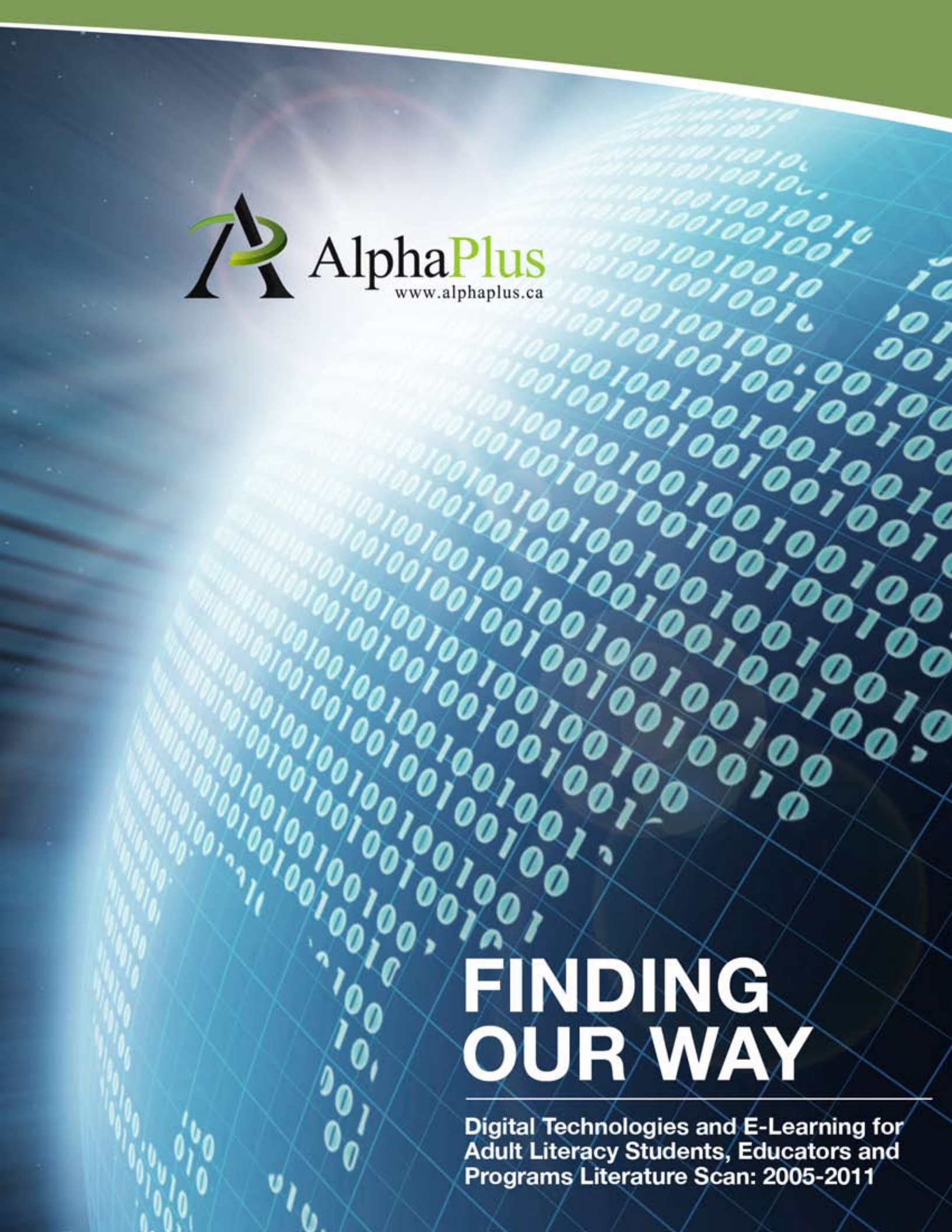

FINDING OUR WAY

Digital Technologies and E-Learning for Adult Literacy Students, Educators and Programs Literature Scan: 2005-2011

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Digital Technologies and E-Learning for Adult Literacy Students, Educators and Programs
Literature Scan: 2005-2011

Written by Maria Moriarty

AlphaPlus
www.alphaplus.ca

161 Eglinton Avenue East, Suite 704
Toronto ON M4P 1J5

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Foreword

At AlphaPlus, we believe that digital literacy is an essential 21st century skill, necessary to participate fully in our society. We aim to enhance the adult literacy sector by providing adult literacy organizations access to digital technology tools, training, support, resources, and consulting so they can teach more effectively and train their students to use everyday technology.

As part of our mission, we are producing nine research projects, which will be published in 2011-12, related to digital technologies and their potential impact(s) on the adult literacy field. The research supports our commitment to uncover best practices and to address the gap in integrating technology in adult education.

In seeking to create a heightened awareness about the use of digital technology in adult literacy education, we will distribute the research nationally and internationally. The research will reveal how technology can be used to support practitioners and learners - to access education materials and acquire the skills needed in today's society. Indeed, we are rapidly approaching, and in many ways, have arrived at an age where the ubiquity of digital technology in daily life creates the need to be digitally literate. The questions are how do we prepare for this need, how can we take advantage of it, and how can we develop our understanding of technology use to help students reach their learning goals?

This report explores answers to the questions above, and provides a snapshot of the latest thinking about the integration of digital technology and e-learning in adult literacy education. The report also explores the transformational power of technology in teaching and learning and its implications on training and professional development for adult literacy educators. Lastly, the report explores the opportunities and challenges that digital technology and e-learning present to the adult education sector, and what potential these tools offer students for learning gains and skills development.

In the coming year, we will publish a number of research reports that explore the uses and integration of technology in adult education. Research topics will include cloud computing and adult literacy, social networking and adult literacy education, exploring the use of digital media with adult learners, incorporating digital technology in the Literacy and Basic Skills Sector, and practices around digital technology in community-based adult literacy settings. We will also publish two Francophone research papers; one paper that speaks to the changing nature of technology and its impact on Adult Basic Education using Moodle and another paper that explores the motivation of adults in using technology for workplace training.

We welcome and encourage your feedback and insight to help us uncover greater uses and possibilities for the integration of technology in the field of adult education.

Peter Rogers
Board Chair

Michael Coteau
Executive Director

Introduction

"During the period 2010-2025, there will be a number of developments in technology that will have a far-reaching impact on learning, teaching and the organizations that design, deploy and assess learning for students."

(Fast Forward p.4)

As long ago as 2003, in a research report on learner perception of Web-based learning in the AlphaRoute online learning environment, AlphaPlus noted the "high level of conceptual Web-readiness in the adult literacy field in Ontario" (AlphaPlus 2003). In the eight years since, as developments in digital technology have picked up pace, the adult literacy field in Ontario has, with the ongoing support of our funders, worked very hard to bring the benefits of new and emerging technologies into our field and to put those technologies at the service of adult literacy students, educators, and programs. Programs and agencies have worked to widen access to learning opportunities and to enable adult literacy students to pursue their learning journeys "anywhere" and "anytime." Although we are just on the cusp of these developments, we have the beginnings of a robust infrastructure in Ontario and are, in many ways, leading the way in Canada in making e-learning available in adult literacy.

For the past 10 years or so at AlphaPlus, we have been engaged in working with the adult literacy field in Ontario and across Canada in exploring the potential of emerging technologies in adult literacy teaching and learning. We are committed to supporting the adult literacy field by disseminating research, information, and training to adult educators on innovative learning technologies. This literature scan is intended to provide the field with a snapshot of the latest thinking and commentary on the potential impact of integration and use of digital technologies and e-learning in adult literacy programming, to inform a conversation about the transformational power of the use of these technologies on how teaching and learning happens in adult literacy, and the implications for the training and professional development of adult literacy practitioners. This literature scan represents our view of what is happening, what needs to happen, and how we can, in collaboration with the adult literacy field, begin to harness the full potential of digital technologies and e-learning in the service of adult literacy teaching and learning.

Community Literacy Ontario (http://www.nald.ca/clo/) (CLO), in its December 2010 **Focus on E-Learning** (http://www.nald.ca/clo/newslet/dec2010_e-learning.pd), outlines the many online and e-learning opportunities available to adult literacy students across the province. For example, **The Learning Hub** (http://www.learninghub.ca), an e-Channel [1] site managed by **The Centres for Employment and Learning** (http://www.thecentreforemploymentandlearning.ca/learning/literacy.html**)** in Southwestern Ontario offers adult literacy students the opportunity to participate in live classes, to engage in online independent study, and to blend the two to suit their own learning needs. Students are also offered short time-limited online courses as well as tutorials to help them become oriented to online learning. The Learning Hub reports that it served over 1400 clients between April and

[1] E-Channel literacy is a web-based innovative way to deliver literacy training that will improve access for Ontarians. E-Channel services are currently available for learners in three cultural streams: Aboriginal, Francophone and Anglophone. E-Channel services are also available for learners in the higher literacy levels knows as Academic Upgrading. E-Channel services for the Deaf are currently under development. In addition, e-Channel will better serve persons with disabilities and those who live in rural and remote communities. (**http://www.tcu.gov.on.ca/eng/eopg/publications/20110309_lbs_guidelines.pdf**)

September 2010. The **Sioux Lookout Learning Centre** (http://www.siouxhudsonliteracy.com/about.htm) via the e-Channel program "Good Learning Anywhere" in Sioux Lookout, Ontario also offers a comprehensive set of online learning opportunities to adult literacy students in the Native community. These online courses were developed based on a series of short term pilot programs (Eady 2006). **ACE Online** (http://acedistancedelivery.ca), the suite of online courses offered by Ontario's Community Colleges, provides adults in the province with the opportunity to work toward a Grade 12 equivalency and there are over 1500 students registered in ACE Online at any given time. In the Francophone community in Ontario, **CAF School for Adults** (http://www.cafplus.ca) offered a range of online courses for adults who want to improve their French language skills or to complete a Grade 12 equivalency in French. At AlphaPlus, we have offered training to adult literacy educators in the use of Moodle, and to date, more than 300 educators have participated in this training. More than 180 educators completed their training and are now fully able to create and deliver online courses using Moodle.

Based on this overview of what is happening in Ontario, it is clear that digital technologies are becoming widely used and online programming and e-learning are happening and expanding. In the following scan of literature, we closely investigated online and e-learning programming in adult literacy across Canada. However, based on a preliminary review we do know that such programs exist from coast to coast. For example, the Newfoundland and Labrador Department of Education has partnered with the Labrador Friendship Centre to pilot **ABE Level 1 E-Learning** (http://www.lfchvgb.ca/home/68) and in British Columbia **LearnNow BC** (http://www.learnnowbc.ca/services/6stepsAdultGraduation.aspx) offers online courses for

adult students who want to complete their High School Diploma.
The genesis of this literature review was our increasing realization, at AlphaPlus, that despite the rapid pace of development and use of digital technologies in the education sector and in adult literacy, there is much to be explored and learned about what the use of digital technologies and e-learning may mean in terms of teaching and learning in adult literacy settings. We set out to do a preliminary exploration, to learn more about the opportunities and challenges that digital technologies and e-learning present, and what potential these tools offer students in relation to learning gains and skills development. We also wanted to look more closely at how educators are and could be supported to master digital technologies and to integrate technologies into their practice. Given the rapid pace of change and the ubiquity of digital technologies, there is some pressure on educators to keep up, to integrate technology, and to deal with the multiple issues and challenges in doing so. We wanted to look at models of professional development, both face-to-face and online, and how communities of practice can support professional development. Finally, we also wanted to explore the concept of digital literacy in relation to adult literacy teaching and learning. We were concerned with the volume and range of terminology related to e-learning and with the absence of clear definitions of the various terms. The situation around terminology has been variously described as “a cacophony of jargon” (Donohue & Howe- Steiger 2005) and “Tower of Babel” syndrome (Guri-Rosenblit & Gros 2011).

We decided to take a step back, to zoom out, so to speak, and survey the landscape. We wanted to look at the latest literature and what is being learned about the role of digital technologies in teaching and learning. We hope that by doing this that we can get a clearer picture of technology use in education and contribute to laying the groundwork for some much-needed research to establish what the potential role of digital technologies may be in adult literacy and to better understand the digital technology learning, training, and professional development needs of educators in the adult literacy sector.

Methodology

The very first discovery we made is that there is relatively little literature on e-learning or digital technologies in adult literacy teaching and learning. Given the scarcity of research and documentaiton in the area of digital technologies in the adult literacy sector, we made a decision early on to look across the education sector, including K-12 and post-secondary. Our intent was to look at the developing body of knowledge in the education sector generally, and, bearing in mind the unique and specific challenges and needs of the adult literacy sector, to begin to extrapolate from this body of knowledge what can be learned and could be relevant to the field of adult literacy. To that end, we conducted a cross database search for relevant journal articles, reports, websites, blog posts, and opinion pieces. We also reviewed a range of cross-jurisdictional official government strategy documents, policy papers, and statements about technology in teaching and learning, digital skills, and e-learning.

The scope of the literature search was restricted to the time period 2005-2011 to capture the very latest research and commentary on technology in teaching and learning. Much of the relevant material included in the literature scan was published between 2008 and 2011. The search was confined to the following jurisdictions: Canada, US, UK, Australia, New Zealand, and Ireland as each of these jurisdictions have well-developed adult education and adult basic education sectors.

The literature search was iterative; we began with a wide-ranging search across the education sector. In the course of our preliminary search we identified over 200 articles and publications across all jurisdictions. These items were scanned for content and relevance against the following criteria:

- Technology in teaching or learning as the primary focus;
- Likely relevance to the adult literacy field, e.g., not too narrowly specific to the K-12 or higher education sectors; and
- Date of publication.

*In two instances publications from 2004 are included based on their high level of relevance to adult literacy. We have also included a single reference to a 1996 publication.
Ultimately, we identified 84 articles and publications for review and inclusion in the literature scan.

The landscape we live in

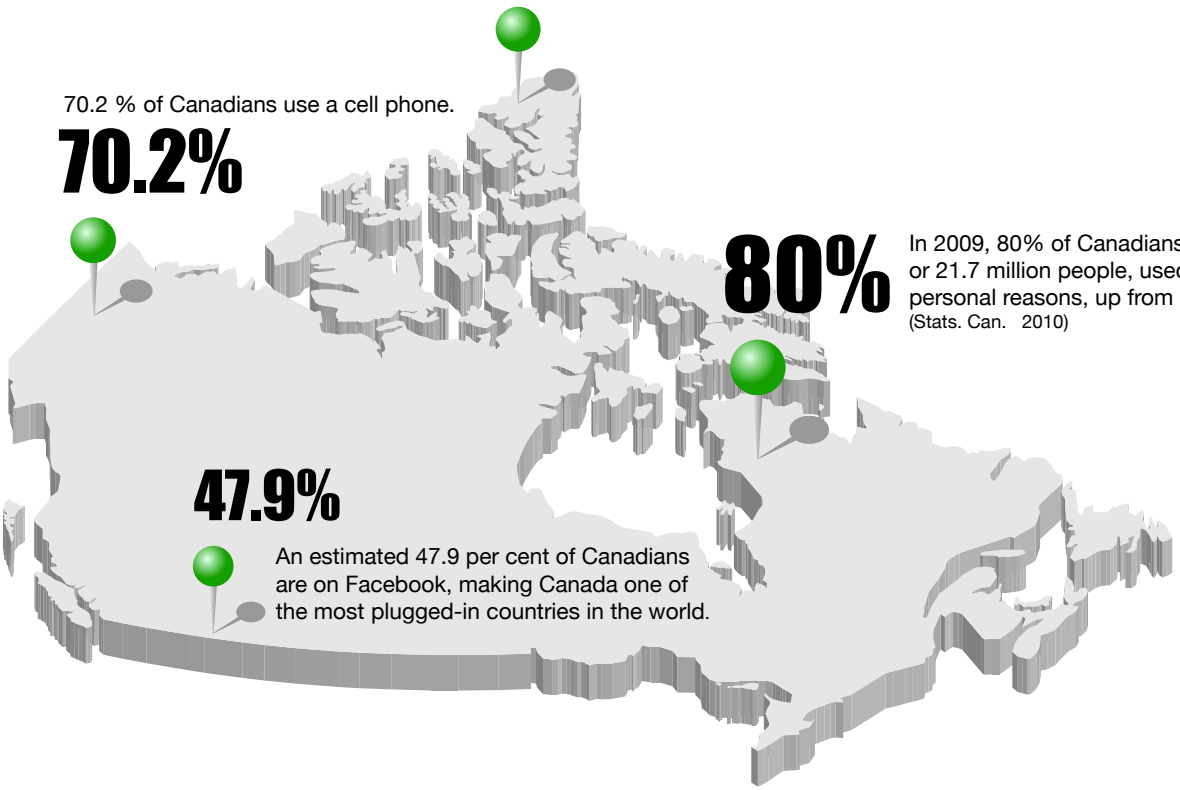
"We now live in a world that functions increasingly in a technology encompassed mode, and learning and work are less and less accessible to those who cannot use technology."

(Power of Technology p. 2)

18 hr. Canadians are spending more than 18 hours a week online, compared with 16.9 hours watching television.
(Ipsos Reid survey reported in the Financial Post Mar. 22, 2010)

70.2 % of Canadians use a cell phone.

70.2%



80% In 2009, 80% of Canadians aged 16 and older, or 21.7 million people, used the Internet for personal reasons, up from 73% in 2007.
(Stats. Can. 2010)

47.9%

An estimated 47.9 per cent of Canadians are on Facebook, making Canada one of the most plugged-in countries in the world.

The recently released **Canada Digital Year in Review** reports that in the last quarter of 2010, Canadians spent almost 44 hours per month online – almost double the global average of 23.1 hours per month.

These figures may obscure the fact that a significant proportion of Canadians, particularly among those who live in rural areas, do not have broadband Internet access and have connection speeds slower than 1.5 megabits per second, which is comparable to the speed of a dial-up connection and is far too slow for many applications, e.g., video streaming that are a part of online and e-learning (Globe and Mail, Oct. 27 2010 & Globe and Mail, Nov. 15, 2010). Canada does not currently have a national broadband strategy and the costs of providing broadband Internet access throughout the country is pegged at a staggering $7 billion. Thus, when we discuss the opportunities for learning that new and emerging technologies make available, it is important to recognize that there are barriers and obstacles that need to be addressed in relation to equity and access for all Canadians. In Ontario, under the **Rural Connections Broadband Program** (http://www.omafra.gov.on.ca/english/rural/ruralconnections/broadband.htm), broadband access is increasing annually, but has not yet reached every area or region of the province.

These figures and statistics, astonishing and overwhelming as they may be, are really beside the point. We include them only to underscore the fact that the use of digital technologies has decidedly become an important part of our mainstream culture; it is in every corner of our lives. The issue is not so much to look at specific platforms, programs, or devices, but rather to consider whether the proliferation of digital technologies is transformative in relation to how and where we learn and how and where we teach; and to explore what this may mean for our understandings of adult literacy learning and teaching.

The use of digital technologies has the potential to transform or is transforming what we think about what needs to be learned and what should be taught. Here are some of the questions we considered as we reviewed the literature:

- How can learning opportunities be distributed so that learners do not always need to travel to a specific plate at a specific time in order to attend programs?
- Do students have the skills they need to use digital technologies and to participate in e-learning?
- How are these skills acquired?

What types of support, training, and professional development do practitioners need? How can programs realize the potential of these technologies for promotion, recruitment, administration, professional development, assessment, networking, and resource sharing? Ertmer & Ottenbreit-Leftwich (2009) make the point that there is an assumption and expectation that professionals in a range of areas will and do make use of technologies, e.g., doctors and mechanics, and they go on to ask if there is the same expectation of teachers. Their work specifically looks at the K-12 sector in the US and the expectation for adult literacy educators may not be the same. The adult literacy field may not have reached the point where it is simply expected that educators have the technology skills, use technologies as part of their practice, accept technology integration, and use it as a component of best practice. But we are rapidly approaching a time when the ubiquity of digital technologies and their place in our daily lives will lead to this level of expectation. The questions are how are we to prepare for it, how can we take advantage of it, and how can we develop our understanding of the use of technologies to help students reach their learning goals?

"...a flexible approach to education and training is essential to prepare Canadians for the 21st century. This broadened paradigm will involve the full integration of learning technologies into education and training."

(CCL State of e-learning: 2009 p. 5)

Literacy skills in pre- and post-digital worlds

As this new landscape emerges, the transformational power of digital technologies in adult literacy teaching and learning comes into sharper focus. We looked at a range of literature from across the education sector to explore this transformation and to try to illuminate some of the challenges and opportunities. We looked at what people are saying about literacy skills in this digital world. What are those skills and how do they relate to our traditional understandings of adult literacy? In Australia, a study by the National Centre for Vocational Education Research (NCVER) concluded that "it makes little sense to continue to think and

talk about literacy practices and the use of information and communication technologies as if they were separate activities: literacy education is equally and simultaneously digital literacy education." The study, based on case studies of adult literacy and numeracy programs in which digital technologies were in use, argues for a fundamental shift in understandings of what constitutes adult literacy teaching and learning and a recognition that adult literacy programming should be re-envisioned to meet the learning needs of learners in a society that is changing based on the pervasive availability and use of digital technologies (Snyder et al. 2005).

In relation to traditional definitions and understandings of literacy, there is the question of how adult literacy educators can accommodate the paradox of working with students who are developing digital literacy skills, particularly younger students who take the digital mode for granted? They turn to digital technologies and to each other to exchange information. How can adult literacy educators effectively work with these students, while at the same time accommodate the demand that they be accountable for the development of the more traditional print literacy skills? How are these "two literacies" to be aligned? This is a central question in the delivery of adult literacy programming (Rooney 2009).

Often in adult literacy we hear that a motivating factor for adults seeking to upgrade their literacy skills is a desire to support their children to be successful in school. But as digital technologies become ever more present in the K-12 sector, it will be necessary for parents to have not only the necessary print literacy skills but also the digital skills to help their children. They will need to know how to access computing platforms and digital devices. Although technology has a positive role to play in helping parents to support children with school work the challenge is to support parents to acquire and enhance their digital literacy skills so that they can do what they want and need to do to support their children's learning (British Educational Communications 2010).

A critical issue for adult literacy programming in relation to digital technologies is the question of how adult learning principles align with the use of technologies in instruction. That is to say, how can adult educators preserve the interpersonal dimension, going beyond the transmission of codified knowledge, within a digital learning environment? This raises the question of the best model of e-learning for adult students. Research literature points to a blended learning approach: one in which face-to-face and online or distance learning opportunities are used together as the best use of technology in adult learning (Ahedo 2009; Means 2010).

Explorations of the effective integration of technology in the K-12 sector argue for an alignment of technology integration strategies with the existing knowledge and experience of educators in instructional planning. Rather than asking educators to design their instruction around a particular technology tool, rather than making technology and technology tools "one more thing" that educators have to do, instructional planning should build on the knowledge, experience, and instructional priorities of educators so that technology will truly support and expand their instructional strategies (Harris & Hofer 2009). This is equally true in adult literacy and it begs the question of how educators can be supported to effectively integrate technology in their practice and what that might mean. Teaching practice has followed and been influenced by available tools and by the introduction of new tools throughout history. How can educators be supported to come to terms with the fundamental transformative power of technology in education and to make use of technology as a tool to support their

practice rather than as an add-on (Martinez 2010)?

In the area of traditional distance education where curriculum is critically important there is some concern that distance education has not fully embraced the collaborative potential of online learning and thus is not in a position to meet the learning needs of learners in the 21st century (Garrison 2009). What is the future of distance education in the digital age? How are distance education programs to address the issue of the digital divide, design affordable programming that incorporates digital technologies, or examine and adjust the roles of the various players and design and implement evaluative tools that will ensure quality programming (Young 2005; Garrison 2009; Guri-Rosenblit 2009)?

A word about terminology….

One of the primary goals in undertaking this literature scan was to look at the range of terminology that is used to describe teaching and learning using technology. We speak of e-learning, online learning, distance learning, technology, digital technology, digital literacy, and digital skills (Bates 2009). However, as we set out to explore e-learning and other related terms we realized that underneath these terms and concepts the issue of digital skills and digital literacy also presented themselves for exploration. At AlphaPlus we have tried to think broadly about e-learning, what it is in the context of adult literacy teaching and learning, how it relates to the practice and delivery of adult literacy, and how it is connected to the learning needs and goals of adult literacy students in relation to employment, further education and training, independence, and civic participation.

Bates (2009 p.6) defines e-learning as "… a broad term encompassing a wide variety of electronic technologies used for educational purposes, and a wide variety of educational formats and designs." Although this is quite an expansive definition, it has the advantage of encompassing a lot of the terminology so that we can come close to a common understanding. The range of terms, e.g., online learning, hybrid learning, blended learning etc., all fit under the umbrella term e-learning.

It looks as though the term e-learning is now being used more and more in the education sector in Ontario. For example, Community Literacy Ontario, in its recently published Focus on E-learning, notes that "… E-learning includes formal online courses that students register to take through a community college or other organization, but it also includes tutors and learners communicating via email and everything in between." Other terms such as ICT (Information & Communications Technologies) have become accepted umbrella terms in the UK, Europe, US, Australia, and New Zealand.

In the UK, BECTA, which was, until recently, the agency in the UK charged with leading a national effort to ensure effective technology integration in education, coined the term Information and Learning Technologies (ILTs). This term has the advantage of covering not just educational technologies but also the use of technologies for more general communication. Although this term is very useful and broad, it had not had much uptake in Canada. Technology-enabled learning (TEL) is also a fairly widely used term, however, it looks as

though that term refers only to learning using technology and may, therefore be too narrow. This raises the thorny question of which term can be used to encompass terminology in general.

The danger is always that by adopting an umbrella term, like e-learning, essential concepts may be overlooked, or the focus of the term may be too narrow to accommodate the pace of change in the area of technology in education and may not be flexible enough to encompass future developments. For example, e-learning is not as useful when we want to discuss technology and its potential and effects in other areas of our lives, e.g., work, where a term such as ICT may be more accurate.

That said, given the growing acceptance of the term e-learning, throughout this report we use the term e-learning when speaking about teaching and learning with digital technologies. We use the term digital skills when speaking about those skills that are necessary to make effetive use of digital technologies for learning, employment, and civic participation.

"The number one benefit of information technology is that it empowers people to do what they want to do. It lets people be creative. It lets people be productive. It lets people learn things they didn't think they could learn before, and so in a sense it is all about potential."

Steve Ballmer CEO of Microsoft

e-learning, digital literacy, digital skills, and adult literacy – what could it all mean for teaching and learning?

Increased access

A recent report in the US estimated that by 2013, 70% of all jobs in the US will require some level of familiarity with digital technologies. The report calls on adult literacy programs and educators to seize the opportunity to incorporate digital literacy and digital technologies into their programming so that students have the opportunity to develop digital skills for jobs (McCain 2009). A study from the UK shows that currently 77% of jobs require some level of digital technology skill (JISC Briefing Paper 2009). Additionally, in the US it is estimated that only a small fraction of adults who could benefit, employment-wise from further education and training and from basic skills upgrading, are actually participating in existing programming. Many do not know about such programs and many do not have the means to attend them. The use of digital technologies to provide wide access across distance and time is cited as the obvious course to take to make participation in adult upgrading more universal (McCain 2009). Also, some studies have reported that adult literacy students who have participated in online learning or used digital technologies in learning have experienced greater learning gains (Porter & Sturm 2006; Mellar 2007; Reder 2007; Means 2010).

We have seen above the exponential growth of e-learning in opportunities. Students need access to learning opportunities when attendance at bricks and mortar locations is not possible. Adult literacy students, at all learning levels, have been shown to be interested, willing to participate, and capable of full participation in e-learning (Porter & Sturm 2006; Silver-Pacuilla 2008). In terms of access, it is also noteworthy that adult literacy students who are living with learning difficulties and disabilities could have access to assistive technologies that have been shown to be beneficial and to enhance their learning gains (Silver-Pacuilla 2007).

"…the computer is not a toy; it is the site of wealth, power and influence, now and in the future. Women and indigenous people and those with few resources cannot afford to be marginalised or excluded from this new medium. To do so will risk becoming information poor. It will not be to count; to be locked out of full participation in society in the same way that illiterate people have been disenfranchised in a print world."

(p.16) Spender (1995) Nattering on the Net: Women, Power and Cyberspace. Spinifex Press

Digital reading

Researchers are beginning to closely examine the differences between print reading and digital reading and the skills required to be a competent reader of digital texts. For example, in Canada, a major multi-year research study at **Acadia University** (http://www.acadiau.ca/whatsnew/newsrelease/2009/reading_digitalage_mar27.html) will explore the future of reading in the digital age.

Roswell & Burke (2009) in a case study of the digital reading practices of two young learners, one in Canada and one in the US, describe the complexities of digital reading and posit that digital reading requires a different set of skills from those required for print. In their view multi-modality, the ability to understand different modes of communicaiton, "visual, acoustic, spatial" is what defines digital reading. Digital texts offer readers many more ways to experience the reading process and require "a repertoire of skills, from interpreting visual clues to mastering the nuances of subtext, to following ideas in a non-linear fashion, to decoding simple reading." They go on to explore the concept of the reading path, which is well-established in print text but more fluid in online reading, i.e., a reader doesn't know where she will end up when she looks at a website.

Although this article focuses on adolescents, it is important for all literacy students and instructors. Particularly in a digital world where we are incresingly required to interact with digital texts and there is an increasing requirement that we have the necessary digital technology skills for every level of job and in most, if not all, workplaces.

Eshet (2004) says that learners need a range of skills to be digitally literate and he proposes a "holistic conceptual framework of digital literacy," proposing a conceptual framework that incorporates several literacies, e.g., photo-visual, reproduction, and branching. What he describes is a set of technical, cognitive, and sociological skills, "survival skills," for the digital era.

A UK study, looking the change in contexts of learning, including employment, finds that educational institutions will need to adapt to help students deal with a range of issues in the global digital economy. The study based on 15 institutional audits in the further education and higher education sectors in the United Kingdom describes the potential impact of increasingly networked societies and communities, the proliferation of digital technologies on teaching and learning and includes a very clear illustrative table of "features of the digital literacies paradigm shift" (Beetham 2009 p.1).

The study, although focused on post-secondary and higher education settings, offers a clear explanation of the effects of rapid developments in technology on our understandings of needs and priorities in teaching and learning.

Digital literacy as a fundamental skill

"Canada has fallen behind a number of other countries in the development of a digital economy. Countries like the UK, Australia, New Zealand, and most recently the United States, have made digital literacy a cornerstone of their digital economy strategies. If Canada wishes to improve its digital advantage and build sustainable prosperity, we must do likewise."

(Media Awareness Network – From Inclusion to Transformation p. i)

The term 'digital literacy' is still the subject of a lively debate among academics and educators. There is no single agreed-upon definition. Here are three definitions that point to the multi-faceted nature of this concept:

"Digital literacy is the set of attitudes, understanding and skills to handle and communicate information and knowledge effectively, in a variety of media and formats" (Bawden 2008).

Digital literacy as delineated in the California ICT Digital Literacy Assessments and Curriculum Framework: "the ability to use digital technology and communications tools, and/or networks to access, manage, integrate, evaluate, create and communicate information in order to function in a knowledge society." (California ICT Digital Literacy Assessments and Curriculum Framework (2008 p.3)

The **NWT Literacy** (http://www.nwt.literacy.ca/digital_literacy.htm) council has developed a very helpful introduction to the concept of digital literacy within the context of adult literacy:

"Digital literacy is the ability to locate, organize, understand, evaluate, and create information using digital technology. The term 'digital literacy' relates to: The functional skills of knowing about and using digital technology effectively [include]:

1. the ability to analyze and evaluate digital information
2. knowing how to act sensibly, safely and appropriately online
3. understanding how, when, why and with whom to use technology."

Is digital literacy a fundamental skill? Arguably it is, since as we noted above, the ability to engage productively with digital technologies enhances employment opportunities, and enables fuller participation in further education and training. Engagement with and mastery of digital technologies also allows for richer civic participation and provides students with

greater access to learning opportunities both across time and across distance. In the case of students with learning disabilities, digital technologies can provide enriched learning opportunities form a range of assistive technologies to enable learning, success and learning gains.

But if this is the case, if digital literacy is indeed a fundamental skill, then the question arises as to how it fits in the traditional adult literacy program? If, for example, we accept the fact that most jobs require some level of digital technology skill then how do we set about ensuring that learners have access to programming and instruction that will enable them to acquire digital technology skills?

Digital skills and employment

"To a degree unmatched even by Literacy, the need for Digital Literacy will be pervasive. To function as a citizen, to operate machinery, to create a product or service…all these actions will be intermediated by a computer or computer interface."

(ICTC's Digital Literacy White Paper)

Industry Canada's consultation paper Improving Canada's Digital Advantage (2010) points to the critical need for all Canadians to develop and enhance digital skills, identifying that successful entry and progression in the labour force is increasingly tied to ability to use digital technologies. The submission to the national consultation on skills for the digital economy by The Media Awareness Network (2010) makes a compelling argument that Canada is falling behind in the global digital economy, and that there is a need to balance investments in technology and infrastructure with investments in skills and knowledge in digital technology. The submission paper calls for a national digital literacy strategy and recommends detailed components of such a strategy. It is no longer a question of whether Canadians use digital technology, but how well they use it.

The issue of digital skill development in Canada is now a priority issue for the federal government. The digital skills initiative led by Industry Canada is fully endorsed by HRSDC. Here is a quote from a recent presentation by The Honourable Diane Finley, Minister of Human Resources and Skills Development Canada, speaking at the **Conference of the Canadian Chapter of the International Institute of Communications** (http://news.gc.ca/web/article-eng.do?nid=576909) in November 2010:

"Canadians in all walks of life need to have the skill sets to be able to access, use and interpret digital information. As technology evolves, it will be harder and harder to participate in the labour market and society unless you have digital skills. Here is a critical statistic: over 40 percent of the workforce currently lacks the basic literacy and digital skills that are needed to thrive in the digital economy. And that means that a significant percentage of the workforce can't, for example, read technical manuals to allow them to learn on the job and use new digital technologies. They are also not always able to fully participate in today's economy, and will have an even harder time participating in tomorrow's economy. And these are not just older workers. A third of those lacking literacy and digital skills are under 35 years of age. Of course, lacking digital skills doesn't just impact workers, it impacts our ability to grow and compete."

This call, for enhanced and general support to populations to acquire these skills, is echoed in research and public policy initiatives in the United States (McCain 2009; e-skills UK 2009; Digital Strategy New Zealand n.d.; Digital Education Revolution Australia 2008).
The recent discussions of digital literacy as a fundamental skill arise from projections and analyses of future job market needs and the role of digital technologies in the economy. The underlying argument for the importance of digital skills is focused on what is described as the changing economy. This refers to an economy in which information and communications technologies play an ever important role and in which digital skills are now necessary, even required, in most occupations and workplaces.

For example, the economic downturn of 2008 and the subsequent decline in the manufacturing and resource sectors leading to high rates of unemployment has had a serious effect on rural communities in Ontario. A comparative analysis of three existing e-learning programs in Ontario argues for the development of a coordinated provincial digital skills training strategy including a robust digital technology curriculum to foster the creation of employment opportunities in rural communities. The author goes on to make the argument that Ontarians, particularly the unemployed and rural residents, need to develop digital skills, which he describes as important as literacy and numeracy skills, to take advantage of employment opportunities (Newman 2010).

An Australian study, based on a series of case studies, examined the potential of e-learning in the vocational education and training sector with particular reference to the development of employability skills in relation to four key adult learning principles, Responsible Learning, Experiential Learning, Collaborative Learning and Reflective Learning. The study concludes that the best uses of e-learning are its potential to allow educators to address a range of learning needs and learning styles; to enable learner-centred approaches to instruction; to provide a range of instructional options and to provide a means to assess employability skill development (Bowman and Kearns 2009).

Warschauer (2010 p.1) reviewed emerging technologies for adult literacy and language learning in the United States and looked at how these technologies can support literacy and language learning and can support adults to acquire the digital competencies they need.
He describes "…the vital role of technological proficiency as a gatekeeper for occupational success and full civic participation." This position is echoed in a comprehensive review of e-learning for adult literacy, language and numeracy conducted in New Zealand, which notes that adults need digital technology skills as part of their repertoire of skills for employment and particularly noting the importance of these skills in relation to the growth and expansion of e-learning and e-training in the workplace (Davis & Fletcher 2010).

The digital divide

"Bridging this digital divide can help members of disadvantaged social groups to participate on a more equal footing in digital society (including services of direct interest to them such as eLearning, eGovernment, eHealth) and to tackle their disadvantage through increased employability. Digital competence is thus one of the eight key competences which are fundamental for individuals in a knowledge-based society."

(Digital Agenda for Europe p.25)

The digital divide refers to the gap between digital technology haves and have nots. It is a short-hand term that covers several issues, including access, connectivity, exposure to digital technologies, and the skills to make use of emerging technologies for work, learning and civic participation. The range of issues: access, skill, motivation, and policy included in the concept of the digital divide are clearly described in a post in the **Passionate Librarian** (http://thepassionatelibrarian.blogspot.com/search/label/dgital%20divide)
(Eliot February 2009).

A study focused on the learning and training needs of newly unemployed adults in the US finds that while educational institutions are offering extensive online programming to meet the needs of these adults, many lack the digital skills necessary to participate successfully in much-needed education and training for new work/jobs (Trekles 2010).

Warschauer (2010) examines the concept of the digital divide and compares it to the literacy divide. The digital divide is not just lack of access to technology but the time and motivation to acquire and practice digital technology skills:

"What is important about ICTs is not so much the availability of the computing device or the Internet line, but rather people's ability to make use of that device and line to engage in meaningful social practices, specifically to communicate with people to access information and to publish information."(p.7)

"ICT access is not found through an AOL account, but through the informed deployment of a variety of technologies in the service of collective inquiry and social action. This is the lesson of the literacy approach to understanding the digital divide."(p.31)

A study conducted as part of the **Longitudinal Study of Adult Literacy** (http://www.lsal.pdx.edu/index.html) finds that literacy proficiency is a key predictor of computer ownership and use. Individuals with higher levels of literacy tend to become early adopters of technology

while each successive increase in overall computer use between1998 and 2005 saw individuals with ever lower levels of literacy becoming computer users. Overall, individuals with higher levels of literacy tended to be more likely to use computers at work. So, in a sense the first digital divide related to ownership and access is closing. However, the fact remains that individuals with lower levels of literacy are less likely to have opportunities to be exposed to digital technologies at work and therefore do not have the same level of opportunity to develop the very digital skills they may require for work advancement, for access to further education and training and for full civic participation (Strawn 2008).

A comparative study conducted in comparable populations in London, England and Portland, Oregon points to a correlation between literacy proficiency, digital technology skills, and employment. The study explores the influence of employment and digital technology on literacy proficiency. Time spent in employment and exposure to and use of digital technologies appear to have a positive effect on literacy proficiency; the reverse seems somewhat weaker. A combination of literacy provision and opportunities to enhance digital skills alongside employment opportunities seems to be the strongest indicator of reduced marginalization, greater social inclusion as well as increased employment and earning power (Bynner et al. 2008 & 2010).

Trekles (2010) notes that a casual search in a job posting search engine returned over 6000 jobs requiring some level of ICT or digital skills. He describes a situation in the United States where older learners and newly unemployed learners seeking new skills are being recruited by colleges and universities through the offering of distance learning. However, these recruits to learning may lack the necessary confidence and skills to take full advantage of these offerings. He makes the point that since the majority of jobs will require some level of these digital skills, colleges and universities need to work at creating and providing a learning atmosphere which acknowledges the different levels of skills that learners bring. It is not enough to simply make technology available; learners have to be supported and encouraged to participate productively in online and face-to-face instruction. There is a need to bridge the divide between the digital realm and understandings of more traditional literacy skills. Working with digital technologies provides students with the opportunity to develop the very digital skills they will need in the majority of workplaces (Mellar 2007; McCain 2009; Warschauer 2010; Davis & Fletcher 2010; Means, 2010).

E-learning in adult literacy offers a range of opportunities for knowledge and skill building. As we have noted, the opportunity for students to have greater access to learning across barriers of time and distance is an obvious advantage. In addition, we have noted reliable data that points to real and measurable learning gains. When students have access to online learning resources for practice and self-study, they spend more time on task. These two “strands” increased access and potential learning gains, are interwoven with a third – the opportunity to build real digital skills that will support entry and progression in the workforce in a digital economy and in workplaces and jobs that now require digital literacy skills.

E-learning provides not just an opportunity to learn where none may have existed before, but an opportunity to progress at a faster rate and the real potential to build essential digital skills by using digital technologies for learning and self-study (Mellar 2007; Davis & Fletcher 2010; McCain2009; Means 2010; Warschauer 2010).

Anywhere/anytime learning

Increasingly technology offers the possibility of access to learning from multiple geographic points and at multiple times. The phrase anywhere/anytime learning carries with it the promise of barrier-free access to learning, no need for materials, no need for instruction, and no need for buildings or programs. It calls to mind the very early days of computers in education when the prospect of completely independent learning without the need for traditional classrooms was widely discussed and debated.

However, anywhere/anytime learning is something of a misnomer. Anywhere/anytime access to learning materials, lessons, instruction, practice, self-study, and self-assessment tests is perhaps more accurate. The infrastructure behind anywhere/anytime learning remains that of a traditional learning institution. Online learning opportunities, both synchronous and asynchronous, offer students the opportunity to tailor their learning schedule to fit their lives, work, and families as never before. One example is the GED Home Study/GED Online program, a highly successful online GED preparation program in Florida designed to accommodate students who have work/family schedules that cannot be accommodated in traditional programs and students who have not been comfortable in the more traditional

education system. Approximately 70% of participants in the program had actively sought an alternative to traditional classroom settings (McClellan & Schoneck 2006). Anywhere/anytime access offers several advantages. Students have the opportunity to participate in learning at their own pace, in their own time, without having to deal with fixed classroom schedules and family obligations such as child care. Students who have had unsuccessful experiences in traditional classroom settings have the opportunity to return to learning without having to experience the setting and norms in which they did not succeed. For some students this is a critical factor in supporting persistence (Warschauer 2010). For other students the need for relative privacy as they learn and the opportunity to try multiple times is important and relieves the stress that they feel in being observed while learning and working on literacy and numeracy skills (AlphaPlus 2003; Davis & Fletcher 2010; Warschauer 2010).

A recent study from the United Kingdom examined solutions and the role of technology to address low-achievement and underachievement in secondary schools. The study found that technology can help by supporting the development of self-efficacy, which they describe as an essential component of academic achievement. This means that if a learner can see her success in a learning setting she is more likely to succeed. They also focus on student motivation, engagement and persistence and say that software with frequent feedback can increase time on task and keep learners engaged and interested (Underwood 2009).

Warschauer (2010) examines the situation in the United States whereby individuals who have the greatest need for access to digital technologies for learning and employment are least likely to have computer and Internet access in the home. The author questions whether adult education programs can actually meet the needs of younger learners. He describes new and emerging technologies as, "[Representing] autonomous learning tools in the hands of learners in relation to the diverse learning needs and learning styles of adult students."(p.2)

However, a study at the Community College Research Center at Columbia University in the United States identifies a set of barriers faced by low-income and unprepared students as they attempt to access and succeed in college-level online courses. The barriers identified include lack of technical skills, insufficient technical support, a sense of isolation, and lack of student supports. The report also cites the cost of online college courses as presenting a significant barrier for this group of students. In order to remove these barriers the author proposes reducing the costs of participation by providing students with low-cost computers and high-speed Internet connections; integrating high-quality student supports in courses; ensuring effective training and professional development in e-learning for instructors, and the implementation of ongoing program evaluation to ensure continuous improvement (Jaggers 2011).

Self-study

An investigation of the threshold or entry-level skills that learners need to have in order to participate in online learning reports that no such threshold levels exist, learners at every learning level can participate and be successful in online learning environments. It also points to the apparently critical importance of self-study in the acceleration of learning gains (Silver-Pacuilla 2008). Research in the US based on the **Longitudinal Study of Adult Learning** (http://www.lsal.pdx.edu/index.html) has revealed the positive effects self-study Reder & Strawn (2001); e-learning has the potential to provide students with many more opportunities for self-study and for the all important repetition and practice of skills (McCain 2009). However, simply making
technologies and e-learning opportunities available to students will not lead to the automatic ability of students to become self-directed and autonomous learners. Effective orientation, on-going support, and digital literacy skill development are needed for both students and educators in order to maximize the potential of digital technologies to support teaching, learning, and self-study (Guri-Rosenblit & Gros 2011).

"Accessible mainstream technology and Assistive Technology represent an opportunity to transform our literacy instruction in ways that put much more creative control in the hands—and heads—of the students with mild disabilities."

(Silver-Pacuilla 2007 p.129).

Learning disabilities/assistive technology

It is believed that up to 80% of students in adult literacy programs live with a learning disability (**CLLN** (http://www.literacy.ca/themes/mcl/PDF/litforlife/learndis.pdf) n.d.). A relatively recent study of effective assistive technology tools demonstrates that assistive technology can be of immense benefit to these students enabling them to access additional supports and providing them with opportunities to learn. Assistive technology helps students to overcome a range of learning disabilities and to engage in practice activities that encourage self-study leading to real learning gains and successful learning outcomes.

Students with learning disabilities may struggle with traditional black on white text. Attention deficit disorder may also interfere with attention and memory and persistence in a learning environment. Assistive technologies may help learners to have access to better and more supports to address their specific needs. Assistive technologies may provide learners with the opportuntiy to access interesting content and relevant materials that they otherwise may have difficulty accessing and may also provide some opportunities for students to extend capacity for critical thinking and analysis strategies, "When literacy learners are given supported access to assistive technologies (in the form of a literacy coach or tutor), the novelty of the tools and the situation create an environment in which literacy is made visible and open for exploration, analysis, and mastery" (Silver-Pacuilla 2007).

However, to realize the full potential of these technologies it is not sufficient to simply add activities using technology to existing learning activities, they must be fully integrated into instruction. Such integration will, necessarily, have an impact on all aspects of programming, including professional development and teaching practice (Silver-Pacuilla 2007).

There are a wide range of assistive technologies available for adult literacy programs. A comprehensive survey and description of assistive technologies developed by Literacy Nova Scotia notes that assistive technologies should be chosen based on an assessment of the specific needs of individual students (Literacy Nova Scotia 2010). **The Learning Disabilities and Whole Life Learning** (http://www.ldandwholelifelearning.ca/?page_id=807) project website in British Columbia contains an extensive section on Multi-Modal and Digital Learning as part of what is described as an "LD-Friendly Learning Setting."

Professional development in technology for literacy educators

"Research has [also] shown that the more opportunities teachers have to work collaboratively with colleagues and professional development experts, to engage in professional dialogue about teaching and earning, and to make their work public, the more engaged they are."

(Jacobson 2010).

Whether we are talking about integration, incorporation, or transformation, any discussion of the importance, use or necessity of digital technologies in adult literacy education begs the question of how educators are to be supported to use these technologies and how professional development can be designed and delivered so that such support is relevant and effective.

A study of adult literacy educators' perceptions of technology integration reports that while adult literacy educators recognize the need for integration and are generally positive about the potential for technologies to extend learning opportunities they are often challenged by lack of appropriate technology and lack of time, resources, and professional development to enable them to engage in extensive and effective integration (Langille 2004). An extensive examination of the connection between effective professional development in the K-12 and adult basic education sectors in the United States concludes that student achievement and learning gains are firmly connected to the enhancement of professional development for educators (Smith & Gillespie 2007).

We have relatively little information from the field of adult literacy about how to effectively support educators to work with and to integrate technology into their practice. There is, however, an extensive and growing body of work exploring effective professional development, teacher change, and technology integration in the K-12 and higher education sectors. In the absence of a substantial body of work in relation to professional development in the area of technology in adult literacy teaching, we have drawn extensively on the work in the K-12 sector in order to see what types of supports, training and professional development would be helpful to adult literacy educators and programs.

There is also a lack of documentation of the real experiences of adult literacy educators working with students in a technological environment. We do not have a great deal of information about the level or range of skills that educators may need; we do not have information about how educators work with students to support them to acquire and develop basic digital skills; we know very little about the hardware, connectivity, and technical support issues that educators face on a daily basis. We have included a sampling of accounts of how educators in the adult basic education field confront these challenges and how they could and perhaps should be supported to develop their own technological and andragogical skills and knowledge in order to effectively support their students.

One very interesting study was conducted in California. This is an ethnographic study of a group of students; young urban adults aged 18-22 from diverse backgrounds and with a range of experience with technology. These students fall into the category of those who are living with the "second digital divide;" individuals who do not have ready access to technology and have not had the opportunity to become familiar and comfortable with it. The students were preparing to re-take the California High School Exit Exam (CAHSEE) in an interactive online course using a hybrid or blended model, combining face-to-face and online instruction with some opportunities to access some coursework from home. The study describes how in-class and online instructors, the participant researcher and students "co-constructed" and "re-formulated their technological knowledge" over the course of eight weeks. Students required ongoing support and assistance from instructors and from each other to develop competence in basic technology functions such as the use of desktop icons, the use of passwords and how to use email for communication. This study demonstrates the actual process of the collaborative construction of knowledge as the instructors and students worked together to master the technology. The study demonstrates that this type of collaborative and participatory interaction between instructors, students, and student-to-student led to significant learning gains (Macias 2009).

The notion of co-construction and re-formulation of knowledge opens up the question of how educators should be supported through professional development to meet the needs of their students and to engage in collaborative learning with students to master and make use of technology. Educators need to know just what may be involved in online programming, to recognize the second digital divide, and to share strategies to narrow the divide. This study shows that while the use of technology offered these students the opportunity to pursue their goal of high-school completion and to use online learning, their relative lack of technological skills constituted a barrier that they overcame in collaboration with each other and the instructors. These types of practices are not well documented in the adult literacy field but are echoed in informal accounts of educators. Students may need a range of supports and teachers and students may need to work together to address and overcome barriers to using technology (Macias 2009).

"But how do we provide rich and meaningful professional learning opportunities that engage teachers in making the shifts that are required of them in blended and open participatory digital classrooms?"

(Jacobson 2011)

Professional development – that works…

While it is certainly true that educators need to have basic technology skills (Hockly 2009), an over-emphasis on technology and on skills development in professional development has been shown to be ineffective in helping educators to successfully integrate technology in their practice (BECTA 2009). Effective professional development has to move beyond the introduction of technology tools and the development of skills to enable educators to critically reflect on the role of technology in their practice. The literature we reviewed focused on these key areas:

- Educator centred rather than techno- centric professional development. Educators must be at the centre of their own learning if changes in practice are going to happen;
- Alignment of educators' values, beliefs and pedagogy with technological innovations;
- Acknowledgement of educators' knowledge and their understanding of the learning needs of their students;
- Building on educators' knowledge and experience in instructional planning – start with that knowledge rather than starting with technology and trying to fit it into instructional planning;
- Need for opportunities to interact, both formally and informally with peers and to collabo rate in learning about technology and technology integration; and
- Communities of practice to support educators to exchange ideas, questions, and learning.

Educator-centred rather than technology centred professional development

A qualitative review of literature related to professional development in technology integration in the UK looked at current practices in what is described as continuous professional development and the key factors which contribute to successful and effective professional development. The results point to the core issue in effective professional development related to technology as being the need to place the educator at the centre of her own learning. Too often training and professional development in technology starts and

ends with the technology or the technology tool. It is techno-centric rather educator-centred. Skills training, learning how to manipulate or use a particular tool or technology, is not sufficient and often leads to a situation where educators are not supported to use that tool or technology effectively in their practice, and the time and resources used in the training or professional development are essentially wasted (BECTA 2009). If technology professional development is overly focused on the technology with little or no reference to the instructional content and learning goals it is unlikely that educators will incorporate technology in instruction. It is crucially important to recognize the pedagogical beliefs of educators and to support educators to work towards self-efficacy in the use and evaluation of technology tools. Educators need opportunities to experiment and to take risks, and they need the experience of success; they need to see and experience the effective and meaningful use of technology in the context of their own pedagogical beliefs and teaching strategies.

Essentially, if effective technology integration is to take place the pedagogical beliefs of educators must change or be extended to include technology and the understanding of what constitutes "good teaching" must be extended to include the effective use of technology in teaching and learning. A number of strategies for change have been suggested by researchers. These include social and cultural influences in interaction with peers, colleagues, and influential others in formal and informal professional communities. They highlight the establishment of learning communities and social networks of technology-using educators to allow educators to share personal experiences related to their use of technology in instruction. They emphasize that educators need successful experiences, support to make small changes and vicarious experiences, for example, observing similar others. In short, educators need to see how technology actually benefits students. Showing educators how to use tools with no connections to learning goals will not help them to successfully integrate technology in their practice. New information and technology professional development must connect with existing beliefs and educators must be able to see the efficacy of technology related to their actual practice and the learning goals of their students (Ertmer & Offenbreit-Leftwich 2010).

Ultimately digital technologies are only beneficial if they are actually put to use. (Hall 2010) discusses the factors required for what he describes as "high-quality implementation" and suggests a "Concerns Based Adoption Model" and an "Implementation Bridge" as possible means to foster effective implementation that includes supports for educator change, based on an understanding of change "as a process rather than an event"(Hall 2010)

Educator beliefs, values and pedagogical approach

Paltak & Walls (2009) in a sequential mixed-methods design research project argued that teacher belief is not necessarily changed in a technology-rich environment. When working in such environments teachers generally make extensive use of technology for lesson preparation, classroom management, and administrative tasks. However, they argue those teachers' pedagogical beliefs, for instance, whether they take a teacher-centred or student-centred approach, do not necessarily change and that lack of change has

implications for how effectively or extensively technology integration takes place. They conclude that effective professional development leading to successful use and integration of technology into practice must take into account teachers' existing beliefs and the contexts in which they practice. Researchers looking at effective professional development leading to educator change in the K-12 sector in the United States show that the TPACK (Technology, Pedagogy and Content Knowledge) model that focuses on the learning needs of students and not on the technology is more effective (Ertmer 2005; Harris & Koehler 2008; Paltak & Wallis; 2008 Harris & Hofer 2009).

In the adult literacy sector, which is often not very "technology rich," an extensive research project has identified a set of key characteristics of effective technology integration (Dillon Marable 2005).

These characteristics are:

- computer use is instructor-facilitated
- computer use is seamless
- it forms part of the standard practice in adult literacy settings rather than a separate set of activities
- computer use is learner appropriate
- the levels of technology are aligned with learners' literacy and technology skill levels computer use is learner-empowering
- it supports learners to learn independently and collaboratively
- it provides choice as to which learning activities they want to engage in using technology
- they use technology to further their learning goals
- it meets their needs for learning, employment and civic participation.

Educators' knowledge and experience in instructional planning

Educators already have extensive knowledge and experience in instructional planning; effective professional development should capitalize on this knowledge and experience. That is to say, professional development should start with the instructional needs and priorities of the educator rather than looking at a specific technology or tool and then trying to fit it into practice (Harris & Hofer 2009).

Collaborative learning & communities of practice

A critical component of successful and effective professional development is the opportunity for educators to have the time to critically reflect on their learning, to connect with each other, to learn from and with each other and to exchange ideas and knowledge. The need for sustained opportunities for collaborative learning and the formation of communities of practice to enable this collaborative learning are also cited as critical factors for successful professional development (Hicks 2008; MacDonald 2008; British Educational Communications Agency 2009; Davis & Fletcher 2010; Fahy & Twiss 2010; Jacobson 2011).

One researcher identifies sustainability of learning and knowledge growth as key factors in successful technology professional development. These she maintains consist of three components: what teachers think or know about their students; access to resources; and social support and opportunities for collaborative learning with peers (Mouza 2009). A study based on interviews with teachers who participated in three self-generated online communities of practices and an analysis of 2000 posts from these communities concludes that teachers see such communities of practice as offering opportunities to share their emotions and reduce isolation. Teachers also see these communities of practice as a means to learn with peers and colleagues, to share ideas and to foster a sense of collegiality (Hur &Brush 2009).

One possible vehicle for supporting sustainability of learning and knowledge growth and in providing forums for knowledge exchange and collaborative learning is technology-based professional development. An extensive national project including surveys of adult literacy educators across Canada found that adult literacy educators see the value of online professional development as saving time and money and as increasing opportunities for access to and communication with peers and colleagues. The use of digital technologies for teaching and learning in adult literacy is a vehicle for instruction and a means for adult literacy students to acquire and expand their digital skills in much the same way technology-based professional development offers educators an opportunity to meet and learn from and with peers and colleagues and the opportunity to enhance their digital skills and online communication skills (GO Project 2008; Fahy & Twiss 2010).

Evaluating professional development

A critical factor in effective professional development is effective evaluation. As effective professional development is designed and developed, it should be carefully evaluated and refined in an iterative process in order to meet the learning needs of educators, to assess the impact of professional development on practice, and ultimately to assess its impact on students (Guskey 2003). A useful chart of Guskey's five levels of evaluation of professional development outcomes can be found in **Wikispaces** (http://connectingcantycommunities.wikispaces.com/file/view/Guskey+5+levels.pdf**)**:

- participants' reactions
- participants' learning
- organization support and change
- participants' use of new knowledge and skills
- student learning

Easton (2008) describes a shift from professional development to professional learning during which educators are actively engaged in designing and developing their learning based on their daily teaching experiences and their knowledge of what is needed in the classroom. Professional learning is collaborative, continuous, and iterative and its effectiveness is measured in terms of its overall contribution to the development of an institutional or organizational learning culture.

Factors that contribute to successful e-learning

When we set out to look at literature related to e-learning in adult literacy we were very keen to know more about what successful e-learning programming would look like. However, there is little or no research in this area. A recent comprehensive review of evidence-based practices in online learning in the United States found that there is a relative scarcity of studies that contrast outcomes in face-to-face and online learning environments (Means 2010).

Certainly, we are not yet in a position in adult literacy to clearly define what works, what doesn't work and why. But there are clear indicators of some of the factors that contribute to success in e-learning. A study from the United Kingdom, of the effective use of ICT for teaching and learning in adult literacy, found that improvements in skill and confidence increased proportionally with the amount of time students spent working with technology. Students also demonstrated literacy learning gains alongside learning gains in the use of digital technologies. Teaching strategies that encouraged student autonomy and peer to peer interaction appeared to lead to greater learning gains and a corresponding increase in confidence (Mellar 2007). The importance of the social or interpersonal dimension in an

e-learning environment to support engagement and persistence is emphasized in a set of Social Interaction Packs developed in Australia. The Social Interaction Packs provide a suggested set of practices designed to foster engagement between learners and between learners and instructors (Australian Flexible Learning Framework 2005).

A literature review commissioned by the College Sector Committee in Ontario to look at success factors for online learning particularly related to the ACE online program, a Grade 12 equivalent program for entry to college and apprentice programming in Ontario, found that the following factors contribute to the overall success of teaching and learning in online environments. Students who are likely to be more successful share a number of characteristics. They are motivated and self-directed, have exposure and access to computers, have a relatively high level of experience with computers and have a level of digital skill that enables them to engage with digital technologies comfortably in an online learning environment. The review also found that in order for e-learning programs to be successful, instructors need orientation, training, professional development, appropriate resources, and time to develop their skills in online instruction (Folinsbee 2008).

A study of the relation between learner characteristics and their level of satisfaction with an online learning experience identified three key factors that contributed to the overall satisfaction of students with their learning experience: educational level, readiness for online learning, and locus of control. These factors were echoed in responses from instructors of the course (Yukselturk 2009). A study of factors leading to successful academic outcomes, in an online learning environment, measured as grade point average (GPA) found that "emotional intelligence is the most direct predictor of GPA" and concluded that 'soft skills" such as sociability and resilience, are critically important to success (Berenson 2008 p.1).

A mixed-method research study of student perception and academic outcomes in two online courses, one designed in a highly structured manner and the other to be highly interactive, concludes a more structured approach is more successful in "receptive learning," while a more interactive approach is more successful in supporting the development of critical thinking. The study's conclusion points to the importance of instructional design in online learning and stresses that the way in which content is delivered is more important than the characteristics of learners. This study echoes the need outlined above for the existing knowledge and experience of educators in instructional design to be acknowledged and incorporated into planning and delivery of e-learning (Lee &Rha 2009).

The crucial importance of the instructor has been clearly shown in research looking at adult literacy students' perceptions of learning in an online environment (Porter & Sturm 2006). Students have reported the importance of instructor presence and engagement in supporting students to develop a sense of community in online learning environments (Lear 2009). A discussion and description of excellence in Web-based teaching begins with the premise that great online courses are defined by teaching, not technology" (Meadows 2008). Meadows outlines a set of principles to support excellence and cautions that content expertise or even technological prowess is not sufficient. The online learning environment is decidedly different from a traditional classroom setting and requires a different combination of skills and knowledge, including an understanding of the appropriate uses of technology, effective Web design, the development of a sense of community and continuous assessment and iterative improvement. He concludes, "… while technology is the vehicle for online courses, that vehicle is driven by good pedagogy" Meadows (2008).

Finally, a research review of distance learning and e-learning in a number of states in the US provides a set of recommendations to programs to support students to be successful in an online and e-learning environment. These include, pre-screening to evaluate the level of technology skills of students, face-to-face orientation to the program, continuous contact between instructor and student using a variety of means, access to technical support, support to students to enhance their skills as self-directed learners, support ,the development of "learner cohort" groups to help students share and learn from one another, and instructor professional development to ensure that educators have the opportunity to master the technology and to adapt their teaching strategies to an online environment (Imel & Jacobson 2006).

Moving forward

"During the period 2010-2025, there will be a number of developments in technology that will have a far-reaching impact on learning, teaching and the organizations that design, deploy and assess learning for students."

(Bates 2010 p.4)

We can see how rapidly digital technologies have moved into every corner of our lives. If the adult literacy field is to be equipped to meet the demands of the immediate future – it needs to support adult literacy students to acquire and enhance the skills, both print literacy and numeracy skills and the digital skills they will need for further education, employment, and full civic participation. We will need to know a great deal more about how these skills are learned, how they can be taught, and a great deal more about promising and best practices. It is very clear that there are quite serious gaps in our knowledge and understanding of the challenges and opportunities offered by digital techologies and e-learning. In a very recent and useful review of areas that still require extensive review, Guri-Rosenblit & Gros (2011) focussed on the effectiveness of e-learning at the institutional and system-wide levels (albeit focused primarily on the higher education sector). They also identified the need for research on the real costs of implementation.

The following areas were identified as some of the areas that could be productively investigated. The list is based primarily on this scan of literature and the relative scarcity of materials related to adult literacy. These issues could form part of a robust research agenda to support the adult literacy field to move forward in providing adult literacy students with the relevant skills to enable them to succeed in the workforce, in further education and training, and in full civic participation:

- Observational case studies of e-learning programs in adult literacy in Canada, including the perspectives of adult literacy students.
- Baseline data on the digital skill levels of adult literacy students.
- Baseline data on the digital skill levels of adult literacy educators.
- Information about the current digital skills required in workplaces.
- Examination of the cost-effectiveness of e-learning in terms of hardware, infrastructure and sustainability at the institutional and organizational levels.
- Quantitative and qualitative data on the effectiveness of e-learning in adult literacy.
- Quantitative and qualitative data on the effectiveness of professional development both in relation to development of digital skills for educators and the integration of digital technolo gies in face-to-face and online instruction.
- Investigation of a Communities of Practice model to support communication and collabo ration between adult literacy educators in relation to e-learning and the integration of digital technologies.

The requirements of a national framework to support e-learning in Canada is neatly encapsulated in the following statement from the Canadian Council on Learning report on the state of e-learning in Canada:

"...a coherent framework to shape e-learning's development—and its relevance to social and economic policy development and implementation—must be premised on certain conditions favourable to learning. Efforts are required in four key areas: generating multi-sectoral momentum; developing a shared vision for e-learning across Canada; harnessing the potential of technology to meet the needs of learners; and filling gaps in research" (CCL 2009 p.8).

The **Ontario E-Learning strategy** addresses the needs of K-12 students, educators, and school boards. A similar strategy to support the needs of adult literacy students, educators, and programs would be welcome. The recently announced Ontario Online Institute may become the locus of research, development, and support that the adult literacy field urgently needs.

One commentator, regarding the use and integration of digital technologies, has highlighted what is described as "digital abundance" (O'Brien & Scharber 2010). Traditionally in the education sector, and perhaps more keenly in the adult literacy sector, educators have become accustomed to living with scarcity, but the proliferation of open-source and Web-based resources provides us with a rich array of possibilities.

The annual Horizon Report provides an up-to-the minute review of emerging trends in digital technologies and provides an analysis of the potential impact of these technologies in education (Johnson 2010 pp.3-4).The 2010 Horizon Report describes four trends as "key drivers" in technology use:

- The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense-making, coaching, and credentialing.

- People expect to be able to work, learn, and study whenever and wherever they want to.
- The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized.
- The work of students is increasingly seen as collaborative by nature, and there is more cross-campus collaboration between departments.

Although these trends reflect the situation in post-secondary and higher education they have implications for adult literacy teaching and learning particularly in relation to the changing roles of educators and the developing expectations of students to have extended access to learning opportunities.

Perhaps it is time for the adult literacy sector to embrace abundance and to put efforts into finding ways to harness the potential of technologies to expand access to learning, support adult literacy educators, and put digital technologies and e-learning to work in the service of adult literacy teaching and learning. If the adult literacy sector settles for shallow adoption rather than deep integration many of the opportunities that digital technologies and e-learning offer may be missed. Educators and students may be denied the opportunity to fully engage with technology on their own terms. All of us in the adult literacy sector need to be flexible, open to change, committed to an exchange of ideas and knowledge, learning with and from each other.

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*Further information about the overall search strategy and process, including search strings used and databases searched are available upon request.
Contact AlphaPlus at: **info@alphaplus.ca**

161 Eglinton Avenue East, Suite 704
Toronto ON M4P 1J5