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Ontario Undergraduate Student Alliance

Research Paper

E-Learning in the Canadian Post-Secondary Education System

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Table of Contents

E-Learning in the Canadian Post-Secondary Education System: Implications for Institutions

Abstract

This paper analyzes recent developments in e-learning technologies with a particular focus on the Canadian post-secondary education system. Using OUSA's four pillars of affordability, accessibility, accountability, and quality, e-learning technologies are analyzed for the potential benefit they may bring to the Canadian post-secondary education system as well as the effects existing technologies have already had. While a number of serious concerns persist, the conclusion is drawn that e-learning technologies, with the proper implementation, can provide great benefits to learners, institutions, and society at large. A number of e-learning enhancement strategies for institutions follow this analysis.

Section One: Introduction

To date, research on e-learning in the post-secondary education environment has focused on a few select issues. There are papers documenting the exciting breakthroughs that have been made in collaborative and visual software, studies comparing traditional classroom learning to e-learning and a hybrid of the two as well as much theorizing about the cost of e-learning courses, now, and in the future. While these developments are useful and sometimes exciting, many of the studies and papers were intended for developers of online classes with little research being conducted with a focus on policy. Furthermore, e-learning, defined as "application of computer technologies to education,"[1] has much broader implications for the post-secondary education system than these select research areas, and these implications merit the attention of academics.

Using OUSA's four pillars for the post-secondary education system of affordability, accessibility, accountability, and quality, this research paper evaluates e-learning by its progress and potential, and e-learning enhancement strategies are suggested for the successful implementation of e-learning technologies in Canadian post-secondary institutions.

Definitions and Clarifications

The definition of e-learning employed in this paper, that is, the use of computer technologies for the purpose of education, is quite broad and there are three clarifications that will help define the focus of this paper.

First, this heterogeneous nature is important because it indicates that e-learning and distance education, while related, are not fully encompassing. As Guri-Rosenblit explains, "most higher education institutions use the digital technologies to enhance classroom encounters rather than adopt a distance teaching pedagogy."[2]

As a second clarification, while there is a tendency to view e-learning technologies to the extent of their innovations, this is not the primary role for these technologies as survey data indicates. The OECD, in collaboration with the UK-based Observatory on Borderless Higher Education, surveyed 19 post-secondary education institutions in 13 countries and revealed that far from targeting new learners or cutting costs through distance education, the driving forces behind institutions adopting e-learning strategies are enhanced pedagogy and flexibility as illustrated in the graph below.[3]

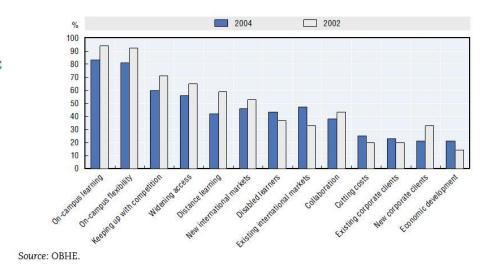[1] Canadian Council on Learning, *State of E-Learning in Canada*, (Ottawa: 2009), 4.
[2] Sarah Guri-Rosenblit, "Distance Education in the Digital Age: Common Misconceptions and Challenging Tasks," *Journal of Distance Education* 23, no. 2 (2009): 108.
[3] Organisation for Economic Co-Operation and Development, *E-Learning in Tertiary Education*, (2005), 3.

Figure 1.

COMPARISON OF
"KEY RATIONALES"
IN INSTITUTIONAL ONLINE
LEARNING STRATEGIES
IN 2004 AND 2002

Source: OBHE.

This leads to a third clarification, that there are essentially four models of e-learning that have developed. E-learning as a supplement to traditional classroom learning, and e-learning for distance credit are perhaps the two most familiar in the Canadian context. There has also been the development of free and open post-secondary courses by American institutions such as MIT's OpenCouseWare project that provides "free lecture notes, exams, and videos from MIT."[4] Lastly, e-learning can be offered as a substitute for traditional classroom learning, often referred to as a hybrid or blended approach, again, primarily offered by American institutions. This last method is used as a way of "leveraging scare classroom resources"[5] where according to the University of Wisconsin "20% or more of the traditional face-to-face classroom time is replaced by online assignments and activities."[6] An unexplored fifth model exists in open courseware with accredited testing from an institution.

These clarifications are necessary to show the heterogeneous nature of e-learning developments as only e-learning developments relevant to traditional Canadian post-secondary institutions are analyzed in this paper.

Framing the Issue

It is hard to overstate the marvel and controversy that has surrounded e-learning in the education community. Some commentators have supported e-learning for its ability to overcome key obstacles to learning such as the interaction of scattered students, easy access to libraries, and ongoing updates of study materials.[7] These developments have lead many commentators to note the trend towards unbundling: whereby the internet opens central features of traditional institutions to the public, often free of charge.[8] Other commentators, though faced with scepticism from the education community, go as far as to predict that the brick-and-mortar institutions of traditional

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[4] MIT OpenCourseWare, *About OCW,* http://ocw.mit.edu/OcwWeb/web/about/about/index.htm
[5] Joshua Kim, "The Hybrid Solution," *Inside Higher Ed*, September 14, 2009.
[6] University of Wisconsin Milwaukee, *Blended Courses*, http://www4.uwm.edu/ltc/blended_courses/
[7] Guri-Rosenblit, 104.
[8] Marc Parry, "Open Courses: Free, but Oh, So Costly," *The Chronicle of Higher Education*, October 11, 2009.

higher education have a short life ahead of them as open courseware projects like MIT's gain in prominence and work out any technical bugs in a similar manner to trends in the print news industry.[9] They conclude with great optimism that the content of higher education is no longer limited by the confines of campuses.[10,11]

Conversely, there are a number of commentators with concerns that e-learning may be reproducing a separation between professor and student that has plagued distance learning and may be partially responsible for the high dropout rates in this form of education.[12,13] Some organizations, such as the Canadian Federation of Students have expressed concerns that e-learning technologies are simply attempts to replace people with machines, a trend they state is incongruent with quality education, an inherently labour intensive process.[14] Within institutions there is also resistance to the development of e-learning. A survey conducted by Campus Computing concluded that faculty resistance and a lack of key resources were among program accreditation and federal regulations as the most frequently cited barriers to growth for online programs.[15] Even at such a cursory level it is clear that e-learning represents both opportunities and challenges for the post-secondary education system.

The Canadian Context

Within the Canadian context, e-learning developments are experiencing a unique blend of opportunities as well as fallbacks. There is certainly opportunity for e-learning developments as widespread access to the internet and a robust telecommunications infrastructure provide the necessary foundation for online learning initiatives. The leadership Canadian industry has shown in computer innovation including the world's first personal computer, and the creation of Javascript and the Blackberry further suggest the ability to implement ambitious e-learning strategy in Canada.[16] Large numbers of young Canadians already use the internet for learning purposes and a 2006 report noted that 31% of 15-year-old students in Canada used a computer daily to search the internet for information while the OECD average was 25%.[17]

Despite these opportunistic indicators for the development of e-learning in Canada, there have been fallbacks. A 2009 survey conducted by the International Telecommunications Union on the advanced use of information and communication technologies (ICTs or IT) ranked Canada 19th out of 154 countries, down from 9th

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[9] Tom Pettigrew, "Debunking the Virtual University Myth," *Macleans*, October 7, 2009.

[10] Patrick J.J. Phillips, "Enjoy your last days on campus," *University Affairs*, October 5, 2009.

[11] Zephyr Teachout, "Welcome to Yahoo! U," *Slate*, September 8, 2009.

[12] Keith Tyler-Smith, "Early Attrition among First Time eLearners: A Review of Factors that Contribute to Drop-out, Withdrawal and Non-completion Rates of Adult Learners Undertaking eLearning Programmes" *Journal of Online Learning and Teaching*, (2006).

[13] Kristen Betts, "Changing Higher Education Landscape: Increasing Demand for Online & Blended Education," *Education Policy Institute*, (2009).

[14] Canadian Federation of Students, *Online Learning: Compromising Quality*, (2000).

[15] The Campus Computing Project, "Online Education Programs Marked by Rising Enrollments, Unsure Profits, Organizational Transitions, Higher Fees, and Tech Training for Faculty," (2009).

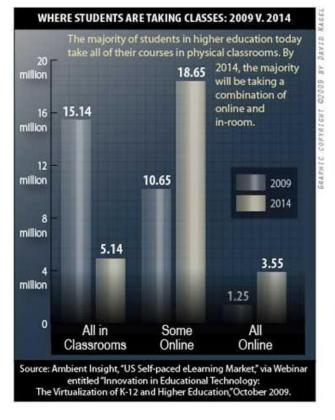[16] Canadian Council on Learning, *State of E-Learning in Canada*, (Ottawa: 2009), 5.

[17] Ibid., 6.

place in 2002. Similarly, a 2008 study by the Economist Intelligence Unit (EIU) on the e-readiness of nations that measured both the quality and usability of IT infrastructure ranked Canada 12th out of 70 largest world economies.[18] Outside of wide access to the internet and a robust telecommunications it appears Canada is experiencing some fallbacks when it comes to computer integration.

It is also important to note that outside of these international studies there has been little research done on e-learning in Canada so a great many unknowns remain. While partially an attribute of the strong provincial role in post-secondary education, there exist no published numbers on Canadians taking e-learning classes, Canadians fully enrolled in distance e-learning institutions, the percent of university budgets and ministry budgets going towards e-learning, and several other key components to an understanding of the Canadian e-learning context. Indeed, the most comprehensive report to date, *State of E-Learning in Canada* published by the Canadian Council on Learning has been criticized by some, such as Tony Bates of E-Learning & Distance Education Resources for missing key areas of research[19] and as the report itself explicitly states, e-learning "holds tremendous promise and potential, yet it remains a largely unexplored field."[20]

Regarding the number of Canadians students enrolled in various forms of e-learning there is one study of the United States that may prove illuminating. The study shows that while 56% of current students are enrolled in an entirely classroom based learning system with 39% taking at least some online courses and 5% completely online, in five years from now only 19% of students are likely to be enrolled in an entirely classroom based learning system with 68% taking at least some online courses and 13% completely online. In raw numbers this means the total number of online learners in the US will dramatically increase from 12 million to 22 million over that five year period.[21,22]

Together, this lack of Canadian research, the prominence of the trend towards e-learning, worrying

WHERE STUDENTS ARE TAKING CLASSES: 2009 V. 2014

The majority of students in higher education today take all of their courses in physical classrooms. By 2014, the majority will be taking a combination of online and in-room.

15.14 — 5.14 — All in Classrooms
10.65 — 18.65 — Some Online
1.25 — 3.55 — All Online

2009 / 2014

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Source: Ambient Insight, "US Self-paced eLearning Market," via Webinar entitled "Innovation in Educational Technology: The Virtualization of K-12 and Higher Education,"October 2009.

[18] Ibid.

[19] Tony Bates, "Review of 'The State of e-Learning in Canada': or life in a parallel universe," *e-Learning & Distance Education Resources,* http://www.tonybates.ca/2009/06/10/review-of-the-state-of-e-learning-in-canada-or-life-in-a-parallel-universe/

[20] Canadian Council on Learning, 9.

[21] David Nagel, "Most College Students to Take Classes Online by 2014," *Campus Technology*, October 28, 2009.

[22] Ambient Insight, *The US Market for Self-Paced eLearning Products and Services: 2009-2014 Forecast and Analysis*, (2009).

signs of a lagging ICT infrastructure, and the strong provincial role in education create a nation without a clear vision for e-learning.

Section Two: Affordability

As the focus of this paper is on the implications of e-learning for traditional post-secondary institutions in Canada, cost issues associated with e-learning in the classroom and distance learning will be analyzed, while cost issues for fully online universities will not be explored. In the following section, the current costs to both students and institutions of e-learning are analyzed, the future outlook hypothesized, and key implications for Canadian post-secondary institutions are discussed.

The Costs of E-Learning Technologies for Students

Tuition, as both a significant student expense and source of revenue for institutions (on average one third of a university's operating revenue), is a key part of the discussion on the costs of e-learning.[23] Comparing distance education e-learning to traditional classroom learning at the same institutions, the Campus Computing survey revealed that a third (31 percent) of campuses charge the same amount of tuition, a fifth charge less tuition for student in online programs and almost half of the institutions surveyed charge higher tuition for online students. In some cases students in online programs paid tuition charges 10% or more than on-campus students in parallel programs, a trend that appears to be reflected in Canadian online institutions.[24] There are also a number of additional course fees outside of tuition costs that students in online courses often incur such as a one-time registration fee, charges for individual courses, course materials or technology resources and services.[25]

Unfortunately, there is no relevant education literature on the subject of e-learning integration into the classroom setting (as opposed to the distance education format) and the effects that may have on tuition costs. The reasons to expect either an increase or a decrease in tuition due to the integration of e-learning in the classroom setting largely depend on whether e-learning is used as a complement or a substitute for traditional features of classroom learning. Also, because tuition rates are highly regulated across the country, it is difficult to separate what effects the increased use of e-learning technologies is having on tuition rates over time.

Outside of course and administration costs another significant academic expense for students is the cost of academic materials. A survey of students conducted by the Canadian Publisher's Council on the costs of online academic materials revealed some interesting price points for students. When asked if they would be willing to pay full price for an online version of their academic materials 22% of students agreed and 62% disagreed, but when the same students were asked if they would be willing to pay half price for an online version of their academic materials 68% agreed while 15% disagreed, tripling the original percentage of students who would pay for online academic

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[23] Canadian Association of University Teachers, "CAUT Almanac of Post-Secondary Education in Canada 2009-2010," (Ottawa: 2009).

[24] Athabasca University, *Undergraduate Calendar*, http://www.athabascau.ca/calendar/page05_01.html

[25] The Campus Computing Project, (2009), 2.

materials.[26] The fact that the costs of e-textbooks are moving into this price range is a hopeful sign for students facing the costs of e-learning technologies.

The Costs of E-Learning Technologies for Institutions

For institutions, a different kind of difficulty arises when trying to estimate the cost they face due to the integration of e-learning. One survey of campuses conducted by Campus Computing returned the results that 45% of institutions report a profit and only 1.6% reported a loss due to the integration of e-learning technologies.[27] Yet the fact that e-learning has largely been integrated rather than separated from traditional course content and the lack of research on several prominent areas of e-learning add a level of uncertainty when institutions calculate such a value. This is evidenced by the fact that most institutions could not respond as to whether or not e-learning had saved their campus money or caused additional expense. There are several good reasons why institutions could potentially experience a net gain or a net loss due to e-learning integration.

Across industries electronic distribution methods have cut costs so one may expect the integration of e-learning to be a cost-saving measure for post-secondary institutions. Much of these savings can be attributed to the realization of economies of scale by using the size of university institutions to avoid unnecessary duplicate of resources. For example, e-learning courseware can largely be the same across many courses and disciplines. Another area of savings is found in the labour saving aspect of e-learning. The electronic grading of quizzes can free up finances formerly devoted to paying TAs or sometimes professors to grade student quizzes.

Alternatively, there are a number of concerns that e-learning will be cost-inducing for institutions. Regarding professor time, because e-learning technologies are often complementary as opposed to substitutes for classroom learning, the implementation and operation of e-learning technologies can often cause additional work for a professor and therefore have the potential to increase labour costs. The annual Sloan surveys show that chief academic officers believe it takes faculty more time and effort both to develop and to teach an online course. This is reflected in a faculty survey conducted by the Association of Land Grant Universities where over 85% of faculty reported that it takes "somewhat more" or "a lot more" effort to develop an online course compared to a face-to-face course and nearly 64% of faculty agreed that it takes more effort to teach an online course.[28]

Another potential burden placed upon faculty who teach in online programs is the mandatory training that just over half of the campuses that The Campus Computing Project surveyed reported requiring of faculty (averaging 27.5 hours).[29] This training of professors in the use of e-learning technologies also represents an increase in cost to school administrations. In addition, one need only think of the expectation of professors to be readily available to

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[26] Mark McCarvill, "How College and University Students and Faculty Think About Course Materials," *Studentawards Inc.* and *Stepwise Research Report for the Canadian Publishers' Council*, (2009).
[27] The Campus Computing Project, 1.
[28] Jeff Seaman, *Online Learning as a Strategic Asset*. Vol. 2, *The Paradox of Faculty Voices: Views and Experiences with Online Learning.* (Washington, DC: Association of Public and Land-Grant Universities, 2009), 12.
[29] The Campus Computing Survey, 1.

answer student emails at all hours of the day. In a certain respect this latter trend in e-learning has had the effect of extending office hours to all hours of the day to meet the online expectations of students.

Likely the most significant cost associated with e-learning is the vast array of electronic infrastructure and the associated personnel that is required to properly integrate e-learning into the post-secondary environment. In his paper, *The ICT Infrastructure: A Driver of Change*, Richard Katz notes that "[i]n most colleges and universities, information technologies represent one of the three largest classes of campus expenditures."[30] Frequently however, post-secondary institutions fail to meet the important financial demands of ICT infrastructure/IT systems. The 2009 Campus Computing Survey of American post-secondary institutions indicated that among IT issues, financing IT systems is a prominent concern as the two most common concerns were financing IT (15%) and upgrading or replacing networks (16%).[31] These survey results indicate a number of important findings. First, e-learning costs are not a one-time expense as IT expenses are constantly incurred through the processes of upgrading and replacing old technologies. Second, that the recent recession has caused financial concerns to dominate IT concerns, a break from traditional concerns as highlighted in the graph below.[32] Recessionary pressures at American institutions resulted in nearly half of surveyed institutions reporting pared down IT budgets for 2009.[33] The Canadian implication is also cause for concern as the greatest rate in cuts, two-thirds, was found in American public universities, the institution type that dominates the Canadian post-secondary education system.[34]

Single Most Important IT Issue

percentages, 2000-2007

2000	2001	2002	2003	2004	2005	2006	2007
Instructional Integration of IT (40.5%)	Instructional Integration of IT (31.5%)	Instructional Integration of IT (24.1%)	Instructional Integration of IT (21.4%)	Network & Data Security (21.2%)	Network & Data Security (30.4%)	Network & Data Security (29.5%)	Network & Data Security (25.5%)
IT User Support (22.3%)	IT User Support (15.4%)	Upgrade/ Replace ERP (18.8%)	Upgrade/ Replace ERP (17.6%)	Instructional Integration of IT (18.5%)	Instructional Integration of IT (18.1%)	Instructional Integration of IT (17.3%)	Upgrade/ Replace ERP (13.0%)
Financing IT (14.6%)	Upgrade/ Replace ERP (12.6%)	Financing IT (15.1%)	Financing IT (16.1%)	Upgrade/ Replace ERP (17.2%)	Upgrade/ Replace ERP (15.9%)	Upgrade/ Replace ERP (16.1%)	Hiring/ Retaining IT Staff (12.3%)

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[30] Richard Katz, "The ICT Infrastructure: A Driver of Change," *EDUCAUSE* (2002), 52.
[31] Steve Kolowich, "IT Budgets Take a Hit," *Inside Higher Ed*, November 4, 2009.
[32] The Campus Computing Survey 2007, 2.
[33] The Campus Computing Survey 2009, 1.
[34] Ibid.

Interestingly however, the APLU faculty surveys, while conducted post-recession, reveal that in all dimensions of IT campus support structures, *except* for technological infrastructure, faculty felt support was "below average". Conversely, the lowest response selected by faculty was their institution's incentives for developing and delivering online courses.[35] It appears that the importance of different cost aspects of e-learning vary widely between key stakeholders including faculty, students, and support staff.

A review of both the cost saving and cost inducing reasons for e-learning suggest that rather than an outright gain or loss in funds for the school administration, e-learning technologies represent a change in the cost structure. In particular, there is a change towards up-front costs as large amounts of IT infrastructure must be established, while the operating costs depend on whether e-learning technologies are supplementary to, or a replacement of, traditional classroom learning.

Key Implications

It is posited that the smart integration of e-learning can result in a net gain of finances for post-secondary institutions. The OECD, for example, offers several strategies for institutions to employ in order to keep costs down including:

- Using online provision to replace on-campus teaching rather than duplication
- Facilitating increased peer/automated learning
- Using standard/pre-existing software
- Drawing on the open standards and learning objects model to increase material re-use and sharing
- Greater course standardization

The report concludes that "re-organisation should involve a decrease in course development costs, an increase in the student/staff ratio or savings due to less use of facilities such as classrooms."[36]

As learning management systems (LMS) are supplied to post-secondary institutions by private providers, some market dynamics have the potential to develop. A recent phenomenon that could affect the future costs of e-learning is the dominance of Blackboard in the LMS market. In early 2006, Blackboard, the largest producer of LMS technology, merged with WebCT, the second largest producer, to give Blackboard an estimated 80-90% market share as evidenced in the graph below.[37] This move was highly contested and first had to pass an antitrust review conducted by the United States Justice Department.[38]

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[35] Seamen, 13-14.

[36] Organisation for Economic Co-operation and Development, 6.

[37] Terence O'Hara, "Blackboard's WebCT Deal Spurs Antitrust Questioning," *The Washington Post*, November 26, 2005.

[38] Scott Jaschik, "Quick Takes: Blackboard-WebCT Merger Approved, State Polices Questioned on Drug Convictions and Aid, Student Satisfaction in For-Profit Higher Ed, AAUP Criticizes NYU," *Inside Higher Ed*, February 7, 2006.
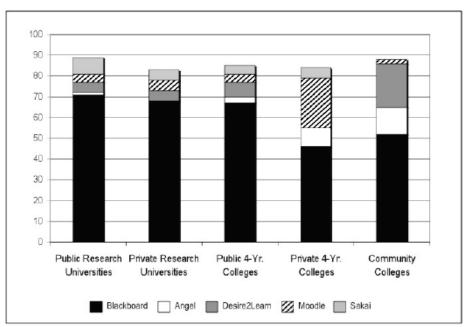
Figure 14: Campus LMS Providers, Fall 2008 (percentages for campuses reporting a "single product campus-wide LMS standard, by sector).

Recently, Blackboard has continued this practice of consolidation, purchasing Angel Learning in May of 2009 for $95 million. One company, Desire2Learn based out of Kitchener, Ontario has expressed that they are not for sale and issued a statement after the Angel acquisition stating that "Desire2Learn values competition and believes that monopolies are unhealthy."[39] This statement may be a response to anti-competitive behaviour from Blackboard when the company sued Desire2Learn in 2006 for $17 million citing patent infringement[40] which Canadian Internet law professor Michael Geist called "the latest example of how a system that easily grants over-broad patents arguably could be used to impede innovation and limit marketplace competition."[41] In this regard, the centralization of learning management systems is not exclusively an issue of affordability but quality as well.

As a completely different alternative, Moodle, is a free and open-source LMS and has been viewed as a promising alternative to the dominance of Blackboard. Recently however, Microsoft, a software giant in its own right, has offered a Moodle application that networks with Windows applications, again raising the prospect of centralization.[42] In fact, there was been speculation that Microsoft will also seek the purchase of Blackboard by the end of 2010.[43]

This phenomenon of e-learning consolidation extends beyond post-secondary education. A report released by Ambient Insight noted that the e-learning industry is experiencing what is known as the barbell effect. "The supply

[39] Dennis Carter, "Blackboard-Angel deal gives pause to some," *eSchool News*, May 7, 2009.
[40] Katherine Mangan, "Courtroom Showdown Begins in Blackboard's Patent Dispute With Desire2Learn," *The Chronicle of Higher Education*, February 13, 2008.
[41] Michael Geist. "Patent Battle Over Teaching Tools," *BBC News*, August 14, 2006.
[42] Moodle. *Moodle Packages for Windows.* http://download.moodle.org/windows/
[43] Joshua Kim, "5 Reasons Microsoft Will Buy Blackboard," *Inside Higher Ed*, September 7, 2009.

chain in the US Self-paced eLearning market is showing signs of a "shake out." There is now evidence of consolidation at the top, clear signs of disintermediation in the middle, and growing stratification at the bottom."[44] The concern here is that consolidation in the industry will lead to monopolistic practices that could raise costs for institutions despite attempts at the internal reorganization of e-learning practices.

While distance education institutions and open universities are not the focus of this paper, it is clear that their rise in prominence is going to have key implications for traditional post-secondary institutions in Canada. While studying at distance education institutions is not currently cheaper than traditional institutions, the rise of cases such as MIT's Open Courseware will likely put increased pressure on traditional post-secondary institutions in Canada to lower costs in order to compete. This trend is likely to continue as the US administration under Barack Obama's lead is by funding the development of free online courses.[45] Besides putting pressure on costs to compete, there is also an accessibility concern that this development will create a tiered system of learning whereby low-income students will study online and those that can afford to will attend campus institutions.

As post-secondary institutions grapple with funding e-learning innovations, many are trying to move to normalize funding to ensure sustainability through a combination of mainstream internal funds and student fees.[46] If e-learning costs are going to fall onto students, it is important that these fees are regulated and subject to student input, by referendum, for example. Furthermore, the cost of e-learning materials is a rising expense for students and regulations are needed to limited both the rise in price and in what materials can be requested for students to purchase.

A key implication that Katz notes regarding e-learning costs is that inter-institutional co-operation can be used to cut costs, or as Brian Hawkins predicts "[i]ndividual campuses won't effectively participate as standalone entities."[47] Across Canada, at any one time during the week, thousands of students at taking introductory courses to biology, psychology, or any number of similar courses. This duplication of resources can be overcome using lecture-capture and other e-learning technologies. The possibility for inter-institutional cost sharing exists.

Similarly, while Katz mentions the increased competition between post-secondary institutions for learners that e-learning technologies are likely to create, he also believes that the appeals of shortening life-cycles and the prospect of risk sharing will lead to increased cooperation between post-secondary institutions. "If indeed the changing ICT infrastructure is likely to transform policies and operations and the practices that support them, and if, further, this infrastructure will be costly in financial and political terms, will it not be wise to consider new cooperative agreements?"[48]

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[44] Ambient Insight, *The US Market for Self-Paced eLearning Products and Services: 2009-2014 Forecast and Analysis*, (2009), 9.
[45] Scott Jaschik, "U.S. Push for Free Online Courses," *Inside Higher Ed*, June 29, 2009.
[46] Organisation for Economic Co-operation and Development, 6.
[47] Katz, 56.
[48] Ibid., 60.

One final cost implication for institutions is the fee structure for online courses and in particular the pay structure for professors. Currently there is wide array in the approach taken by institutions on this issue.

Section Three: Accessibility

The previous discussion on affordability illustrates that the cost issues associated with e-learning will have a significant impact on issues of accessibility. The impact of e-learning on tuition has important implications for the ability of some students to access the post-secondary education system. Additionally, the degree to which institutions finance IT infrastructure on campus affects the ability of students to properly access the e-learning technologies available to them. As such, accessibility issues merit a discussion themselves and form a key pillar of the Canadian post-secondary education system. Accessibility issues will be analyzed both in terms of the barriers to learning that e-learning can help to overcome, the digital barriers that e-learning may create, and the key implications for Canadian post-secondary institutions.

Removing Barriers to Learning

While some commentators in publications such as *Slate*, *University Affairs*, and *Macleans* debate whether developments in e-learning will spell the end of the physical campus, this confuses the means and the ends of e-learning, and distance education in particular, which is particularly about accessibility and removing barriers to learning. As Guri-Rosenblit explains in her work, *Distance Education in the Digital Age: Common Misconceptions and Challenging Tasks*, "[d]istance education has never defined independent study as a proclaimed or desired goal to obtain. Self-study materials have been the means not the goals, of distance education."[49] As opposed to creating autonomous learners, e-learning through distance education is about addressing the needs of students with geographic, time sensitive, or a number of other access issues and some evidence suggests that this is indeed occurring.

One group that has traditionally faced barriers to the post-secondary education system is students from low-income families. Programs targeted at removing the financial barriers to entry for these students through loan programs supplemented with interest relief and grants have failed to make much headway, and many attribute this to the debt aversion that is particularly prominent in low-income families.[50] The possibility of e-learning technologies to lower tuition costs, while thus far it has yet to be actualized, represents great potential in removing barriers for students of low-income families.

Geographic barriers often form an important barrier to entry in the post-secondary education system. The distance education framework can help engage Canadians in isolated communities that have little contact with the post-secondary education system. The collaborative opportunities that e-learning technologies can add to traditional

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[49] Guri-Rosenblit, 110.
[50] Canadian Council on Learning, *Are Lower Income Families Averse to Financing Post-Secondary Education by Borrowing?* (Ottawa: 2006).

distance education add significantly to the ability to integrate students facing geographic barriers into the post-secondary system.

Another important group that e-learning technologies can target, especially through a distance education framework, are individuals who have inflexible time commitments. While one need only think of potential student in a rural setting that has obligations to the family farm to see the possibility to remove barriers to access, inflexible time commitments applies most to those engaged in the process of "lifelong learning" by attended post-secondary education in addition to working a job. Because of the inflexible time commitments these individuals face at their place of employment, these individuals often are unable to attend traditional post-secondary institutions. In addition to being an issue of accessibility, the ability of e-learning technologies to integrate these individuals is essential for upgrading the skills in the Canadian workforce and raising the percentage of Canadians with post-secondary degrees; a necessary condition for Canada's success in the knowledge-economy. Human Resources and Skills Development Canada notes that of the 5.5 million jobs opened up by 2015 due to retirements and job creation, two-thirds will require post-secondary qualifications and a report from the Canadian Council on Learning concludes that Canada will need 1.42 million additional university graduates and over 2 million college or apprenticeship graduates by 2015.[51] There is also the potential for this trend to alter the composition of student populations, as lifelong learners add diversity and experience to class settings, a beneficial trait for collaborative e-learning technologies.

Within the classroom setting there are accessibility barriers that e-learning technologies can help overcome. Blind, dyslexic and other learners with diverse abilities often face barriers to learning because they cannot access academic materials. One new e-learning technology is AccessText, a centralized database where post-secondary institutions can acquire electronic versions of textbooks from 92 percent of all publishing companies. While institutions traditionally have to convert the text into a readable format, AccessText integrates a notification system if an institution has also spent the time and resources to convert that text.[52]

While not traditionally conceived as a barrier to post-secondary education, campus emergencies present a clear barrier to student learning that e-learning can help institutions overcome. By providing course content online and methods of simulating classroom activity, e-learning technologies can enable campuses to overcome emergencies including hurricanes, flooding, flu outbreaks, and other threats to a physical campus. When Hurricane Katrina struck in 2005, the University of New Orleans, like the rest of the region, closed down. But in October 2005, the University opened for a mini-semester using Blackboard and remote locations. Since then, the University has added emergency phone notification and a virtual campus in Second Life to further bolster its emergency plan.[53] Similar digital responses have proven successful at Valley City State University as a result of the rising water levels from the Sheyenne River and the use of lecture capture technologies at Washington State University in response to

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[51] Canadian Council on Learning, *Post-Secondary Education in Canada*, (Ottawa: 2009), 113.
[52] Steve Kolowich, "Textbooks for the Disabled," *Inside Higher Ed*, August 28, 2009.
[53] WCET, *Online Learning to the Rescue: Continuing to Teach when Disaster Strikes*.
http://www.wcet.info/2.0/index.php?q=node/1244

the H1N1 outbreak.[54] These occurrences symbolize the tremendous overlap between e-learning as a tool for classroom learning and for distance education.

Creating Digital Barriers

In addition to helping remove barriers to learning, e-learning technologies also have important issues regarding the accessibility barriers they create. In particular, e-learning technologies require access to digital equipment and technical support, a high degree of usability, and the resolution of jurisdictional issues. Wilfrid Laurier University in Waterloo, Ontario will be drawn upon as a case study for the presence of digital barriers.

Nearly every e-learning technology addressed in this paper requires access to a modern computer. While for many campuses this has meant the provision of student computer labs, there have been some complications. At Wilfrid Laurier University, for example, a portion of the cost of computer labs was paid for by the Wilfrid Laurier University Students' Union. Despite this fact, computer labs have evolved from a student life initiative to an academic necessity and are therefore the responsibility of the institution. Highlighting another complication, it was recently discovered that Nippising Universtiy students who were studying concurrent education through Wilfrid Laurier University, Brantford Campus, were being requested to pay an iTeach fee of $250 for classroom technologies such as Apple laptops, digital cameras, and Smartboards. This fee, paid by all concurrent education students was a required course payment, and thus classified as a tuition-related compulsory ancillary fee, an illegal fee in Ontario since the 1980s.[55] Since there was no referendum on the fee by the Nipissing University Students' Union, students were not actually required to pay such a fee.[56] This series of events again illustrates the need for institutions to play a more active role in providing e-learning technologies.

Besides the physical hardware a student now requires in an e-learning environment, there are also certain necessary functions. While access to high speed wireless internet is an often maligned issue on campuses, the entire technological maze of systems a student must navigate can also harm learning. At Wilfrid Laurier University the editorial board of the campus newspaper openly pleaded with university administration in September 2009 that fixing technology systems on campus was their number one wish on their "Laurier Wishlist", writing:

> Whether it is signing up for classes using LORIS, checking one's WLU e-mail or trying to find out information about classes on WEBCT, nothing ever seems to work properly. If one wish is actualized in the imminent future it should be that the school not only gets a handle on its current technology systems, but also takes proactive steps to prepare for problems and contingencies.[57]

Digital access issues also play prominently in the role of e-learning technologies in distance education. As in most industrial nations, Canada experiences a digital divide between information and technology "haves" and "have-

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[54] Sonic Foundry. *Fortify Your Institutional H1N1 Plan with Lecture Capture*.
http://www.sonicfoundry.com/register/h1n1/default.aspx?path=h1n1%2fdefault.aspx&sm=20
[55] Lauren Millet, "Brantford Students Charged Illegal Fee" *The Cord*, September 30, 2009.
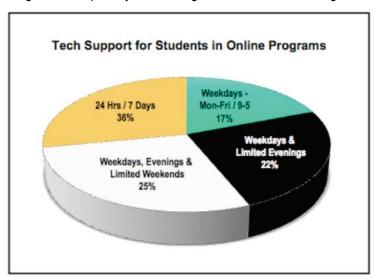[56] Alex Denonville, "WLUSU Investigating iTeach Fee and Referendum," *The Sputnik*, October 7, 2009.
[57] The Cord Editorial Board, "Laurier wish list," *The Cord*, September 7, 2009.

nots" due to the uneven diffusion of the Internet. A 2002 study, *Unveiling the Digital Divide* published by the Minister of Industry reports that "the digital divide is sizeable; ICT penetration rates grow with income" and that although the divide is generally closing, it "is widening when the lowest income deciles are compared with the highest income decile."[58] Other studies have shown additional worrying impacts of the digital divide on accessibility. In particular, individuals in rural settings, individuals from low-income families, females, the elderly, and Aboriginals access a home internet connection in lower numbers than the rest of the Canadian population.[59,60] This digital divide presents the additional problem that these population groups have a much larger learning curve since they are unfamiliar to the basic systems of e-learning technologies if the access exists at all.

Several of these groups are currently underrepresented in the Canadian education system and government programs specifically target these groups to raise post-secondary graduation rates. It is clear then that e-learning technologies are far from the silver bullet for accessibility issues in the post-secondary education system. This is an especially important consideration as e-learning technologies are quickly replacing traditional paper mail forms of distance education.

Some digital accessibility issues are significant for e-learning both in the classroom and through distance education. Access to proper technical support is one such issue. The apparent spontaneous failure and glitches of e-learning technologies requires that for accessibility concerns to be taken into account amble tech support for students much be provided. Regarding current practices, the data from the Campus Computing Survey is again useful in illustrating the range of campus tech support available to students as illustrated in the graph below.[61] Given that assignments, especially online assignments, are due at midnight, the limited hours of tech support is worrying.

Tech Support for Students in Online Programs

24 Hrs / 7 Days 36%
Weekdays - Mon-Fri / 9-5 17%
Weekdays & Limited Evenings 22%
Weekdays, Evenings & Limited Weekends 25%

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[58] Grant Sciadas, "Unveiling the Digital Divide," *Statistics Canada*, (Ottawa: Minister of Industry, 2002), 4, 20.
[59] Diane E. Looker and Victor Thiessen, "Beyond the Digital Divide in Canadian Schools," *Social Science Computer Review* 21, no. 4 (2003), 475.
[60] Susan Crompton, "Off-reserve Aboriginal Internet Users," *Canadian Social Trends*, (Ottawa: Minister of Industry, 2004), 13.
[61] The Campus Computing Survey 2009, 2.

Besides the provision of tech support to ensure that e-learning technologies are working as designed, it is also important that the design of e-learning technologies is actually user-oriented. While an extensive section of this paper is devoted to the quality of e-learning technologies, some design issues are primarily related to accessibility. Again, using the case study of Wilfrid Laurier University, some distance education classes provide VHS cassette tapes with course materials. E-learning is beneficial in this respect, updating the format of materials to be more in-line with a format that students not only prefer to use, but may only have the necessary equipment to use. Yet e-learning is also problematic in the format that course materials are presented in. Digital rights management (DRM) is used by content creators to restrict unauthorized copying of the material but has the repercussion that it also restricts format shifting. Since learners may require a certain file format in order to properly access the material, learners with diverse abilities, for example, there is an accessibility concern that some e-learning materials many not be properly accessed by some learners. Even at a more basic level it is hard to avoid the user experience of e-learning technologies. If students find it difficult to login, navigate or read text in a learning management system they will be unable to access academic materials and assessments properly and have poor learning outcomes. It is clear that accessibility and usability are interlinked.

Key Implications

It is clear from this discussion that developments in e-learning have had, and will continue to have major implications for accessibility issues. While e-learning technologies hold much promise in mitigating some existing accessibility barriers for low-income students, those with diverse abilities, and individuals suffering from a campus emergency, there are also accessibility concerns in the development of e-learning and the creation of digital barriers to learning such as access to the necessary hardware, access to technological services and tech support, as well as concerns about usability. Yet there is no inherent reason why a trade-off must exist. As e-learning technologies develop they can continue to address barriers to learning while the provision of sufficient resources to support e-learning can go a long way to insure the bridging of any digital barriers that may exist.

For e-learning technologies integrated in the campus environment it is essential that there is the proper level of campus IT infrastructure. Requirements cannot be placed on students to complete portions of a class in an e-learning environment without ensuring access to the necessary hardware, systems, and tech support. These supports require significant investment and the onus falls both on governments to recognize the positive contributions of e-learning to accessibility issues and fund the development of infrastructure on campuses and on institutions themselves to not simply integrate e-learning incrementally to keep up with other institutions, as surveys revel a key motivation to be, but to shift resources towards support for e-learning as staffing and upkeep are important components for the successful operation of ICT infrastructure. In addition, institutions must develop contingency plans in the case of technical failure as well as policies in place for online quizzes and other aspects of e-learning that may be affected.

For e-learning technologies integrated through distance learning it is important that traditional print forms of distance learning be made available until the digital divide is bridged. Federal and provincial governments should work to address the digital divide as e-learning is not just a phenomenon in post-secondary education but symbolizes a shift in culture towards rapidly disbursed information and integrated environments. All demographics of Canadians should be included in such a transformation.

Provincial governments have done well to consider the needs of learners with diverse abilities such as the Accessibility for Ontarians with Disabilities Act, 2005 (AODA). Now the provincial governments must ensure that post-secondary institutions are implementing mandatory accessibility standards to integrate diverse learners into the learning environment.

Section 3: Accountability

While accountability is often not viewed as a significant pillar of the post-secondary education system, e-learning technologies, because of the magnitude and openness of their operation and new features available to educators and learners, have significant implications for accountability. In particular, privacy issues and intellectual property issues arise and must be addressed for e-learning to meet accountability concerns.

Privacy Issues

Since June 10, 2006, the Freedom of Information and Protection of Privacy Act (FIPPA) has applied to all universities in Ontario, with similar legislation in effect for other provinces.[62] The passing of this Act has caused many universities to modify traditional practices with respect to mass emails, records containing personal information, returning assignments, informing students about their grades, and a number of other relevant operations. E-learning technologies have been used by many institutions to meet the new requirements placed upon them, by posting student grades to the institution's learning management system, for example. Yet developments in e-learning technologies also involve new privacy concerns. Many learning management systems integrate a chat feature whereby students can correspond with each other online. Features such as this, while presenting beneficial opportunities for students to collaborate, also disclose student names which students may wish to keep personal and may also allow for e-stalking to take place where a student is repeatedly contacted by another student against their wishes. A further privacy issue that has arisen with the development of learning management systems is the ability for professors to view a record of a student's personal activity in course modules. While such tracking may not represent a violation of a student's right to privacy, it is unclear whether students know that such a feature is present. This is especially worrying if some aspect of student performance is judged on their online activity without the student's knowledge.

As learning management systems are often run by private operators, there arises a concern that these operators are held to a lesser standard of accountability. In his work on ICT infrastructure expenses Katz notes that "[o]n research university campuses, two-thirds of these expenditures occur in academic or business units outside the direct control of the central campus administration,"[63] to give an idea of the scope of private operation. While Canadian post-secondary institutions may be bound in their actions by provincial privacy legislation, private operation may be cause for concern as it is not as clear what standard private companies are held to with respect to student privacy. As a great deal of data is collected and held by private companies operating on behalf of post-secondary

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[62] Government of Ontario, "Freedom of Information and Protection of Privacy Act," *Queen's Printer for Ontario*, (2007). http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f31_e.htm
[63] Katz, 53-54.

institutions, this concern is especially pertinent. There remains a great deal of mystery surrounding the implications of e-learning developments and holding post-secondary institutions accountable for student privacy.

Intellectual Property Issues

A second issue that has arisen with the implementation of e-learning technologies is the issue of intellectual property. In particular, there are issues with ownership of student generated material, and issues with the ownership of course content generated by a professor.

Student intellectual property issues related to e-learning technologies mainly surround the use of the plagiarism detection website turnitin.com. Concerns have arisen regarding the cost of the software, presumption of guilt, but also that student works, once submitted, become the domain the website. The User Agreement for turnitin.com states,

> With regard to papers submitted to the Site, You hereby grant iParadigms a non-exclusive, royalty-free, perpetual, world-wide, irrevocable license to reproduce, transmit, display, disclose, archive and otherwise use in connection with its Services any paper You submit to the Site whether or not originally submitted in connection with a specific class. This license shall survive the termination of the User Agreement. Any cessation of use of the Site shall not result in the termination of any license You grant herein to iParadigms.[64]

Due to these issues, on March 6, 2006, the Senate at Mount Saint Vincent University in Nova Scotia joined a number of American schools prohibiting the use of turnitin.com and similar plagiarism detection websites. The Senate voted that "the use of Turnitin.com and any other plagiarism detection software that requires that students' work become part of an external database where other parties might have access to it, be prohibited effective Summer Session I, 2006."[65]

Intellectual property issues have also arisen for course materials that are generated by professors. Katz notes,

> [w]hen courses are modified for use across networks, their cost of production and their revenue potential are altered. Under such conditions, institutions are expressing new levels of interest in a share of ownership of such materials, and individual faculty are often displaying a greater "proprietary" concern about such materials.[66]

Post-secondary institutions have also become more interested in pay differentials for professors whether they acquire access to course material or not.

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[64] Turnitin, "User Agreement," *Turnitin.com* http://www.turnitin.com/newuser_join.asp?svr=11&session-id=3cc78d4df95475c2ac6f29e6a9045ebb&lang=en_us&r=25.042514317073
[65] Mount Saint Vincent University Senate, "Minutes of Meeting," March 6, 2006. http://www.msvu.ca/senate/2006/MinutesMarch6.pdf
[66] Katz, 56.

Key Implications

        Canadian post-secondary institutions can still do much more to integrate e-learning technologies as a method of securing individual privacy. For example, the Privacy Coordinator Office at Wilfrid Laurier University notes that with regards to returning assignments, FIPPA compliant practice allows professors to "return these items in class by means such as reading out names or allowing students to go through piles of papers at the front of class, or you might allow them to access a pile of papers during your office hours."[67] While such a practice may be in compliance with the FIPPA, Canadian post-secondary institutions have a responsibility to protect the privacy and integrity of their students to the high degree, and login systems of grade distribution such as learning management system technology means that piles of assignments need not have grades attached.

        The complex relationship between e-learning technology and accountability calls for post-secondary institutions to develop new and comprehensive policies. As Katz notes:

> [o]ne of the most complex areas associated with the emerging ICT infrastructure is the policy arena. New technologies create new capabilities and new ways of organizing the higher education mission, information resources, and services. These new ways will likely test and perhaps even render obsolete many important institutional policies.[68]

As highlighted, post-secondary institutions should develop clear policies regarding the disclosure of e-learning technologies used by professors, such as tracking student activity on course modules, requiring that student online activity such as discussion board posts must be the sole authorship of the student owner of the account the post is submitted from, as well as updating other institutional policies on privacy that may be outdated due to new e-learning capabilities. Post-secondary institutions must also insure that all agreements with providers of a student service sufficiently protect against privacy and intellectual property concerns.

        Provincial governments also have a key role in guaranteeing accountability. As a portion of provincial funding is distributed through Multi-Year Accountability Agreements (MYAAs), provincial governments have substantial leeway in stating the conditions under which funding is released. In particular, institutional accountability should include issues of student privacy and intellectual property that are currently overlooked.[69]

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[67] Wilfrid Laurier University, *Examples of FIPPA-Compliant Practice*. http://www.wlu.ca/page.php?grp_id=1779&p=7261
[68] Katz, 54.
[69] Ontario Confederation of University Faculty Associations, *OCUFA Briefing Note*, (2008). http://www.ocufa.on.ca/OCUFA/docs/issues/bn_accountability_oct08.pdf

Section 4: Quality

Affordability, accessibility, and accountability, while certainly important factors to education, miss an important component of the post-secondary education system, that of purpose. The post-secondary education does not exist for the first three pillars but rather exists because it is seen as producing a quality product that is beneficial to society. As the purpose of the entire system, the issue of quality is an important one, although defining quality is more difficult than simply stating its importance. Recently there has been a focus on this very difficulty with many stakeholders attempting to define the meaning of a quality post-secondary degree, culminating in the Canadian Council on Learning paper, *The Challenge of Demonstrating Quality in Canadian Post-Secondary Education* released on November 24, 2009.

Echoing the difficulties of defining a quality post-secondary education, the paper outlines three models of purpose for the post-secondary education system as originally developed by Ernest Bogue. The *limited supply model* focuses on quality as excellence and measurement, that research leads to institutional reputation and prestige thereby recruiting the best students who then perpetuate the level of excellence. The *quality within mission model* holds that post-secondary education consists of a collection of institutions undertaking different activities that should not be ranked on quality but instead judged by how they meet their unique goals. Lastly, the *value added model* focuses on results and outcomes of post-secondary education in the individuals it creates as a product.[70] These three diverse models on how quality should be evaluated in the post-secondary education system can be used as frameworks to evaluate e-learning technologies. As such, the ability of e-learning to meet these quality evaluation models through labour-market demands, approaches to learning, and heterogeneous student learners are analyzed, followed by the consideration of quality concerns.

Labour-Market Demands

The diversity of views on the purpose of the post-secondary education system need not remove a discussion of quality regarding e-learning technologies. As the Canadian Council on Learning notes,

> [c]ompeting views about the purpose of post-secondary education can complicate efforts to understand and measure its quality. However, a widely accepted goal of PSE – from a fitness-for-purpose perspective – is to support the development of a skilled and adaptable workforce that can respond to the demands of the labour market.[71]

The question then becomes whether e-learning is suited to meet the demands of the labour market, a concern that reflects the value added model. A prominent point in the Canadian Council on Learning paper is the size of the retiring cohort, and the knowledge driven economy that Canada is becoming, concluding that "a quality post-

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[70] Canadian Council on Learning, *The Challenge of Demonstrating Quality in Canadian Post-Secondary Education*, (Ottawa: 2009), 8.
[71] Ibid., 10.

secondary education system might be viewed as one that has the capacity to attract and retain large numbers of students from a wide variety of backgrounds."[72] The positive potential but complicated reality of e-learning technologies to contribute to this quality goal through accessibility has already been discussed.

While noting that more and more occupations require a post-secondary degree as part of Canada's knowledge-driven economy, the study does fail it highlight just what components of a post-secondary degree need to be acquired. In order to properly evaluate the contributions of e-learning technologies to quality these skills must be discerned.

To a large extent, a knowledge-economy is about intangible skills. The Canadian economy has now moved well beyond its agricultural and manufacturing roots and into a service based economy and the significant private financial returns to nearly ever university degree suggest that the labour market is still rewarding degree types.[73] While it is difficult to discern whether these financial returns can be attributed to skill development or the signalling effect of a post-secondary degree, the value-added approach to education suggests that skill development should be evaluated.

Yet the skills to be developed for the knowledge-economy are not just about acquiring knowledge as an individual, but about the sharing and transfer of knowledge, a central function in the knowledge-economy. It is therefore technical skills, competence with methods of effective knowledge transfer and computer literacy that the knowledge-economy requires of the post-secondary education system. This reflects the fact that much of the skills development in post-secondary education can be viewed as a type of job training for future participation in the labour market that utilizes the economies of scale present in an en masse post-secondary education system. Some may malign certain developments in e-learning that are seen to sacrifice face-to-face education, trends in the knowledge-economy suggest that this type of experience, while important, is becoming less relevant to the future work environment. Using the value-added approach to education suggests that e-learning technologies contribute to a quality education by way of developing important technical skills important for Canada's emerging knowledge-economy.

Approaches to Learning

Similar to the recent discussion on defining quality in the post-secondary education system, there is a discussion taking place on components of the system related to student success. Regarding student success in an academic context, the comprehensive work, *Piecing Together the Student Success Puzzle: Research, Prepositions and Recommendations* by Kuh et al. points specifically to engaging pedagogies such as active and collaborative learning, classroom-based problem solving, peer teaching, service learning as beneficial for a students' educational

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[72] Ibid., 11.
[73] Karim Moussaly-Sergieh, and Francois Vaillancourt, "Extra Earning Power: The Financial Returns to University Education in Canada," *C.D. Howe Institute*, May 14, 2009.

experience.[74] These forms of engaging pedagogy are of particular interest to developments in e-learning technologies as there exists the potential for e-learning technologies to help in the implementation of such practices.

Furthermore, "[s]ome evidence suggests that courses redesigned to infuse instructional technology have made the teaching and learning enterprise more active and learner centered", suggesting that collaborative learning is one area where e-learning potential has been actualized.[75] Kuh et al. cite evidence that learners who frequently used information technology for classroom-related activities or assignments were more likely than their counterparts to report higher-order thinking, frequently interact with faculty, work in groups outside class.[76] While these numbers are self-reported and there is little comment on the specifics of the interactions, the results appear to have positive implications for achieving collaborative learning and other pedagogies through the use of e-learning technologies.

Other studies have shown course redesign projects that integrated e-learning technologies perform quite well on common metrics of student success such as "improvement in course completion rates, lowered drop-failure-withdrawal rates, and higher achievement rates." Additionally, these metrics extend to groups that are currently underrepresented in the Canadian post-secondary education system, in particular, low-income, first generation, and working adults. Factors linked to success include the benefits of convenience and flexibility for working adult students and the benefits of an open, inclusive learning environment where students of racial minorities are more willing to participate in class discussion.[77] This later finding may just be avoiding a serious societal problem, but the advantages are clear for the learners involved and the phenomenon that these studies analyze appears to mitigate some of the potential accessibility barriers created by e-learning technologies through a digital divide.

Another approach to learning that has been highlighted as beneficial to student success is individualized instruction. Cites a study that concludes "Because every student learns differently, individualized instruction is more effective under most circumstances (McKeachie, Pintrich, Lin, and Smith, 1986)." SpacedEd, an online provider of free instruction on topic from bartending to urology, has a course approach where a question on the course material is repeated to the learner in periodic fashion until enough correct answers have sufficiently retired the question from the individual's database. Not only does this method utilize spacing intervals that retain information more effectively than traditional binge-and-purge methods of education, it also individualizes course testing for students by retesting individual students on concepts that they have struggled to understand.[78]

The contributions that e-learning technologies can and have provide to new and effective approaches to learning further the limited supply model of post-secondary education whereby quality is measured as excellence, and particularly academic excellence. The transformations that often accompany e-learning technologies are indeed welcome. As the report on student success by Kuh et al. bluntly states "[m]ost of the scholarship on teaching and

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[74] George Kuh and others, "Piecing Together the Student Success Puzzle: Research, Prepositions and Recommendations," *ASHE Higher Education Report* 32, no. 5 (2007), 92.
[75] Ibid., 96.
[76] Ibid.
[77] Ibid., 97.
[78] SpacedEd, *Addictive Learning That Sticks*, http://www.spaceded.com/info/howitworks

learning indicates that the passive lecture, where faculty do most of the talking and students listen, is contrary to almost every principle of an optimal learning environment."

Heterogeneous Student Learners

Not only do these alternative pedagogies indicate the shortcoming of the traditional learning environment and the advantages that e-learning technologies provide, they also indicate the heterogeneous nature of students as learners; that a variety of students have a variety of learning types. The quality within mission model of evaluating quality holds that institutions undertake different missions and are evaluated accordingly, and as such, e-learning technologies will likely have a role to play in some of these institutions as they cater to certain student learning styles. The contributions of e-learning technologies this model of quality evaluation are especially interesting given a number of emerging voices from Canadian post-secondary institutions on the need for differentiation between large, research oriented institutions and small, undergraduate oriented institutions.[79,80]

Quality Concerns

Despite the contributions of e-learning technologies to all three models of quality evaluation outlined, critics of e-learning have a great number of concerns regarding quality. For many, e-learning technologies stand in stark contrast to an ideal system of education found in Plato's Academy whereby students engage in face-to-face didactic exchange with a professor.

There is an important distinction to be made between e-learning quality concerns that are related to the technology, and those that are inherent. To a large extent, quality concerns related to the technical aspects of e-learning tend to have a technical solution. Concerns about the importance of facial cues to learning were responded to with the development of webcasts just as concerns about importance of exchange were responded to with the development of online forums and concerns about participation have been met with a live raising feature. There should be little reason to doubt the ability of e-learning technologies to mimic desired aspects of classroom learning.

With respect to inherent concerns regarding e-learning technologies it is important to note that e-learning is not being implemented by institutions as a replacement for this romanticized view of post-secondary education but as the most appropriate way of dealing with a litany of pressures that an institution faces. Comparisons between learners in an e-learning environment and those in traditional settings often produces slightly favourable results for the former. A meta-analysis conducted by the U.S. Department of Education on all the e-learning trials reached the

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[79] Paul Wells, "Our Universities Can Be Smarter," *Macleans*, July 28, 2009.
[80] Robert Campbell and others, "Educating Canada," *The Globe and Mail*, December 10, 2009.

conclusion that a hybrid approach yields the best results though an exclusively e-learning environment had a slight edge over exclusively classroom based learning in most of the studies.[81]

Despite these e-learning trials, some inherent quality concerns remain. One such concern is that e-learning technologies used by spatially isolated individuals will lead to slower developments in student maturity.[82] E-learning technologies are thus missing a key result in a value added model. While one may question whether student maturity is actually a feature of a value added quality evaluation model, and whether or not further technological developments in e-learning will remove some feelings of spatial isolation, the most significant point is that if digital environments are indeed the direction of the Canadian knowledge-economy is it imperative that instead of shying away from e-learning technologies post-secondary institutions integrate then so that students learn to interact in digital environments appropriately and will be able to function appropriately in the economy and society at large.

Another concern is that has received some attention over the past few years is that the process of reading online is fundamentally different from the process of reading printed text. There is a body of research that employs eye-tracking tools to map how vision moves and rests and concludes that online reading is often a scan of the text to find "the nugget", or the central point of the text leading one scholar to conclude that digital test causes one to read "in a shallower, less focused way."[83,84] The concern appears to overlook the concept of opportunity cost and that fact that individuals may scan a text online is because of the wealth of information that is inseparable from an online experience, rather than some formulation based on tactile differences as well as overlooking the point made with respect to maturity; that the post-secondary education system should be helping students learn important skills in online environments such as efficient reading.

Quality concerns such as these show the stubbornness to move towards a new societal practice and not a concern with post-secondary education itself. Yet adaptation in post-secondary is not only necessary but desirable. In his ancient text Plato himself was something of a Luddite, cautioning that the invention of writing would produce forgetfulness and cause the use of external aid and foreign symbols instead of the use of internal faculties.[85] Plato is of course correct, writing likely does take away from some memory functions, but the trade off that exists is heavily weighted in favour of the information sharing aspects of writing, and a similar trade off exists with developments in e-learning. While there are concerns with e-learning technologies that should be addressed, they must be put in the perspective of the benefits.

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[81] Barbara Means and others, "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies," (Washington D.C.: U.S. Department of Education, 2009).

[82] Linda Chrisholm, "ee-Learning: The best road to adulthood?" *Innovate* 3, no. 6 (2007).

[83] Mark Bauerlein, "Online Literacy is a Lesser Kind," *The Chronicle of Higher Education*, September 19, 2008.

[84] Mark Bauerlein, "Screen Reading and Print Reading," *The Chronicle of Higher Education*, October 21, 2009.

[85] David Jardine and Pam Rinehart, "Relentless Writing and the Death of Memory in Elementary Education," *Studies in Philosophy and Education* 12, no. 2-4 (1993), 127.

A Net Generation?

        A different kind of e-learning critic comes from Mark Bullen out of the British Columbia Institute of Technology, a sceptic of claims about a Net Generation that fundamentally learns in a different manner. Such claims have been trumpeted by Don Tapscott and Marc Prensky who have written works coining the terms Net Generation and Digital Natives respectively, with Diane and James Oblinger adding significant contributions as well. These theorists along with a number of supporters in the learning community believe that technological developments have created a generation with a proclivity for learning that is participatory, experiential, includes freedom and customization, and employs entertaining features or games.[86,87,88] Yet Mark Bullen criticizes these claims as sweeping generations that fail to meet up to the facts.[89] In a study conducted at the British Columbia Institute of Technology shows that there is a low level of agreement on collaboration about current students and comparing Net Generation and non-Non Generation there appears to be few differences. Some interesting findings of Bullen's are that social networking technologies do not always lend themselves to academic technologies and that professors embracing some technologies such as instant messages is perceived by students as unnerving. This is echoed in a study at the University of Guelph that concluded with the finding that students prefer not to mix professional and personal online. As far as approaches to learning are concerned, Bullen concludes that while students sometimes like group work this is only true if it helps their outcome. E-learning technologies therefore have an instrumental value, not an inherent value.

        These criticisms from Bullen echo the points made earlier about heterogeneous student learners. Perhaps e-learning is not for all, but it is certainly for some, and the benefits of e-learning technologies that have been described suggest that that option should be available.

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[86] Don Tapscott, *Growing Up Digital: The Rise of the Net Generation*, (Toronto: McGraw-Hill, 2009).

[87] Marc Prensky, "Digital Natives, Digital Immigrants," *On the Horizon* 9, no. 5 (2001).

[88] Diana Oblinger and James Oblinger (eds), "Educating the Net Generation," *EDUCAUSE* http://net.educause.edu/ir/library/pdf/pub7101.pdf

[89] Mark Bullen and others, "The Net Generation in Higher Education: Rhetoric and Reality," *International Journal of Excellence in e-Learning* 2, no. 1 (2009).

Section Six: Evaluation

Using OUSA's four pillars for the post-secondary education system utilized throughout this paper the complexities of e-learning technologies and the tradeoffs they present are illuminated. On the issue of affordability, while there are concerns about how the costs of e-learning technologies will be allocated between different stakeholders in education, the potential for these technologies to reduce costs is encouraging. On the issue of accessibility, while e-learning technologies create digital barriers to learning, technological developments have also helped to address existing barriers to learning. On the issue of accountability, while privacy and intellectual property issues emerge, these issues, as well as issues of privacy can largely be addressed through a combination of institutional and governmental policy. Lastly, on the issue of quality, while many technical and inherent concerns exist, these tradeoffs are often short-sighted and are relatively minor in comparison to the benefits that e-learning technologies provide to heterogeneous student learners and the development of the Canadian information-economy. The conclusion from this analysis is that there are benefits to integrating e-learning technologies into the Canadian post-secondary education system and there are positive implications for institutions that implement e-learning technologies successfully.

This is an important conclusion as it changes much of the nature of the debate and research regarding e-learning. In his work, *The Failure of E-Learning Research to Inform Educational Practice, and What We Can Do About It*, David Cook explains that much of the research on e-learning has focused on trials between e-learning and traditional classroom methods much to the detriment of meaningful technological development. Cook draws an analogy with early testing of automobiles, stating that while it was popular at the turn of the twentieth century to race early automobiles against horse drawn carriages, the real breakthroughs in automotive technology came when automobiles with different components were tested against each other.[90] This is how the debate and research regarding e-learning must change. Different e-learning technologies are vying for position in the marketplace and researchers and institutions should analyze what technical features can further the pursuit of affordability, accessibility, accountability, and quality while addressing the prominent concerns that have been raised. These serious concerns regarding e-learning technologies that remain deserve equally serious policy changes to mitigate their impact.

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[90] David Cook, "The Failure of E-Learning Research to Inform Educational Practice, and What We Can Do About It," *Medical Teacher* 31, no. 2 (2009), 158-162.

Section Seven: E-Learning Enhancement Strategies for Institutions

1) Focus on Usability

  The multitude of e-learning technologies in use lead to the first policy recommendation; that any adopted e-learning technology must focus on features of usability for administrators, students, professors, and teaching assistants. The list of such features is extensive and includes:

- The ability for users to change font size and style
- The ability for users to change the discussion format style
- Constant process improvement to reduce the number of "clicks"
- Role switch, so professors can see student view
- Feedback mechanisms for students
- Automated check up emails to students who fail to login for an extended time period
- Adaptive modules to student performance
- Insight into site statistics so professors can understand student experience in the system
- Lack of pop-up windows
- Consistency in view
- Learning tools such as an equation editor and spell checker
- Deadline extension for special circumstance
- Protection of privacy from other users
- Automated adaptive feedback provided in response to incorrect quiz responses that links a student to course material

All of these features should function across web browsers and across platforms to ensure e-learning technologies can properly develop at the instructional level.

2) Train Faculty in the Use of E-Learning Technologies

  At the institutional level, there are many policy changes that can aid in the proper implementation of e-learning technologies. As Katz notes, "that the barriers to realizing the promise presented by the changing ICT infrastructure are far more likely to be found in the organizational, leadership, and policy arenas than in the technology and resources domains."[91] A key overlap with the instructional level is the role institutions have in ensuring quality teaching instruction. Teaching is often a secondary concern to research for many institutions,[92] and teaching quality, through relevant training becomes even more important as instruction using e-learning is

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[91] Katz, 59.
[92] Kuh, 10.

fundamentally different from classroom instruction and requires a unique skill set. A constructivist approach to education that emphasizes collaboration does not mean that teachers are omitted from the process. However, institutions should look at their teaching model to see if it would be beneficial to restructure the distributed teaching responsibility to allow for the creation of new systems of tutors and online administrators that breaks the standard practice of one professor taking on sole responsibility for the majority of the functions in a course.

3) Recognize Differences in Faculty Funding

With regard to the significant differences in e-learning instruction, it is important to note that these differences have resulted in a great deal of extra time for faculty teaching e-learning classes. Currently course courses do not compensate for this fact and in some instances pay faculty teaching e-learning classes less.

4) Reform the Tuition Structure

Another institutional level change is to reform the tuition structure to a per-credit basis to adapt to increasing number of part-time students that are working full time jobs but e-learning accommodates into the post-secondary education system. At many institutions the current tuition framework is based on the assumption that every student will take a full course load, but this fails to reflect the realities of student life. As calls for a reformed tuition framework in which all tuition is charged on a per-credit basis gain traction, it is important to note that e-learning will further this trend as, much like the reformed news industry, individuals in an e-learning environment are granted greater flexibility in what will compose their learning experience, and at what time.

5) Prioritize IT Infrastructure

Without a robust IT infrastructure e-learning technologies cannot be properly utilized by students. Institutions must therefore prioritize developments in their IT Infrastructure in decisions relating to the allocation of campus resources. These developments may include a high-speed wireless connection, a large amount of bandwidth and information capacity, memory to store information from student email accounts, as well as the provision of hardware such as campus computer labs.

6) Ensure the Protection of Student Privacy and Intellectual Property

Institutions also have a role in ensuring proper practice is conducted with respect to practices being conducted outside of the institutional itself and by private providers. These insurances are especially important with respect to the protection of student privacy and intellectual property and the trend towards consolidation of private providers of e-learning technologies.

7) Ensure E-Learning Technologies are Up-to-date and Industry Standard

The application of e-learning technologies is not a one time initiative but a commitment to a method of learning that is constantly under change. What were once common media technologies a decade ago are now incompatible with the standard media equipment of today. Furthermore, as post-secondary education is often viewed as training for the workforce e-learning technologies should be industry standard to ensure transferable skills.

8) Maintain Paper Distance Education

As several key concerns have been raised concerning e-learning, institutions have a role in addressing these issues. One example is the digital divide that e-learning creates by isolating individuals who cannot easily access digital content. It is clear that e-learning is not a replacement for traditional forms of distance education and thus to engage learners that are geographically and technologically isolated traditional forms of distance education must persist.

9) Explore Methods of Inter-Institutional Collaboration

While it has yet to occur in practice, there exists great potential for e-learning technologies to cut costs for institutions. Indiana's Ivy Tech Community College can provide one example of how e-learning technologies can utilize economies of scale. Through the use of e-learning technologies the college harmonize its 130 000 students and 24 campuses and consolidated many of the college's procedures into a single software suite. The result was that the College has been able to avoid any tuition increase while managing 45% over the past two years.[93] Collaboration between institutions can also allow for new possibilities such as cross enrolment and a greater diversity of class selection for students if e-learning classes are offered by other institutions as well as a greater diversity of students participants within these classes if they are opened up to a greater number of institutions.

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[93] Linda Briggs, "Massive IT Overhaul Helps Ivy Tech Handle Growth," *Campus Technology*, October 29, 2009.

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