-and-mortar courses). Indeed, the whole concept of a hybrid zone in which blended learning is facilitated and embraced to enhance student learning is quite a revelation, especially for teachers frustrated by current school-level constraints, limited or rationed resources, and structural barriers to classroom innovation (Christensen, Horn, and Staker 2013).

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# Summary and recommendations

Fostering disruptive innovation is a formidable challenge in rigidified school systems such as those in Atlantic Canada. The region's school systems remain wedded to traditional brick-and-mortar school operations, most comfortable with established command-and-control management practices, inclined toward strict management of technology integration, and committed to training children and youth for a disappearing workplace. National schemes to introduce the "learning shift" promoted by C21 Canada, learning corporations, and high-level education officials still smack of top-down initiatives with vague and somewhat fuzzy projected outcomes in terms of raising student performance standards. Leading online learning experts, including Canadians Michael K. Barbour and Larry Kuehn favour advancing online teaching, but remain skeptical about outsized claims that testify to the improved learning outcomes of students in an online learning environment (Barbour and Adelstein 2013).

Initial phases of introducing e-learning in schools do cause turbulence and discomfort for teachers and principals, and, as Christensen openly acknowledges, produce mixed initial results and even setbacks. Without vocal support and demand from middle and high school students and parents, such ventures can be ignored, shed, or extinguished by threatened educators. Having recognized the institutional barriers, introducing disruptive learning is still possible, under the optimal conditions with the proper balance of pressure and support to effect the change in teaching and learning modalities (Horn 2016). Once classroom teachers see the enormous learning potential and taste what the Rotation Model enables for their students, they become more interested in, and hungry for, new teaching approaches that enable richer, deeper, enhanced learning more attuned to the personal needs and passions of students (Christensen, Horn, and Staker 2013, 37–8).

Teachers and education leaders have much to gain from the remaking of the twenty-first-century classroom, bringing real life experience and a healthy skepticism to bear with regard to ephemeral fads and hair-brained schemes. Top-down educational initiatives, especially in information and communication technologies, die a quick death or simply languish without the active support and engagement of regular classroom educators. That is why innovative and disruptive ideas such as the Flipped Classroom and a Virtual Enriched learning environment dreamed up by corporate change management experts and delivered from on high rarely succeed in changing the trajectory or improving the quality and variety of student learning in K-12 education.

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Top-down initiatives branded with 21st Century Learning labels and high-sounding philosophical principles tend to falter, and rarely succeed in winning over regular teachers or in penetrating classrooms. Curricular reform that taps into the enormous potential of e-learning will succeed only if it enlists the support of regular classroom teachers and mobilizes them from the school level up. The following nine policy recommendations are more likely to spark needed "disruptive innovation" in Atlantic Canada's school systems and to produce deeper learning of much greater benefit to students.

## Recommendations

**Recommendation 1: Support early adopters committed to initiating blended learning programs.** Identify a core team of regular working teachers at the school level committed to demonstrating the exciting possibilities of blended learning, and give them the freedom and resources to innovate outside artificially imposed limitations and the framework of the traditional classroom.

**Recommendation 2: Strengthen and expand existing self-directed online learning programs and "seed" new ones.** Focus initial blended learning projects on strengthening and enhancing existing or proposed self-directed learning programs, such as elementary literacy and mathematics, remedial tutoring, high school credit recovery, advanced placement coursework, and co-curricular gaming activities.

**Recommendation 3: Focus on building the A La Carte model of blended learning programs in junior and senior high schools.** Expand the number and variety of junior high and senior high school courses using the A La Carte model, which would offer engaging, substantive, and meaningful courses otherwise unavailable to students.

**Recommendation 4: Clear away current structural barriers and regulatory constraints.** Gradually remove current constraints imposed by provincial regulations, such as Article 49 of the Nova Scotia teachers' contract — which limits online classes to between twenty-two and twenty-five students and confines instruction to regularly scheduled school times — to encourage more flexible, responsive online learning program initiatives outside the normal boundaries of brick-and-mortar schooling; look to British Columbia for guidance in facilitating successful new initiatives.

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**Recommendation 5: Build school leadership capacity in e-learning, change management, and disruptive innovation.** Start to train the trainers by providing principals and instructional leaders with the competencies and skills required to nurture, support, and protect disruptive innovation projects in blended learning in Atlantic Canada's K-12 school systems.

**Recommendation 6: Develop and test more reliable measures of the effectiveness of e-learning program innovations.** Follow the lead of the Canadian e-Learning Network in developing more reliable measures of learning competencies and in assessing the impact of online and blended learning initiatives on the acquisition of core knowledge and solid improvement in student performance.

**Recommendation 7: Broaden the range of e-learning innovation policy initiatives.** Embrace and gradually implement learning-innovation-friendly educational policies in a far wider range of policy areas, including expanded school program choices, greater teacher autonomy, more flexible staffing formulas, expanded student learning time, and accredited, autonomous virtual high schools.

**Recommendation 8: Foster the development of more agile, flexible, and adaptable alternative schools.** Reinvent the traditional structure of a regional school district, transforming at least some of it into a more flexible and adaptable community of schools that offer a wider range of choice in terms of elementary and secondary school programs, including incubator (e-learning) schools.

**Recommendation 9: Transform traditional top-down school management systems into "communities of schools" that provide face-to-face, online, and blended learning program choices.** Transform identified candidate school districts — such as Halifax Regional School Board, Anglophone East in New Brunswick, and the City of St. John's school district — from management structures that administer a system of relatively homogeneous, consistent school programs into more of a portfolio of different types of traditional, alternative, and blended schools. Build upon the practical experiences of the Edmonton public schools and other school districts offering a wider range of school choice options, including innovative and autonomous school-based management.

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