DRAFT 1

PUTTING SKILLS AT THE CENTRE OF THE POLICY AGENDA: ADVICE TO THE NEW AGENCY

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| ***NOTE***  Based on discussions underway among Scott Murray (DataAngel), Peter Hicks (Consultant) and Janet Lane (Canada West Foundation), consideration is being given by the Canada West Foundation to publishing a version of this paper (not yet drafted) that would be targeted to a broader non-technical audience. It would be structured and drafted in a more popular style and would be much shorter.  An edited version of the present draft would be published in electronic form on their web site. It is mainly aimed at those who will have an more substantive interest in the mandate and work plans of the New Skills Agency including:   * More senior people who will likely want to skim the paper, but who may want to examine the underlying argument in more detail in places of particular interest – and to know that a comprehensive analysis exists. * Analysts who will be interested in the more detailed analysis.   The present draft is the result of a deep re-write by Peter Hicks of material found in an earlier, more technical paper, by Scott Murray. Scott, often working with different partners over the years, has been a key figure in Canada, and internationally, in providing the data and analysis that has shed such new light of the importance of skills to policy-making. |

PUTTING SKILLS AT THE CENTRE OF THE POLICY AGENDA: ADVICE TO THE NEW AGENCY

## Introduction and summary

# Purpose of the paper

An understanding of the skills of Canadians and how they are used (or not used) in the labour market and in daily life must lie near the center of any narrative about economic and social well-being. This includes discussions of policies that are addressed to promoting economic growth, competitiveness and productivity as well as policies for addressing problems such as joblessness, the gap between good and bad jobs and rising wage, income and health inequality. A key message is that there is little sense in dreaming of a society of entrepreneurs, innovators and critical thinkers when roughly half of the adult population has levels of literacy and numeracy that are too low to support fluid problem solving.

Unfortunately, our ways of measuring skills have, historically, been indirect – based on proxies that allow only partial and sometimes distorted insights into the way in which people acquire and use their skills, knowledge, aptitudes and abilities. This paper discusses how, over the past three decades, newly developed direct measures of generic or essential skills are allowing us to, at least partially, lift the obscuring veil of proxies.

These new approaches to measuring skills have, along with new empirically-based ways of acquiring skills throughout the course of life, reached a stage of maturity where they can start to be used in practical policy-making. This has been recognized by the Government of Canada in its 2017 budget which called for new approaches to address skills gaps and support lifelong learning throughout Canadians’ working lives:

*To that end, Budget 2017 proposes to provide $225 million over four years, starting in 2018–19, and $75 million per year thereafter, to establish a new organization to support skills development and measurement in Canada. Working in partnership with willing provinces and territories, the private sector, educational institutions and not-for-profit organizations, this organization will:*

* *Identify the skills sought and required by Canadian employers.*
* *Explore new and innovative approaches to skills development.*
* *Share information and analysis to help inform future skills investments and programming.*

The purpose of this paper is to put our new understanding about how skills are related to policy in a way that could help the New Skills Agency, once created, in developing its priorities and work plans.

# Summary and outline of the paper

Our basic approach is to tell a series of separate but overlapping stories that illustrate progress to date in applying the new information about skills to questions of interest to policy. The goal is threefold. First it may help the New Skills Agency in identifying gaps that it could help fill – including those related to data and research, to supporting new partnerships, to promotion and marketing, and to undertaking experiments and demonstrations. The second goal is to encourage the New Skills Agency to place an early priority on weaving these strands together into a more comprehensive narrative, that will be both persuasive and evidence-driven – that will provide a needed vision for its work, that will bring coherence to its activities and partnerships, and that will promote understanding and support for the emergence of a new skill-based approach to policy-making. The third goal is to help the New Agency in shaping its key partnership roles early in its mandate.

The basic premise is that most of the strands of the skills story are reasonably mature. However, there are still important gaps and puzzles that the new agency will be ideally suited to address. It will be well situated to pull things together in a way that holds huge promise for helping shape policies that can make major improvements in Canada’s international competitive position and in achieving social and economic well-being at home.

The separate strands of evidence described in the paper attempt to provide the best possible current answers to following questions:

* To what extent does the new data allow us to quantify the effects of investing in skills on economic well-being, including higher earnings, productivity and competitiveness?
* What are the policy consequences of the new insight that people can lose skills over time as well acquire new skills?
* What are the policy consequences of the new insight that there are large mismatches between the skills required by jobs and skills of the workers that hold those jobs?
* Do trends in the demand and supply of skills, including projections of future demand and supply, suggest the need for policy action as opposed to letting market forces play out within the existing framework of rules and incentives?
* In terms of the acquisition of skills, should the education system do more in meeting new information-age demands?
* Should employers do more in in supporting the skills upgrading of their own employees?
* Should governments do more in supporting the skills upgrading of those who are unemployed or others who face serious obstacles in finding a decent job? As well should governments do more in providing individual citizens with the information needed in order to acquire the kind of skills needed in the labour market?

In telling these stories, the paper draws on the richness of the new data sources which allow powerful policy-related inferences to be drawn from international comparisons. Many of these international lessons have already been developed, especially in labour market and competiveness analyses undertaken by the Organization for Economic Cooperation and Development (OECD). The international analysis described in this paper is supported by deeper analysis of the Canadian data, including new analysis undertaken specifically for this paper.

### Background

Section 2 sets the stage. It describes the research that has taken place since the 1990s to collect the new data on essential skills. It reviews the methods used to measure literacy skills and explains why this paper uses the example of the most important of these new measures – the learning-to-learn skills that were developed as part of new research that took place under the heading of literacy.[[1]](#footnote-1)

Section 2 also describes the initial wave of information that first attracted public attention. This was a new story about the wide diversity that exists in learning-to-learn literacy skills, including among people with different levels of educational attainment and by gender, immigration and employment status. The focus of attention was especially on the large numbers of people who did not have the learning-to-learn skills associated with leading a normal life in today’s information-age society – and on the large differences that existed across jurisdictions and countries.

As new waves of information were collected over the years, attention focused on another, surprising to some, story about the occurrence of large losses in skills, as well as gains.

### The economic payoffs from investing in skills

Section 3 uses the Canadian data to show that literacy skills result in higher earnings for employees. However, to get a clear picture of how higher level skills result in increased productivity and international competitiveness, it is necessary to turn to international data. Fortunately, the OECD has undertaken two quite recent studies that shed much light on this subject and that points the way to further development of this information in Canada.

### Skill gains and losses

Section 4 explores skill gains and losses among different population groups. Traditional policy thinking about skills has centered on the acquisition of skills through education and training. The new data make it clear that addressing skill losses is equally important, mainly addressing the reality that people lose skills that are not being used. The section reviews skill losses among various population groups, including among young people as well as older age groups.

### Skill mismatches

Section 5 describes the extent to which the skills of workers and the skills demanded by the job in question are in balance, as well mismatches where workers lack needed learning-to-learn skills or have literacy skill that are not being used in the jobs that they hold. The section explains why the very large mismatches that are found are an important concern for policy. International comparisons are provided.

One plausible explanation for the large mismatches lies in a possible polarization in the human resource strategies of business, with some following high-skill strategies and others facing incentives to ‘dumb down’ the level of skills they demand and to allow significant mismatches in the skills of their workers. This can create a vicious cycle where the underutilization of skills in turn create a loss of skills and reduced pressure on the education and training system to increase skill levels for the future.

### Trends and projections in demand and supply

Section 6 discusses data on trends in the demand and supply of skilled labour. A clear picture emerges of growing demand for higher-level literacy skills. Data on the supply side are murkier. There have been only three international readings of the supply of skills and the concepts used in the different surveys have evolved over time. Nevertheless an overall picture emerges that shows that the supply of higher-level literacy skills has been seriously falling behind the demand for those skills.

Trend analysis is critically important to policy. Are things getting better or worse in the absence of government action? What will be the likely effects of government action, if needed? Even more important than past trends are projections of what is likely to happen in the future. Virtually all analysis points to a continuation in the demand for higher-level skills. The section then turns to supply and reviews likely future supply from different sources: young people entering the labour market, immigration, greater participation of women, and greater labour force participation of older workers. Contrary to the often sole emphasis in much of the literature on young people entering the labour force from school, the section finds that a key source of the supply of skills over the next decade or so will be the increasing number of skilled older workers who are staying in work longer and retiring later.

### The role of the education system in creating skills

Section 7 digs deeper into the performance of the education system by examining the literacy scores of 15 year olds with same cohort young people when they reach age 25 and, for most, have finished their formal education. There are clear gains from at least completing high school, but the results are generally disappointing. The analysis looks at the wide dispersal of literacy skills among people at all levels of educational attainment. There are far too many people with low literacy scores, including among post-secondary graduates who, by definition, should be able to analyze and evaluate evidence.

### The role of employers in upgrading the skills of workers

Section 8 shows that the evidence, at least on a first examination, would seem to suggest that employers would get a high payoff from literacy training for their employees, particularly for those whose current proficiency in not far below that demanded by the job. Yet that does not often happen in practice and the section explains why. A key next step is the development and marketing of a training approach that is demonstrably feasible and efficient. An appropriate methodology for doing this has been developed and the section explains how the New Skills Agency might add value by promoting its use and further development.

### The role of governments in supporting adult learning

Section 9 explores the huge potential of big data and predictive analytics to greatly improve the effectiveness of more complex kinds of training including active labour market programming which helps people who often have very low skills, and who often face a range of other obstacles, find jobs. The basic techniques also hold promise for providing tailor-made, real-time information directly to citizens about the likely benefits that will arise from undertaking further training or other labour market interventions that are open. The same technology can provide information to students that will allow them to make their choice of postsecondary field of study in a way that can be linked to later success in the labour market. These are topics where an agency that is outside government but that works closely with both orders of government (and has strong ties with both non-governmental service providers and employers) could play an important catalytic role.

### The role of the New Skills Agency

Section 10 concludes by summarizing the findings as they relate to the New Skills Agency. It suggests that, in its initial planning, the new agency may wish to consider the importance of balance and partnership in planning initiatives to be undertaken. It should also consider the usefulness of a strong skill-based policy narrative that, at minimum, encompasses the strands of the skills and policy story discussed in this paper.

There could be a balance in choosing initiatives that support skills acquisition, skills recognition and skill use, and that promote both immediate practical action and longer-term research. Some initiatives could have visible payoffs in the near future and others could lay the data and analytic foundations needed to gradually move skills nearer to the center of many policy agendas. Initiatives might cover skills acquisition that takes place through employer training, the education system and new approaches to individually-based skills upgrading.

The choices made in selecting a balanced set of discrete initiatives or projects will play a large role in defining the partnership arrangements that will define the new agency – how it intends to supplement and support the roles of others. Both partnership and balance could be main criteria in the development of its initial work plan.

An encompassing, empirically-driven policy narrative about skills could provide a transparent context for its initial work projects and its partnership arrangements. It would provide a needed overall vision.

Practical examples of what might be done are given in each of these areas.

# MEASURING ESSENTIAL SKILLS: WHERE CANADA STANDS

This section provides needed background:

* Section 2.1 argues that radical changes in the way we measure key aspects of society will eventually result in equally radically changes in the policies that affect these areas. That is now happening in the area of skills.
* Section 2.2 shows why we have chosen to use new information about literacy skills as the main measure to illustrate the argument of the paper.
* Section 2.3 describes the new measure of literacy skills.
* Section 2.4 describes the deep changes in understanding of skills that emerged from the first international surveys of literacy skills in the 1990’s.
* Section 2.5 puts the Canadian data on literacy in an international context.

# Lifting the veil: first direct looks at skills

In the *Affluent Society*, Galbraith (1958) wrote:

*People are the common denominator of progress. So... no improvement is possible with unimproved people, and advance is certain when people are liberated and educated. It would be wrong to dismiss the importance of roads, railroads, power plants, mills, and the other familiar furniture of economic development.... But we are coming to realize... that there is a certain sterility in economic monuments that stand alone in a sea of illiteracy. Conquest of illiteracy comes first.*

Galbraith contrasted the obvious importance of people’s skills to economic and social progress with the inability of much economic and social analysis, then and even now, to take this essential factor into account. His choice of the word *illiteracy* was prescient. Some 30 years after the *Affluent Society* was published, researchers used literacy as a starting point for directly measuring the skills that were needed in today’s society. They found that today’s *sea of illiteracy* could be found in the surprisingly large number of people who are without the learning-to-learn skills that are needed to enable people to live a full life in todays’ information age and competitive global economy.[[2]](#footnote-2)

Policy can only effectively deal with things that are measured. If we change our measures in a major way, or start measuring important aspects of our society for the first time, then it seems reasonable to expect that policies may change in a similarly major way. That proposition is, however, hard to demonstrate. The reality is that there have been relatively few big breakthroughs in our statistical knowledge about fundamental areas of our society in recent decades. In a country such as Canada, with a mature statistical system and a mature set of economic and social programs, the more familiar pattern has been one of small incremental improvements in our statistical knowledge and small incremental changes in our policies.

A radical exception to the pattern of incremental improvements in our knowledge base has taken place over the past 30 years. We have been able to measure the learning-to-learn and other essential skills that people actually use in the work place and in daily life. Canada has played a major role in the breakthrough, as can be seen in Box 1.

# Finding the best single measure for purposes of illustration

The new measures represent a breakthrough on many levels, but also present a practical problem in the form of an embarrassment of riches. It is likely that the new measures of literacy, numeracy, and problem-solving will eventually all find their particular analytic niches – as will new measures that have not yet been fully developed[[3]](#footnote-3). Existing proxy measures related to occupation, experience and educational attainment will also continue to serve many purposes, particularly since they cover a longer historic period, are collected regularly and often can be readily analyzed in combination with other variables of interest for social and economic policy. In the future, composite indicators that combine different various measures may well be

*Box 1. Radical improvements in measuring skills: key events*

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| ***1980s – Need for direct measures identified***  Researchers, especially in North America, highlighted the need to move beyond educational attainment proxies and to develop direct measures of how skills were acquired and used.  ***1987 and following – Early surveys***  In 1987 the first survey of literacy in Canada was conducted by Southam Inc. This was followed in 1989 by the first Statistics Canada survey of literacy used in daily activities. These, and earlier American studies, dispelled the notion that there was a sharp literate/illiterate divide. The new concept of literacy as continuum of skills exposed a large, and for many a surprizing, problem of functional illiteracy.  ***1994 – First set of international surveys of essential skills among adults***  Statistics Canada, working with international organizations, played a leading role in developing the first multi-country and multi-language assessment of adult literacy: the International Adult Literacy Survey. This survey, which built on the new research as well as the results of the earlier surveys above, measured continuums of essential skills related to prose literacy, document literacy and quantitative literacy. Waves of this survey took place in other countries throughout the later 90s.  ***Mid 90s until today – Occupational-based essential skill profiles***  The predecessor department to today’s Employment and Social Development Canada developed profiles describe how workers in a wide range of occupation use each of nine essential skills: reading, document use, writing, numeracy, oral communication, thinking, digital technology (originally, computer use), working with others and continuous learning. The essential skills profiles, which have been updated over the years (there are currently 350 profiles in the database) describe the skills workers need, as well as the level of difficulty required to perform their jobs successfully. These profiles provide a workplace-based counterpart to the surveys of essential skills that are based on individuals.  ***2000 until today – International studies of essential skills among students***  In 2000, the OECD launched first launched its international Programme for International Student Assessment (PISA), which tests the essential skills of 15 year students in mathematics, science, and reading. It is repeated every three years and, similar to the adult literacy surveys, it is intended to measure essential skills related to cognition and problem- solving in daily life. 65 countries participated in the 2012 version of the test. | ***2003 – Second set of international surveys of adult skills***  Between 2003 and 2008, a second international survey, known as the Adult Literacy and Life Skills Survey (ALL) was conducted, again with much leadership from Canada. It built on lessons learned in the first set described above as well as on additional research. As with the earlier set, it contained measures of document and prose literacy. It also provided an improved measure of numeracy (formerly called quantitative literacy) and added new measures of problem-solving skills. Factors that influence the acquisition and use of skills were explored. A follow-up survey further probed reading skills among different population groups.  ***2008-2010 – A Canadian breakthrough: projecting demand and supply of skills***  From the mid 00’ onward, the policy research firm, DataAngel (that is also responsible for the present paper) undertook ground-breaking research, often working under different contracts. This research linked the international data with other data sets, some of which are only available in Canada, in order to produce estimates of the demand and supply of learning-to-learn literacy skills. This included projections, imputed data for small areas and industries, segmentation analysis of the need for literacy upgrading, and calculations of the economic consequences of imbalances in demand and supply.  These calculations involved imputing data from the second set of international adult skills on to occupational data from the 2006 census. The detailed occupational data was coded by the skills required for those occupations using the essential skills profiles described above, resulting in estimates of demand by occupation (and hence by industry and geographic area). Projections of demand and supply were made using independent projections occupational demand (known as COPS), Labour Force Survey data, and population projections.  ***2012 – Third set of international surveys of adult skills***  Large changes took place in information and communications technologies in the years after the second set of surveys including the growth of social media. A third set of surveys, referred to as the Programme for the International Assessment of Adult Competencies (PIAAC) introduced major changes to capture the changing environment. A new literacy measure was developed that combined the previous prose and document skills and added the reading of digital texts. The problem-solving measure was replaced by one that measured problem-solving ‘in technology-rich environments’, Despite changes in content and methodology, the survey was also designed to allow comparability (after making internal adjustments) with the second set of international readings of adult literacy. |

developed to serve particular needs. Having many measures adds to the richness of our understanding.

However, this paper has the limited purpose of providing a simple introduction to those who are unfamiliar with the new data and of providing an illustration of the kinds of work that the New Skills Agency might wish to address. For these purposes, it would be most useful to pick a single measure that illustrates the main points being made. Otherwise we could drown in the detail.

Fortunately there is a single measure that works well – although it is one that, to an outsider, may seem surprising. It is the score that people achieve on measures of literacy. This is the best indicator of the learning-to-learn, generic skills that are needed for people to live a full life in today’s rapidly changing society and economy and to adjust to changing circumstances.

Literacy skills are a foundational measure. They have been shown to have a significant impact on a wide range of individual labour market, health and social outcomes and upon key indicators of macro-economic performance and of population health (DataAngel 2011). They underlie the acquisition and application of other skills. Box 2 provides background on other measures that were considered.

In addition to being foundational, literacy measures have other valuable attributes that make them especially useful for policy analysis:

* *They are future-oriented*. A learning-to-learn measure is, obviously, more useful in looking to an uncertain future than measures which reflect present or past skill levels, such as belonging to a particular occupation. As well, proxy measures such as educational attainment are not always good predictors of the skills that are actually held by the adult population, let alone how those skills change over the course of life.
* *They are relevant* in the sense that they can be directly affected by policy. For example, the evidence shows that increases in literacy skills are, as one would expect and hope, closely associated with participation in the education system. The largely variation that exists in literacy scores across regions and countries suggests

**Box 2. Why literacy is the most foundational measure**

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| Literacy skills are more fundamental than the other essential skills referred to in Box 1.   * Although numeracy skill has also been shown to have a marked impact on labour market outcomes, including wage rates, numeracy proficiency is highly dependent on literacy skills, i.e., the extent to which people can understand and act on written and digital material. As well, the work on linking numeracy skills to general economic and social development is not nearly as advanced as for literacy skills. * Other skills, including digital skills, problem solving and teamwork, have also been shown to have independent impact on labour market outcomes but, as with numeracy, both proficiency, and their impacts on outcomes, are highly dependent on language and literacy skill. * In addition, teamwork has been shown to be highly culturally bound. People who understand the cultural norms and who have the skill realize better outcomes, but the norms themselves seem not to matter to productivity.   Oral language proficiency (as opposed to literacy skills which are related to written and digital materials) is also correlated with whether people have jobs and earnings.   * The big exception is for non-official language speakers, especially recent immigrants, where oral language proficiency does have a significant impact on labour market success. The numbers of people here are relatively small however compared with literacy skill shortages which touch 40% of people aged 16 to 64 | * However, literacy is more fundamental for most people and it alone is correlated with the level of earnings (Data Angel 2011).   Finally, much attention has recently been devoted to so-called non-cognitive, soft skills related to leadership, team work and self-actualization such as loyalty, honesty, creativity, innovation and perseverance – concepts that encompass values as well as skills in the ordinary sense of skills. (Green 2001, Kottelenberg and Lehrer, 2014)   * This is an important area for future research, since evidence exists that non-cognitive skills may play an important role in influencing earnings. (Kottelenberg and Lehrer, 2014) * Cognitive skills may underpin non-cognitive skills, at least in part. Adults with high cognitive skill levels can depend on the skills to cope with most everyday tasks and may adopt a more self-assured stance in the workplace. Adults with low levels of skills cannot rely on the cognitive skills and some may adopt a range of less efficient and effective coping mechanisms * However, to date, it has not been possible to develop in this area that strong enough to be used in conjunction with accepted measures of literacy, numeracy or problem-solving (Murray, Clermont and Binkley, 2005).[[4]](#footnote-4)   In other words, literacy is the key to both the skill acquisition and the skill application hierarchies. It is central to both learning other important skills and has key direct effects on the economy and society in its own right. |

* that education policy can play an important role in shaping the ability of students to read and understand what they read. As well there is strong evidence that training can be highly effective in improving adult literacy, as discussed at greater length in Section 8.[[5]](#footnote-5)
* *They inform many policy areas.* Theemphasis of this paper is on the acquisition and use of skills in labour market and economic policy contexts, since this appears to be a main focus of the New Skills Agency. However, literacy skills are also closely related to health,[[6]](#footnote-6) to participation in social networks and political processes and to a range of factors that contribute to social well-being. They can play an important role in helping integrate a wide range of topics of interest to social and economy policy.

Literacy measures are likely to prove to be central in the analysis of a wide range of topics in addition to allowing relatively straight-forward presentations such as the one attempted in this paper. As will be seen, when used in practical applications in industry such providing training, a literacy perspective can result in significant payoffs. Nevertheless in other applications, other measures will be more relevant, including numeracy, or oral proficiency in the case of analysis dealing with recent immigrants, or measures of team-work skills once these are fully developed and tested. And, as already noted, the New Skills Agency will want to examine the analytic power of using combinations of skills or even composite indicators in different applications.

# Measuring literacy skills

Literacy skills in the international surveys described in Box 1 are measured on a scale of 1 to 5. At level 1 (and below), people can only read and understand very simple short texts. Some 17% of Canadian adults are at level 1 or below. At the other extreme, only 1% Canadian adults achieve level 5, a much lower proportion than the proportion of adult Canadians with post

***Box 3. Levels of proficiency in literacy skills used in the third round of international adult surveys (PIAAC)***

(Descriptions have been summarized by the present author)

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| ***Below Level 1*** (*a category that was created to allow consistent comparisons with earlier surveys*)  The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs.  4% of adult Canadians are below Level 1. |
| ***Level 1***  Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognizing basic vocabulary, determining the meaning of sentences, and reading paragraphs of text is expected  13% of adult Canadians are at Level 1. |
| ***Level 2***  At this level the medium of texts may be digital or printed, and texts may comprise continuous, non-continuous, or mixed types. Tasks in this level require respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present.  32% of adult Canadians are at Level 2. |
| ***Level 3***  Texts at this level are often dense or lengthy, and include continuous, non-continuous, mixed, or multiple pages of text. Understanding text and rhetorical structures become more central to successfully completing tasks, especially navigating of complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inference. Many tasks require the respondent to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate content to answer accurately. Competing information is often present, but it is not more prominent than the correct information.  38% of adult Canadians are at Level 3. |
| ***Level 4***  Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesize information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform successfully. Many tasks require identifying and understanding one or more specific, non-central ideas in the text in order to interpret or evaluate subtle evidence-claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information.  13% of adult Canadians are at Level 4. |
| ***Level 5***  At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidenced based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a key requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.  1% of adult Canadians are at Level 5. |

secondary qualifications. At this level, tasks may require the respondent to “search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidenced based arguments”. A description of all five levels can be found in Box 3.

Level 3 is a critical dividing line. It is the level of skills that are needed to fully participate in today’s information age economy and society. At levels 1 and 2, most people can still retrieve and apply information in routine, predictable ways. At level 3 and above, they have the skills to analyze, evaluate and create new information, precursors to fluid problem solving, critical thinking and innovation.

In labour market terms, it is, of course, important that all workers have the specific technical skills associated with their occupation. However, for the majority of jobs that require technical skills and knowledge to be applied in a non-routine way, it is necessary to have literacy skills at level 3 or higher. These learning-to-learn skills will become more important as automation takes over tasks that only require the application of routine procedural knowledge.[[7]](#footnote-7)

# The ground-changing narrative that emerged from the first international surveys

The first set of international literacy surveys in the mid-90s provided a portrait of literacy in Canada that was surprising to many. Literacy skills were not as high as might have been thought (although still good by international standards). In the most recent surveys, only a little over half (52%) of the adult population were at level 3 or higher.

Further, while literacy was linked to educational attainment, that linkage was not as strong as might have been expected. As well the notion that skills could be lost over time through lack of use was introduced. Box 4 describes the findings of the 1994 survey as these were set out in a

***Box 4. Profile of literacy in Canada: a contemporary account of the results of the 1994 survey***

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| ***Many Canadians have low literacy levels***  There were large numbers of people with low literacy levels. About 22% of adult Canadians 16 years and over fall in the lowest level of literacy (serious difficulties in reading) and another 25% or so in the lowest level (can read but not well, only simple documents).  ***Regional variations***  There were large regional variations, with literacy generally higher in the west and lower in the east, mainly reflecting east-west differences in educational attainment.  ***The link to education is strong, but not as strong as might be expected***  While the connection between educational attainment and literacy levels is strong, it is far from exclusive. One third of the does not fit into the literacy = educational attainment pattern. For example:   * One third have those who have not completed secondary school reach Level 3 or higher * A quarter or more of those who have completed a community college program are at the lower levels (1 or 2). * Those who drop out of school without a diploma, and have lower chances of success in later life, have lower literacy schools than those who remain in school. Poor literacy may be a determinant of educational attainment as well as a consequence of it.   ***Official languages***  Difference between Anglophones and Francophones largely reflects differences in educational patterns (the tests were run in both official languages). In Quebec both Anglophones and Francophones did well, while minority languages Francophones in other provinces did not score as highly.  ***Immigrant status***  In Canada, as in other countries, a greater percent of immigrants had, as might be expected low literacy scores. On the other hand, unlike other countries immigrants to Canada also scored higher at the high highest levels of literacy | (levels 4 and 5) – likely due to Canada’s active recruitment of high skilled and entrepreneurial immigrants.  ***Generations and age***  There was a markedly higher literacy levels among younger people whose education was mainly after World War II than among older people educated before the war. This mainly reflects the growth of the education system since then. However, even when educational differences are taken into account, there is still a small deterioration in skill with age.  ***Literacy and labour market success***  As would be expected, largely because of the link between education and literacy, people with higher literacy skills were less likely to be unemployed, to work longer during the course of a year and to have higher incomes. For example, an unemployed person is about three times as likely to be at Level 1 compared to someone who is employed. Consequentially people with lower literacy skills make greater use of Employment Insurance and, especially, social assistance.  ***Maintaining skills***  As well, employment provides the opportunity to use and maintain one’s skills. The survey found that, in most cases, the workplace is richer than the home in terms of opportunities for reading.  A familiar cycle emerges: skills enable participation in literacy-intensive experiences which in turn allows for the maintenance and enhancement of those skills.  If people don’t use literacy skills after they have left school or college, they can lose them. The reverse is also true: if they practice literacy or receive training, people can gain skills.  ***Self-assessment of skills***  Only a minority of those persons with weak literacy skills recognize a need to improve their levels. While it may seem that individuals are overrating their skills, this may not be the case. Individuals were asked to relate their literacy skills to their job demands and IALS data show that for some individuals these demands are low. |

document published at that time (Statistics Canada 1997). As will be seen later, the basic profile set out in Box 4 has not changed radically since then, although new variables have been added.[[8]](#footnote-8)

# Canada in an international context

Many policy insights can be drawn only by examining Canadian data in an international context. By way of general introduction, following are some key international comparisons come from the 2011 survey as reported in Statistics Canada (2011):

* Canada ranks at the OECD average in literacy, although results are better than they appear if we look at the scores of immigrants and native-born Canadians separately.[[9]](#footnote-9)
* Canada has a higher proportion of its population at the highest proficiency levels in literacy, but also a larger proportion of adults at the lowest proficiency levels.
* Canadian provinces and territories are far from homogeneous when it comes to literacy scores. Some provinces have similar scores but, in other cases, differences are as large that as those between different countries as can be seen in the following text box.

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| Following is the ranking of participants in the 2011 survey, starting with countries with the highest literacy scores: | | | |
| 1. Japan 2. Finland 3. Netherlands 4. Australia 5. **Yukon**, 6. **Alberta** 7. Sweden 8. **British Columbia** 9. **Ontario** 10. **Manitoba** | 1. **Prince Edward Island** 2. Norway 3. England and Northern Ireland 4. Flanders (Belgium) 5. **Canadian average** 6. **Nova Scotia** 7. OECD average | 1. United States 2. Estonia 3. **Quebec** 4. **Saskatchewan** 5. Germany 6. **New Brunswick** 7. Denmark 8. **Northwest Territories** 9. Poland 10. **Newfoundland and Labrador** | 1. Czech Republic 2. Austria 3. Ireland 4. Korea 5. Slovak Republic 6. Cyprus 7. Spain 8. **Nunavut** 9. Italy |

# THE ECONOMIC PAYOFFS FROM FULLY USING PEOPLE’S SKILLS

We now turn to the heart of the paper, where we examine the best evidence we have today that provides answers to a series of questions about how skills are related to policy. In this section we ask the fundamental question about the economic payoffs from investing in, and promoting the full use of, people’s skills.

* Section 3.1 takes a firm-level perspective and shows how literacy skills results in higher earnings of employees.
* Section 3.2 looks at the bigger, and much more complex, question about the extent to which a skills agenda can increase to productivity and global competitiveness.
  1. How literacy skills affect earnings

This question can be answered by looking the Canadian data. Data on average hourly earnings is available from the monthly Labour Force Survey, one of the sources used in computing the demand for skills, using methods discussed in more detail in Section 4.1. This allows a calculation of trends in earnings by literacy skill level.

Figure 1 compares average hourly (measured in constant dollars) earnings with literacy skills.

* The first set of bars is for Level 2 skills. It shows that there has been no growth since 1999 in average hourly earnings for jobs that require low skill levels.
* The next set of bars shows that there has been a small increase in hourly earnings for people in jobs that require level 3 skills, where workers are expected to have the minimum kind of literacy skills associated with normal life in today’s information age.
* The last two blocks of bars show much higher increases in hourly earnings for jobs with more demanding skills at levels 4 and 5.

***Figure 1. Trends in average hourly earnings in 2010 constant dollars by literacy skill levels demanded by the occupation, paid jobs, Canada, 1997 – 2015***

Includes only occupations with an assigned essential skill

That is, a growing wage premium is associated with jobs that require higher skill levels. Expressed as percentage, the growth in hourly earnings over the past 16 years or so has ranged from 1% at level 2, up to 16% for level 5. When converted to an annual earnings basis, employees at level 2 gained only $325 between these years. Those at level 3 gained almost $3000 annually, while those at levels 4 and 5 gained $7,200 and $8,800 respectively.

Background analysis[[10]](#footnote-10) suggests that employers with Level 3, 4 and 5 jobs are bidding up wage rates in response to a relative shortage of workers with these skills. To return to the earlier discussion of wage inequality, this suggests that increasing the supply of workers with these skill levels would reduce the rate of wage inflation and the associated growth in skill-based wage and income inequality.

The same analysis suggests that that wage increases in jobs that demand Level 2 skill are growing slowly because of downward pressure from automation and skilled foreign competition and employers reducing the cognitive demand of their jobs in response to high proportions of the workforce with Level 1 and 2 skills.

# The productivity and competitiveness payoffs from having a highly skill workforce

### The conventional wisdom is often not based on clear evidence

The conventional wisdom is that investing in skills development and fully using those skills in the labour market will be beneficial on virtually all counts when one looks at the economy and society as a whole – higher productivity, a stronger competitive edge internationally, higher GDP, higher wages, less inequality, greater worker satisfaction, better health and much else that is good.

While claims at this level of generality are almost certainly true, until recently it has not been possible to develop a persuasive, evidence-base narrative that shows the direct link between skills and economic prosperity. Without such a narrative, it is hard to know which kinds of skill investment are needed and what actions are needed to promote the use of different skills. There are also puzzles that need to be explained. If the benefits of skills training are so obvious, why have not employers and educators done more to increase the level of basic learning-to-learn skills? Why are skill losses so common? Why are there are large mismatches between the skill requirements of jobs and the skills of workers who fill these jobs? Why do employers do so little training of their own employees?

We will turn to some of these puzzles in later sections. Here we explore the evidence that is finally coming together to make a persuasive case for the economic payoffs from a high-skill labour force – particularly one that emphasises strong basic skills such as literacy that are needed in order to adjust quickly to a rapidly changing global economy.

### High skills result in increased productivity

The first strand of the story relates to the link between skills and productivity. An important Canadian contribution this literature (Coulombe and Tremblay 2005) used international data from the first literacy study referred to in Box 1 along with data from other sources. They argue that the use of direct measures of skills, as opposed to the use of educational proxies, shows the:

“clear relationship between investments in human capital and both long-run economic growth and long-run labour productivity. Specifically, a country’s literacy scores rising by one percent relative to the international average is associated with an eventual 2.5 percent relative rise in labour productivity and a 1.5 percent rise in GDP per head. These effects are three times as great as for investment in physical capital. Moreover, the results indicate that raising literacy and numeracy for people at the bottom of the skills distribution is more important to economic growth than producing more highly skilled graduates.”

The third set of international literacy surveys has provided the richest source of data needed to explore the benefits of the full utilization of the skills of the population. The current issue of the OECD’s influential Employment Outlook (OECD 2016) sets out its findings based on state-of-the-art findings that have been carefully reviewed by country experts. Box 5 summarizes its conclusions on why the use of skills matters at the firm level and that factors that affect that usage. In summary, it finds that full use of skills results not only in higher productivity but also in improvements in a range of factors relating to productivity including in higher wages, greater job satisfaction, greater protection against the negative effects of automation, lower turnover and higher outputs.

The international comparisons are important in that they point to conclusions that are difficult to find when looking at national data alone. For example both Coulombe and Tremblay and the OECD Employment Outlook can draw conclusions about the link between skills and productivity

***Box 5. Skills use at work: the OECD view on why it matters and what influences it***

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| ***Using skills on the job has big payoffs***  ***Higher wages***. The use of Information processing skills (including literacy proficiency) on the job results in higher wages. In terms of influencing wages, reading and the use of ICT skills on the job are more important than years of education or literacy proficiency.  ***Job satisfaction***. Greater skills utilization is associated with greater workers satisfaction, likely with spill-over effects on greater satisfaction with life in general and better health. The use of writing, reading and ICT skills is significantly related to job satisfaction in nearly all countries.  ***Productivity, turnover and output.*** At the level of the firm, better skill utilization is associated with higher productivity, lower staff turnover, and output per hour worked. In the latter case, for example, the link with output is particularly strong for reading and writing skills that are used on the job, quite independent of the level of proficiency in these areas.  ***Risk of automation***. Jobs that require workers to make fuller use of their skills are less likely to be automated. (The Employment Outlook also reports on research that suggests that the effect of automation on jobs is considerably less than is often reported. In Canada about 8% of jobs are at risk of being lost through automation, and about 33% are at risk being either eliminated or significantly changed.)  ***Low- and high-skill usage as firm-level strategies***  In some countries, low-skill utilization has been linked to a ‘low-skills equilibrium’. Companies that follow low-wage, low-skill strategies will tailor their jobs in a way that requires low skills and will give their workers little discretion, autonomy or flexibility. This is in contrast with employers who compete on the basis of quality, with differentiated products and services, and who will accordingly structure their workplaces to make fullest use of skills.  Even in firms following high-skill, high-wage strategies there will never be a perfect link between the skills held by workers and the skills actually being used in practice. Apart from the usual adjustment issues, there is no readily | available information available on the skills held by new recruits and educational attainment must often be used as a rough proxy.  ***Factors within a company that influence skill use***  The utilization of skills in a firm is related to the way in which work is organized, the design of job content, and management practices. The practices that lead to fuller utilization are known as High-Performance Workplace Practices (HPWP). Examples include promotion of team work, autonomy, mentoring, job rotation, flexible hours, bonus pay and training. The 2011 round of international surveys asked question about many dimensions of HPWP.  HPWP accounts for much of the variance seen in the utilization of most essential skills including literacy.  Two-way causation is likely at play. HPWP motivates/enables workers to use their skills better, but employers will also want to use these practices if the complex and varied problems encountered in the work require the full use of the essential skills of the workers.  Larger firms are most likely to use HPWP, with less use in medium-sized firms (11 to 50 employees) and somewhat greater use among very small firms (under 10 employees) such as high tech start-ups. There are also large differences in HPWP usage among occupations and industries. They are mainly used in conjunction with full-time permanent employees.  Canada is about average in term of firms using HPWP practices.  ***External factors that influence skill use***  Off-shoring, the effects of technology, aging and other structural shifts affect the use of skills. For example, if production activities are moved off-shore, there tends to be greater use of the skills of those who remain, of who work in jobs with greater value-added cognitive content.  Strong job protection legislation and collective bargaining arrangement make work more costly and thereby encourage employers to fully using the skills of those workers. This benefit can, however be negated by a dis-employment effect if wages are raised beyond a level that is justified by productivity gains. |
| **Source**: *Chapter 2 of OECD (2016). Some of the phrases above are taken directly from that chapter or are a close paraphrase by the present author. The chapter contains much analytic material that underpins the conclusions reported in this box.* | |

### that is not easy to find when looking at national data alone.[[11]](#footnote-11)

### Skills result in improved global competitiveness

Similarly, it is difficult to trace the linkages among skills, productivity and international competitiveness using only Canadian data. The OECD has, fortunately, developed rich international data bases relating to both skills and global value chains (GVCs).   
GVCs are the key indicator of globalisation today, namely the extent to which workers in different countries contribute to the design and production of the product. A recent study (OECD 2017) provides rich comparative analysis of that takes account a range of skills in different countries, their productivity and how this relates to their success in participating in GVCs. Box *6* shows the conclusions of their study. Note that this explanation takes account of a broad spectrum of skills in addition to the literacy skills that are highlighted in this paper.

In summary it shows that high skills have large impact on a nation’s competitive success in the kind of globalization that now exist in the world.

### Weaving the threads together

We now have clear evidence drawn from international evidence that shows that investment in skills and promoting their use has high economic payoffs both in terms of increased productivity and global competitiveness. What is missing is a fuller Canadian story that would, for example, also make use of provincial and territorial data in Canada to supplement the

*Box 6. Skills and trade: the OECD analysis of the importance of skills to global value chains*

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| The world has entered a new phase of globalisation over the past two decades that presents countries and workers with new challenges and opportunities. Helped by the rise of information technology and transportation innovations, production has become globalized and fragmented along so-called global value chains (GVCs): workers across different countries now contribute to the design, production, marketing, and sales of the same product. On average in OECD countries, one-third of jobs in the business sector depend on demand in foreign countries. Thirty percent of the value of exports of OECD countries now originates from abroad. (Canada is about average in participation in GVCs.)  The impacts of GVCs on economies and societies are more complex, more diffuse and more inter-dependent than those from earlier phases of globalisation. The benefits of globalisation are being questioned. Countries can help ensure that their participation in global market translates into better economic and social outcomes through a range of policy actions, where investing in the skills of their population is paramount.  Skills can help countries make the most of GVCs through various channels:   * Skills are needed to realize the productivity gains offered by participation in GVCs and ensure these gains | transfer to a broad range of firms, including small ones, and thereby benefit the whole economy.   * Skills can protect workers against the potentially negative effects of GVCs in terms of job losses and lower job quality. * Skills are essential for countries to specialise in the most technologically advanced manufacturing industries and in complex business service that are expected to lead to innovation, higher productivity and job creation.   When skills development accompanies participation in GVCs, countries can achieve stronger productivity growth. Countries with the largest increase in GVCs over the period 1995-2011 have benefited from additional annual growth in industry labour productivity. This extra growth ranges from 0.8 percentage points in industries that offer the smallest potential for fragmentation of production to 2.2 percentage point in those with the highest potential, such as many high-technology manufacturing firms.  To integrate and grow in global markets, all industries need workers who have not only strong cognitive skills (including literacy, numeracy and problem-solving) but also managing and communication skills and readiness to learn. To spread the gains from participation in GVCs across the economy, all firms including small firms, need workers with such skills. |
| Source: OECD *Skills Outlook 2017, Skills and Global Value Chains*. The words are taken directly from this report, but re-arranged slightly. | |

international findings. Also a completely satisfactory narrative would need to include an integrated account of relationship of skills and earnings that was discussed above. It would need to reflect data on the Canadian demand and supply of skills along lines that are separately described in following sections. The concluding section suggests that a key task of the New Skills Agency might be to weave these various strands together in an evidence-driven narrative that is both comprehensive and persuasive.

In summary, we now have evidence about the economics payoffs from a highly skilled labour force that is an order of magnitude more persuasive than the conventional wisdom mentioned above. However, we still need to do more work to develop an unambiguous story that can identify the particular society-wide payoffs that will result from specific investments in skills.

1. SKILLS GAINS AND SKILL LOSSES: IMPLICATIONS FOR POLICY

This section moves to the second strand of our skills and policy story: the policy implications of what is likely the most single most important new insight that has emerged from the international surveys. This is the understanding that people lose as well gain skills. Policy related to skills has traditionally concentrated on the acquisition of skills – in schools, through formal and informal training and practical work experience. It must now address the important problem of skill losses that mainly result from lack of use of skills that have been acquired.[[12]](#footnote-12)

* Section 4.1 describes the source of data and provides some technical background. Fortunately our analysis here is much more straightforward than it was in the last section and can use Canadian data.
* Section 4.2 discusses skills gains and losses by educational attainment, the area where implications for policy are particularly large.
* Section 4.3 describes skill loss by age, gender and immigrant status.
* Section 4.4 discusses workplace factors that are related to skill losses and gains.
* Section 4.5 summarizes.
  1. Source of the data

The analysis of literacy skill gains and losses is based on an exploration of changes between the second and third international surveys in 2003 and 2011 using a combination of analytic techniques that are described in Box 7.

Overall averages show small skill gains and losses between 2003 and 2011, with slightly more losses than gains. However there are significant changes among different groups, mainly

***Box 7. Technical note on the analysis of the 2003 and 2011 data***

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| ***Three kinds of analysis***  In an attempt to quantify the gains and losses in different population groups, three kinds of analysis were carried out.   * First was a simple comparison of the cross-sectional results of the 2003 and 2011 international surveys. * Second was a ‘synthetic cohort’ analysis that, for example, examined changes in people who were in a particular age group in 2003 with those who were 8 years older in 2011. This allows a (rough) approximation of how the same people changed over the 8-year period between the two surveys. The results of the cross-sectional and cohort analysis were similar. * Third was a regression based on the synthetic cohort data in order to gain some insight into the factors that underlie skill gain and loss, particularly the degree to which the level of cognitive demand on the job matters.   ***The synthetic cohort analysis***  The ideal way of examining changes over time would be track the same individual across time. However the data to undertake this kind of longitudinal analysis does not exist; synthetic analysis which looks at changes in groups of people is the closest approximation possible with this kind of cross-sectional data.  The synthetic linkage was designed to be conservative in its estimates of gains or losses in skills. It generated the least amount of literacy skill change.  The synthetic cohort was created by a probabilistic linkage of respondents in the 2003 ALL and the 2011 PIACC public microdata files.   * The two files were classified by static characteristics, including age and sex. * Next, the smaller of the two datasets was adjusted to have the same number of records as the larger file within each cell in the linking matrix and the sampling weights were adjusted accordingly. The donor pools of like individuals were further subdivided by educational level. * Finally, records in the two file were matched on age and gender and conditionally on education (where the condition specified that education had to equal or greater than that observed in 2003) and by reading skill score (where the condition was that a match was made | between the two records resulting in the least change in score, either positive or negative).  ***Changes in concepts***  Care needs to be exercised in measuring changes over time since concepts have evolved across the three sets of international readings, and it is necessary to make adjustments for comparability, particularly across the second and third set of surveys. Those adjustments have been made in the comparisons in this report. Note that some of the analyses exclude immigrants arriving after 2003.  ***Converting changes in skills into the equivalent earnings***  The whole range of literacy skills (i.e., all five levels) is measured on a scale where the very lowest score equals 1 and the very highest equals 500. Here we convert these changes to their equivalent in terms of earnings. Each point on this scale is worth $61 in equivalent earnings.   * This was derived using regression analysis of the marginal dollar value of an additional point of literacy skill in earnings per year. * The regression yielded symmetrical results. There was a decrease of $61 in annual earnings for each point that an individual was below the lower threshold of the literacy proficiency level identified in the Essential Skill profile for their occupation – and an increase of $61 per point above that lower threshold. * The regression controlled for the effect for a large number of other variables known to influence earnings such as age, gender, education, immigration status, Aboriginal status and mother tongue. This value excluded the income benefits of additional literacy in terms of additional weeks of employment on average. It did not take account of non-cognitive skills such as self-esteem or other leadership traits which are known to also play a role in determining earnings.   ***A caveat – other factors are also at play***  Changes in potential earnings are, of course, affected by factors in addition to literacy, and skills gains and losses have effects in all domains of life, not only in the labour market.  Nevertheless, the focus of this paper is on the labour market, and this measure, if crude, provides a simple way of illustrating the extent of the differences in skill gains and losses that are taking place in different groups. |

reflecting a continuation of past trends. In making these comparisons, we try to convey some sense of their order of magnitude by converting them into their potential for gains or losses of potential earnings. Again, the method for doing this is explained in Box 7.[[13]](#footnote-13)

# Gains and losses by educational attainment

We begin by examining skill gains or losses by people with different levels of educational attainment. Overall, the changes between 2003 and 2011 were not large. Similarly, a comparison of results from the first two international surveys in 1994 and 2003 found, perhaps surprisingly given the increases in educational attainment that had taken place, that there was little change in literacy levels between those two years, with much of the change that did exist being simply the product of changes in the underlying age structure of the population (Statistics Canada 2005).

What is of interest to policy is that the loss of skill between 2003 and 2011 was among those with the most education. The higher the level of educational attainment, the higher was the risk of significant skill loss. People who did not complete high school lost virtually no skills or potential earnings, while university graduates lost skills over this period that would amount to $525 in terms of annual earnings potential.

An earlier study that compared the 1994 and 2003 surveys reported similar findings (Green and Riddell 2007). It found that literacy inequality had decreased between the two surveys as a result of *improvements in literacy at the low end of the literacy distribution but deterioration at the top end. The improvements partly reflect improved literacy among high school drop outs but appears mainly to result from improvements in the education level of the population. ... Successive birth cohorts have had poorer literacy outcomes at the top of the distribution, potentially pointing to an education system that is doing better for those at the low end but doing a poorer job of generating literacy for those at the top.*

This is a result that, in traditional thinking, could be interpreted as resulting from compositional factors in combination with an education system that has become more inclusive and less elitist – or it could point to the need for the education system to pay more attention to literacy skills, including as student reach higher levels within that system. However, as we shall see, widespread skill loss can also be explained in terms of the deterioration in the skills that people previously held.

* 1. Skill gains and losses by age, gender and immigrant status

***Skill loss increases with age***

People 16-25 increased their literacy levels over this period, related to increases in participation in education. In all groups older than this, there were skill losses, particularly among people who are in the tradition pre-retirement and early retirement age groups. The regression analysis suggests that gains among young people aged 16 to 25 were equivalent to a small increase in their annual earnings potential of about $42 dollars. Losses in earnings potential were $157 for those aged 26 to 35, $278 for those aged 36 to 45, and $684 for those aged 46 to 55. However, for those aged 56 to 65, there was a loss of $1,675.

Several factors account for this relatively large change in the oldest group. First, there was an increase in employment rates of older people between these two years, reflecting a 20-year upward trend in employment rates among older people. Staying longer in work would seem to suggest a gain in skills, according to the ‘use it or lose it’ theory. However, it may well be that some older workers, as they approach their retirement years, work in familiar settings with fewer of the learning challenges that maintain skills. [[14]](#footnote-14) We return to skill losses among older workers in Section 6.7.

***Women bear a disproportionate share of skill loss***

Converting this loss of skill into potential loss of earnings, men on average lost some $151 annually, while women lost $650. Again as noted these losses are small at the level of individual but translate in large sums when rolled up to national totals – a loss of something like $1.9 billion in earnings potential as a result of skill losses among men, but over $8 billion as a result of skill losses among women.

***Immigrant status***

The analysis of the distribution of skill gain and loss by immigrant status reveals that the majority of adults, both immigrants and non-immigrants, maintained roughly the same skill level between these two years although immigrants are less likely to experience significant skills loss. Immigrants also appear to have a higher probability of experiencing skill gain, not surprising given the proportion of non-official language speakers in this population and their relatively high education levels. The loss in individual earnings potential for immigrants was $275, compared with $444 for non-immigrants.

* 1. Workplace factors that affect skill gain and loss

The regression analysis, which took workplace factors into account, suggests that skill gain and loss in adulthood is driven by the cognitive demand of the job. Workers in jobs that impose a high level of cognitive demand tend to gain skill whereas workers in jobs that impose low levels of cognitive demand tend to lose skills. The regression seems to suggest that employers have reduced the level of literacy required of their workers between 2003 and 2011. That is, educational attainment has risen and, as will be further discussed in the next section, the skills levels associated with job profiles have also gone up. Nevertheless, there is still a skill loss that is associated with a lack of utilization of skills. The only obvious explanation that can reconcile these conflicting results seems to be that employers have reduced the actual skill levels of the employees that fill these jobs. This topic is explored at length in the next chapter.

* 1. Summary

Gains and losses in literacy levels between 2003 and 2011 for main population were usually small, with losses predominating – similar in magnitude to the small changes that were found in earlier analysis of changes between 1994 and 2003.

As noted several times, while the losses do not appear large when looked at in terms of the potential loss of earnings for the individuals concerned, they are significant at the level of the economy as a whole. As well even small losses seem counter-intuitive and disappointing in light of the energy and resources devoted to education and training over the past twenty years. Section 7 will provide a closer examination of the role of the education system in the developing proficiency in literacy skills.

# DEMAND AND SUPPLY: SKILL MISMATCHES IN THE LABOUR MARKET

This section outlines the policy story that arises from the existence of mismatches between the skills required by the jobs that workers hold and the skills that they actually have. The section is structured as follows:

* Section 5.1 discusses how we measure the supply and demand for literacy skills.
* Section 5.2 provides an overview how supply and demand were matched in 2011.
* Section 5.3 provides the main analysis of mismatches between supply and demand.
* Section 5.4 provides an international perspective on mismatches.
* Section 5.5 is reminder of the broader economic consequences of those mismatches.
* Section 5.6 puts skill mismatches in the broader context of a possibly polarizing labour market.

# Calculating supply and demand

In this section we need only look at the demand and supply of literacy skills at a particular point in time, since we are interested examining mismatches: cases where workers possess greater or lesser skills than those are required by the job. The next section will discuss trends.

### Measuring supply is simple

Data on the supply of literacy skills at different levels is based on the 2011 International survey results that were obtained from those people who reported themselves as employed.[[15]](#footnote-15)

### ***Calculating demand is more complex***

The demand for skills refers the number of jobs in the labour force that require skills at different levels; it is information that can only come from workplace sources, not from the individuals who responded to literacy survey. Estimates can only be calculated by making inferences from several data sources.

To make matters more complicated, this paper is interested in exploring not only the existing demand for skills, but also the extent to which the literacy skills of all workers are being fully utilized in the labour market. For reasons that are expanded on in Box 8 it would therefore be useful to find a measure that would correspond to a hypothetical level of demand where skills were fully used in the work force in such a way that productivity, competiveness, and economic well-being would be maximized at regional and national levels.

The solution described in Box 8 is very conservative. It is simply assumes that ‘full-utilization demand’ refers to the skill levels of existing jobs that are required to meet the most difficult requirements of those jobs. These are ‘peak’ level of existing skills requirements, the more complex skills which may not be needed on a day-by-day basis. As the box notes, however, these are almost certainly less than the skills that would be required in a scenario where all employers were following a high-skill strategy, making best use of the skills of the population.

# Supply and demand: an overview

Given our approach to measurement, demand must equal supply by definition. The number of jobs must equal the number of employees in those jobs. That is, we do not take account of the number of unemployed (the potential supply equals employees plus the unemployed) or the number of job vacancies (the potential demand equals employees plus vacancies). Figure 2 shows that, taken as a whole, employees have a slightly higher level of literacy skills than the skills required by the jobs they hold. There are many jobs that require low level skills and there are many people with at least those levels of skills to fill those jobs who are either unemployed or not in the labour force as can be seen in Figure 3. Note as well that employed people have higher skills levels than do other people aged 16 to 65. It is not surprising that employers have

***Box 8. Measuring 'full-utilization' demand for skills***

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| ***Difference between firm-level and economy-wide goals***  When examined from the perspective of individual employers, economic goals can be cast in terms such as profits, sales or market share. Employers can generally be relied on to organize their Human Resources functions in a way that meets their particular firm-level goals. If both labour and education markets were functioning efficiently, there would be no skill mismatches. The skills of existing employees could be taken as close measure of both supply and demand (setting aside the effects of job vacancies and unemployment).  As shown in Box 5, having employees working in jobs that made full use of those is an important factor in achieving a range of desirable society-wide economic goals.  As is also shown in Box 5, it is possible that the incentives which drive decisions by individual employers as they relate to the recruitment, training and use of skills may not necessarily be those that maximize success at level of the economy (and its supporting human development system) as a whole, including the very large investment that society makes in the education system to produce skills that are needed in the workplace.  A purpose of this paper is to examine the extent of differences in Canada between firm-level and society-level success as it relates to the generation and use of skills.  ***Criteria needed to ‘full-utilization’ demand***  A ‘full-utilization’ level of demand for skills that would maximize economic benefits at regional and national levels is, of course, only a hypothetical concept that cannot be measured directly. What is needed is a proxy that:   * In order to be realistic, would be rooted in the skills that are implicit in the structure of today’s jobs and in the skills of today’s and tomorrow’s workers. * Would reflect the reality that markets never work perfectly and that some level of under- and over-utilization is inevitable and that the goal is to keep this at minimum. * Be consistent with the goal of improved competitiveness and productivity, and therefore be more ambitious than today’s demand level but still be attainable and realistic. | * Must be measurable and consistent with the literacy skills measures on the supply side.   ***Skill profiles at peak levels provide a conservative approximation***  ESDC’s skills profiles, described in Box 1, provide a practical, if imperfect solution. They are based on a sound methodology for measuring skill requirements that includes intensive interviews with those who hold jobs that are coded to different occupational groups in order to identify those skills that are routinely used on the job on a day-to-day basis (typical demand) and those more complex skills that are part of the job but that need to be used on less frequent basis (peak demand).  The peak level of demand, while admittedly not designed for this purpose, provides a reasonable, if conservative, proxy for a full-utilization level of demand. It provides a practical way of measuring skill demands that is rooted in today’s reality but is slightly more ambitious than a measure based on typical demand levels. When the skill level of a job is multiplied by the number of people in that job, there is, on average, about an 8% difference between typical and peak demand skills.  It is a conservative proxy that understates the extent of skill-underutilization. That is, shifting to an economy based on fuller utilization of skill would involve a gradual shift to job structures that were more skill-intensive than is currently the case – a job structure that would almost certainly require higher levels of skills than simply those that are required to perform existing jobs at a peak demand levels.  It is also worth noting that the impact of failing to meet the peak literacy demands of one’s occupation will vary by occupation in response to the cost of error. In some cases this cost will be high – think of Homer Simpson managing the nuclear power plant in Springfield – in others the cost will be trivial and all born by the individual. Currently, no systematic data is available on the variation in the cost of error. This is a matter that the New Skills Agency might consider since one of the less appreciated impacts of automation is an increase in the relative importance of human error to productivity. |

Figure 2. *Supply and demand, 2011, Canada showing percentage of jobs and employees at different skill levels*

*Figure 3. Percentage of people 16 to 65 by labour force status and literacy skills proficiency, 2011*

hired employees who have higher skill levels than those who are unemployed and those who are not in the labour market at all.[[16]](#footnote-16)

In other words, these summary readings tell a rather self-evident story. What is of greater interest is the discussion below of the mismatches between demand and supply in the workforce.

# Mismatches that result in under-utilization and over-utilization of skills

The new data allow us to explore the mismatches between the skill proficiency of employees with the peak level skills that are required by the job they hold. Figure 4 shows the number of

employees[[17]](#footnote-17) who have the minimum literacy skill level demanded by their job at peak times, the number of workers with literacy skills below the level demanded by their job and those with higher skills than required by the job (excess). The bars on the chart can be interpreted as follows:

* There are very few workers at Level 1 and these have been dropped from the chart.
* The majority of employees with Level 2 skills (63%) are in jobs that require a higher level. Only 36% of Level 2 employees are in jobs that require Level 2 skills.
* There is more balance for employees with Level 3 skills. The largest percentage of these employees (46%) is in jobs that require Level 3 skills. However, there is also a large percentage (30%) in jobs that only require Level 2 skills, meaning that they are under-utilized in terms of their literacy skills. The remaining 22% are working in jobs requiring higher level skills and therefore risk not being able to do the job in a satisfactory manner.
* The situation is quite different for employees who possess skills levels 4 and 5. Most of these have higher level skills than is required by the job, contributing to an important pool of excess skills that are not fully utilized in the labour market. That is, there would be plenty of people available if employers were to upgrade the learning-to-learn skill requirements of their workplace. (Note however that little weight should be given to Level 5 skills, since the number of people at this skill level is small).

*Figure 4. Distribution of employed workers by individual level of literacy skill compared to literacy level demanded by the job, adults aged 16 – 65, Canada, 2011*

Taken as whole the data suggest that about 40% of all workers aged 16 to 65 have literacy skills below the minimum level demanded for peak workloads. That figure varies of course depending on factors such as geographic location, the human resources strategies of different employers and industry. To illustrate, Figure 5 shows the proportion of workers in different industries[[18]](#footnote-18) that fall short of the skill requirement of their jobs, where the demand and supply of literacy skills is in balance, and where there are skill surpluses.

It is interesting to note that percentage of cases of balance – where the skills of the employees match those of their jobs – is reasonably consistent across industries and always represents

*Figure 5. Distribution by industry of workers with less than, in balance with, or more than those required by their jobs, employed age 16 to 65, Canada, 2011*

well less than half of the employees in that industry. Shortages of workers with the needed skills are highest in the professional and scientific industry (where there are many skilled jobs) and lowest in accommodation and food services (where there are relatively few skilled jobs). However, in between no obvious pattern appears to emerge, at least based on readings taken at this high level of summarization.

The conclusion is simply that the issue of mismatches is not an isolated one. It exists in all parts of the economy.

* 1. An international perspective on mismatches

Mismatches exist in all countries of course and there are different ways of defining mismatches. OECD (2016b) uses the 2011 international survey to identify:

* Qualification mismatches, where the worker has an educational attainment that is higher or lower than that required for the job.
* Field of study mismatches, where workers are working in an occupation that is not related to their educational field of study.
* Literacy mismatches, where literacy skill is higher or lower than that demanded by the job.
* Combinations of the above.

Given this broad definition, mismatches are of course large in all countries, typically around 50% or 60% of the total employment. Canada is about in the middle. The largest category is ‘field of study’ mismatches (people often work in jobs in areas that are not directly related to their educational field study). Qualification mismatches come next. These findings are not particularly worrying from a workplace perspective although they might be of more interest for those who whose concern centers on the relevance of the education system to the job market.

Of much greater interest here are the literacy mismatches. While the concepts used in the OECD study are not identical to those used in the Canadian data described above[[19]](#footnote-19), they provide a reliable way of showing where Canada’s stands internationally. Canada compares well. Literacy mismatches account for only 7% of all employees by this measure. Of the 23 countries in the study, only Finland and Sweden at 6% were lower, and many of the countries that are often compared with Canada had considerably higher literacy mismatches, such as Australia (10%) and the United States (11%).

# The broader economic consequences of mismatches

When thinking in terms of labour market decisions at the level of individual employers, it is important to recall that literacy skills are not the only factor at play when considering the mismatches between demand and supply. As already noted, people with poor literacy skills may have adequate levels of other kinds of skills – trades skills, other essential skills such as numeracy or non-cognitive skills. Especially in larger work places, it may well be possible to put together groups of employees with different levels and types of skills that can complement each other in a way that still allows the job to get done. In other words, a certain amount of mismatch in any particular skill, such as learning-to-learn literacy skills, is not necessarily worrying.

Mismatches are, however, a concern when we think in terms of the competitiveness and productivity of national or regional economies taken as whole. As already described literacy skills are fundamental to labour markets that can adjust quickly and make use of new technologies and global opportunities.

The proportion of mismatches shown in Figure 4 and Figure 5***,*** while not large in terms of patterns in other countries, are high enough to imagine that they are having a material impact on productivity at the level of the economy as whole. Many jobs are not filled by workers that have learning-to-learn literacy skills that are required by their jobs, at least when looking at full-utilization levels of demand. Conversely many jobs are filled by those with skills that are well in access of requirements, suggesting a missed opportunity to fully use those skills.

It is worth underlining again that some level of mismatches should be normal for a variety of reasons already mentioned but especially because employers lack access to one of the key requisites for selecting candidates with the needed level of literacy skill. Common credentials, including high school and college diplomas, do not provide a reliable signal of literacy skill. Employers currently lack the tools to identify the literacy skills of new employees before hiring them. They do, however, have the means to assess and upgrade the literacy skills of existing employees.

The evidence suggests that literacy skills upgrading by employers would have a high pay-off. However it seldom happens in practice. Section 7 discusses this evidence, suggests reasons why employers do so little training of this sort and provides a methodology for a more successful approach.

# The market for skills in a polarized labour market

The data on skills, wages, and mismatches discussed to this point raise some puzzling questions. For example, many employers appear to be paying for skills they are not using. Nor, as just noted, are employers undertaking the kind of skills upgrading for under qualified workers that would appear rational based on these numbers.

Workers in jobs that require high-level skills gain skills on average and workers in jobs that impose low levels of skill, lose skill on average. The net change is negative because the economy has been creating more of the latter jobs. Yet, paradoxically, both the demand for skill and wage premia to skills is rising rapidly. It seems likely that some employers may be dumbing down what should be cognitively demanding jobs – perhaps in response to high proportions of workers with skills below the needed level demanded by the job (particularly at level 3) and perhaps to avoid having to pay the growing wage premia for skill.

A full answer to these questions cannot be easily derived from existing skills data in any one country. In particular, missing from the national data are variables that describe the differing human resource strategies of firms as they relate to skills, wages and productivity.[[20]](#footnote-20) However, a likely explanation does arise from the general literature on wage inequality and polarized labour markets and from international comparisons using the new literacy data.

The data make most sense if we assume that different employers follow quite different human resource strategies as described in Box 5 which sets out the OECD’s reading of current international evidence as it relates to the dichotomy between low-skill, low-wage employers and those employers who compete at the high end.

At one end of the spectrum are employers who do follow a full-utilization policy for their existing workers and who attempt to increase the knowledge and skill intensity of their jobs over time to increase productivity and maintain a strong competitive position. These new jobs demand the non-routine application of problem-solving that itself depends on a workforce that has the learning-to-learn skills to support such activity.

At the other end of the spectrum are employers with a strategy of cost containment, reducing –or at least not increasing the knowledge and skill requirements their jobs. This strategy of minimizing labour costs works well for some employers, especially when global trading arrangements have eroded the bargaining power of workers in the lower half of the skills distribution. If these workers attempted to gain higher real earnings, the result would be to hasten the rate at which jobs are being automated or out-sourced to lower-cost jurisdictions.

Employers following such a low-cost, low-skill strategy will have no incentive to maintain the skills that existing workers already possess. This lack of use will, in turn, lead to a loss of cognitive skills, making it harder for these workers to change jobs and move another employer that does use those skills. In other word, a kind of vicious circle emerges that is consistent with a polarizing employer market for skills.

This kind of explanation is broadly consistent with the mainstream story about labour market polarization and earnings inequality that results from technological change. Box 9 provides examples. Note however that analysis in this area is not straightforward, and requires an examination of the relationships among skills, wages and productivity. There is, for example, no consensus on whether trends towards polarization are continuing.

This strand of our analysis is far from tidy or conclusive. However, clarity here will have high payoffs when, as we suggest, the New Skills Agency considers weaving this kind of evidence into a more comprehensives narrative.

*Box 9. Other analyses that support the high-skill, high wage versus low-skill low-wage dichotomy*

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| ***The declining middle***  Green and Sand (2016) report on the international literature that shows an increase in the proportion of workers in both low-skill and high-skill jobs, with a corresponding decline in middle-skilled jobs.[[21]](#footnote-21) The theory is that:   * Occupations that involve cognitive tasks (such as professional and management jobs) have experienced an increase in productivity with the advent of computers. * Occupations that involve routine tasks (such as manufacturing and clerical jobs) tend to be replaced by computers. * Occupations that involve non-routine manual occupations (such as service jobs) are neither replaced nor enhanced by computers.   The literature finds that employment polarization along these lines has been occurring for decades in Europe and the United States. In most countries, wages for high skill workers also grew while those in low skilled occupations fell – a steady pattern of growing inequality. The decade of the 90s in the United States was an exception in that there was also a polarization of wages, where the wages of those in the middle of the skill distribution fell relative to both higher- and lower-skilled workers.  Green and Sand have explored the relevance of this model in Canada. They found that during several decades prior to 2000, there was job polarization (increases in the number of managerial and professional jobs and decreases in production jobs) and growing wage inequality. After 2000, however, things changed. The polarization pattern in employment has leveled out, marking the end of the strong secular increase in demand for high-skilled workers. At the same time, there has been an increase in wage polarization as well – although this has its roots in industrial changes (the boom in the resources industries) and in policy (increases in minimum wages) and not in the demand and supply of skills per se.[[22]](#footnote-22) | ***Earnings inequality and productivity***  The economics literature that explores the relationship between productivity and real earnings provides a supporting narrative.  Sharpe et al (2016) analyse the gap between strong productivity growth in Canada and the stagnation of real earnings for people in the middle class. They report that, between 1976 and 2014, the cumulative growth in labour productivity was 52.5 per cent, the hourly earnings of the median worker grew by only 3.3 per cent, after adjusting for the rising cost of living. Their analysis shows that rising earnings inequality accounts for half the gap between the growth of productivity and real earnings.[[23]](#footnote-23) Real wage growth in recent decades has been fastest at the top and at the bottom of the earnings distribution, with relative stagnation in the middle.[[24]](#footnote-24)  ***Earnings inequality and skills usage***  At the international level, the OECD has perhaps gone furthest in exploring the link between skills and wage inequality. For example OECD (2015) used a series of multi-layered analytic techniques to assess the contribution of skills to explaining differences in wage inequality across 22 OECD countries based on the rich data found in the 2011 international survey. The analytic tools that were used to tease out solid policy-relevant conclusions were complex but results are simple, if general:  *“Investing in skills matters even after labour market institutions, policies and practices that affect wage inequality are taken into account. The impact of skills investments on wage inequality is shown to be especially large when skills are scarce in relation to demand. The results also show that reducing inequalities in how skills are distributed within countries can have a significant impact on wage inequality. Finally … putting skills to better use can further help in reducing wage inequality, by strengthening the link between skills, productivity and wages.”* |

# TRENDS IN THE SUPPLY AND DEMAND FOR SKILLS

The last section dealt with mismatches in the supply and demand for literacy skills at a point in time. Here we examine an even more central strand in the story: past trends and future prospects.

* Section 6.1 explains why information on trends and projections is so important for policy-making.
* Section 6.2 examines trends in demand.
* Section 6.3 examines trends in supply.
* Section 6.4 opens a discussion on the sources of future labour market skills by examining what is traditionally the largest source of supply – young people entering the labour market from school.
* Section 6.5 discusses future supply from women.
* Section 6.6 discusses the role of immigration as a future source on labour supply.
* Section 6.7 turns to a very large, and not well understood, source of labour supply over the next 20 or so years, namely the dramatically increasing employment rates of skilled older workers.

# Why trend data is so important

Time series data is essential to policy-making and in the case of literacy skills, the most foundational of all skills, we have only partial data on past trends. This will pose a challenge that the New Skills Agency will need to address head on.

Economic policies related to skills will be based on analysis of the efficiency with which skills are acquired, their distribution throughout the population, and their use in the labour market. In each of these areas, the priority assigned to policy action will depend to a large extent on an assessment of whether things are getting better or worse. It is essential to know whether the need for policy solutions is becoming larger of smaller over time, whether existing arrangements will be sufficient or whether they need to be augmented by new policy initiatives. [[25]](#footnote-25)

This section discusses trend data as it relates to learning-to-learning literacy skills, particularly comparing basic trends in the overall demand for and supply of these skills. Is the gap between demand and supply getting larger or smaller? There are real challenges here since there have been only three basic readings of adult essential skills over the past 20 years and changes in definitions used have made some comparisons difficult. However, there is enough information available to piece together at least a partial answer.

# Trends in demand

Recollect that, for purposes of the cross-sectional analysis discussed in the last section, it was relatively easy to get data on the supply of skills, but harder to get useful data on the demand for skills. This is reversed in the case of trend data, where the demand for literacy skills is easier to calculate than those for supply. Recall that demand is calculated by examining the essential skill profiles of jobs. In countries such as Canada there are long-time series from the monthly Labour Force Survey that show the numbers employees in different occupations. With some exceptions, it is possible to look at the literacy requirements of those occupations using the occupational profiles described in Box 1.[[26]](#footnote-26) The measure is not perfect, but does provide a reasonably consistent reading of changes over time.

Figure 6 shows that the number of jobs that require higher-level literacy skills has grown:

***Figure 6. Increase in employment levels by the literacy level (full-utilization) demanded by the job, 1995 to 2015***

* The largest number of jobs is at Level 3. There was growth in these in the late 90s but in recent years the trend has been flat.
* The second largest number of jobs is those at that require higher-level skills (Level 4) where there has been a steady increase since 1997.
* The number of jobs requiring the highest skills (Level 5) has also grown but not greatly.
* The demand for low-level skill jobs (Level 2) has been flat.

In summary we see a pattern of modest growth in the demand for higher-level skills, not greatly affected by economic cycles.

Trends look back; projections look ahead. A discussion of future trends in the demand for skills can be brief. There is almost complete consensus in the policy literature that competitiveness in the global, ICT economy requires increasing the skill level of jobs. Even those who predict a kind of employment dystopia where robots take over most jobs, call for increasing levels of literacy and other learning-to-learn skills to support a life of self-fulfillment outside the traditional area of the market economy.

* 1. The supply of skills

As noted, there are only three readings on the supply people with different skill levels. Analysis of trends is therefore more problematic. Nevertheless, the overall picture is clear. In the adult population as a whole, trends in literacy scores have been flat or negative for many years. Paccagnella (2016) has adjusted the data from the three international surveys for consistency and found that that there was little change in Canada between 1994 and 2003 (a very slight increase of 1%) and a small but significant decline between 2003 and 2011 (-7%). In this last period, the percent of people:

* With higher skills (Levels 4 and 5) fell from 18% to 14%.
* At Level 3 fell from 41% to 38%.
* With lower skills (Level 2) rose from 27% to 32%.
* With very low skills (Level 1 or below) rose from 15% to 17%.

This discouraging picture is common in other countries as well. Some of the change could be the results of compositional effects, such as more older people, or changes educational levels of different groups or changes in the percentage of the foreign-born population. However Paccagnella (2016) has controlled for the effects of such changes and found they do not typically do not account for much of the overall changes in most countries. And, in Canada, he finds that the effects of compositional changes are positive, and partially alleviate even deeper losses in proficiency levels. Similar analysis by Murray and Shillington (2014) found that adjusting for compositional effects had minimal impact on the overall patterns of change.

In summary, the demand for literacy skills has been growing, while the supply of those skills has been static. The reasons for this have been explored earlier and relate, for example, to skills losses that have taken place, to employer human resource policies, and to mediocre performance of the education system in providing literacy skills. This is a fundamental issue that the New Skills Agency must address.

The remainder of this section looks to future prospects for the supply of skills.

* 1. The changing literacy skills of young people

Young people entering the labour market from school have been the traditional main source of labour supply. We begin by looking the skills of 15 year olds where there is good data. We then examine what happens to those young people who go on the post-secondary education before entering the labour force.

### The literacy skills of 15 year olds

Beginning in 2000, the OECD has conducted a series of international surveys (Programme for International Student Assessment or PISA) that measure the skills of 15 years olds, including reading skills. The reading scores can be equated with the literacy scores on surveys of adult literacy, giving a good indication of the literacy skills that are attained based on participation in elementary and early secondary education. The Canadian Council of Ministers of Education (CMEC 2014) summarized the findings of the 2012 survey as follows:

* Canadian students’ performance in reading remained stable over time. However, with improved scores in some other countries, together with the accession to PISA of new countries with high performance scores, there was an erosion of Canada’s international standing in reading. Nevertheless, Canada continues to perform well internationally in reading, being outperformed by only 5 of the 65 countries that participated in the survey.
* Although Canada’s performance in reading remained stable between 2000 and 2012 on average, achievement decreased in 5 of the 10 provinces. Three of these provinces (Quebec, Saskatchewan, and Alberta) showed continued strong performance in PISA 2012, well above the OECD average. On the other hand, as a result of a decrease in performance in reading, Manitoba went from performing above the OECD average in 2000 to performing at the OECD average in 2012, and Prince Edward Island went from performing above the average in 2000 to performing below it in 2012.
* Students attending majority-language schools in Nova Scotia, New Brunswick, Ontario, Alberta and British Columbia outperformed their counterparts attending minority-language schools in reading. No differences were observed in Quebec and Manitoba.
* An optional digital reading assessment was administered for the first time in Canada in PISA 2012, providing initial insights into the proficiency of Canadian youth in accessing, interpreting, and evaluating information on line. Again Canada performed well, being surpassed by only four of the 32 participating countries. For Canada overall students in Anglophone systems outperformed their francophone counterparts in digital reading. Girls outperformed boys in digital reading, but by a narrower margin than in print reading. When the digital and print scores were combined, the new composite score largely mirrored the digital scores.

The underlying message is that the reading scores of 15 year olds have not been improving in recent years, while there have been improvements in other countries. The report from the Council of Ministers of Education concluded that, although Canada’s performance in these domains is still strong, even a minor decrease in performance may be an indication of potential loss of future competitiveness in a global economy.

Note especially that when the PISA scores are equated with literacy scores used on the surveys of adult literacy,[[27]](#footnote-27) the PISA score fell below the threshold between Levels 2 and 3 – the critical divide between the skills needed for to be effective in today`s information age. It is unlikely that the students below Level 3 will close the skill gap before they leave the secondary system.

This is a troubling result in two respects.

First, youth with less than Level 3 skill do not have the cognitive tools to take full advantage of education at the post-secondary level. Given that a significant percentage of these low skilled students are entering the post-secondary system reduces both their, and the public’s, return on the investment of time and money.

Second, youth are an important source of new skill supply at a time when the demand for literacy skill has been rising. More than half of these young people do not have the literacy skills to satisfy the literacy skill demands of the overwhelming majority of jobs, even the ones that are normally filled by workers without post-secondary qualifications. More specifically, by the time they reach age 15 (and likely by the time they graduate from, or drop out of, the secondary system), about half of young people will have acquired only Level 2 literacy skills while in the labour market, only 4% of paid jobs demand Level 2 literacy skills.

***Literacy and post-secondary education***

The literacy skills of those leaving the secondary system may not yet be adequate, but Canada has a large post-secondary system that could, at least in principle, fill the gap. Indeed, 85% of all high school leavers in recent cohorts go on to some form of post-secondary study.

However, up to 60% of all college students enter their program of study with literacy skills below the level needed to take full value out of education at this level, something that reduces both the public and private returns to investments in this system. And, as might be expected, the literacy gap is only partially filled when students are at college. Some 40% of all college students leave their programs with literacy skill below the level needed to satisfy the demands of their intended occupations. These students do not have the literacy skill needed to apply their technical skills and knowledge to globally competitive levels.

# Greater participation of women

Looking back in time, increasing labour force participation by women has been a main source of new labour supply. Women accounted for 37% of employment forty years ago in 1976. The percent has grown since then, but the rate of growth has, obviously, slowed as the percentage of women in the labour market has approached men. Twenty years ago in 1996, women accounted for 45% of all employees and in 2016 their share reached 48%. There is some room for more growth in the total labour supply of women in the future, but not for much.

There may be more room, however, to increase the use of the skills that women bring with them to the labour market. Girls outperform boys in reading scores at age 15, but, among adults, gender gaps are quite small. As shown earlier, women lost literacy skills between 2003 and 2011 to a greater extent than men. Although research based on these literacy surveys does not point to an explanation for this, one can speculate that it might reflect less opportunity for women to apply their skills to the fullest extent.

# More immigration

As already described, while the level of literacy skills among immigrants, on average, is lower than among people who are Canadian-born, there have been more gains in their skills over time, and fewer losses. These findings are in line with expectations given that many immigrants do not have English or French as a native language and require time to gain these second language skills. Moreover, immigrants do better than non-immigrants at the very highest levels of literacy, reflecting policies to attract immigrants that are highly skilled and entrepreneurial. These policies also contribute to the not so-obvious finding that, in international comparisons that examine the literacy skills of immigrants and non-immigrants separately, both groups are at the top of the list compared with other countries. In short, immigration policies appear to be working well, at least as they relate to skills.

As the baby boomers in the work force are now entering traditional retirement years, it is sometimes claimed that Canada will have to rely even more heavily on immigration in order to fill the gap in employment that will be left by their departure. However this is unlikely. There are many reasons to welcome skilled immigrants to the workforce. However, changing demographic patterns related to the retirement of the baby boomers is not among them, as will be described in the following paragraphs.

# Greater participation of older workers

Employment rates among older workers have been increasing dramatically since the mid-1990s, resulting in a significant increase in the supply of labour and one that is likely to continue for a decade or two into the future even, in some scenarios, at an increasing rate (Hicks 2012). Between 1996 and 2016 the percentage of young people age 15-24 who were employed rose slightly from 58% to 61% and, in total they now account for 13% of all employees. We can think of this as a rough indication of the size of the supply of labour that results from young people entering the labour market from the education system. On the other hand, the share of older workers in the labour market more than doubled. In 1996 people age 55 and over accounted for 10% of all employment. By 2016 they account for 21% of all employees.

Of greatest interest to policy[[28]](#footnote-28) are changes in the employment rates of older people, especially in their 60s, as seen in Figure 7. Increases are also taking place in the employment of people over age 70, but numbers here are much smaller. Figure 7 shows the dramatic growth in these rates since the mid-1990s, far more rapidly than has been assumed in much policy analysis. If the trend continues, and there is much evidence to think that it will (Hicks 2012), it will largely offset the much-discussed grey tsunami threat to employment now that the baby boom generation is now reaching traditional retirement ages.

*Figure 7. Employment rates of men and women in their 60s, 1976 to 2016*

It therefore seems likely that, over the next decade or two, older workers will constitute an even larger share of labour supply. This could have a large effect on the skill levels of the workforce. However it is difficult to disentangle the many factors are at play. How many low-skilled workers will be forced to work longer for economic reasons? How many high-skilled workers will continue to work even if they no longer need the income? To what extent do workers in different circumstances lose or gain skills in their pre-retirement working years? What role is played by a genetic loss in learning capacity with age?

While these particular questions are difficult to answer definitively, underlying directions are quite clear. There are two main factors at play: one relates the deterioration in the level of skills that happens with age. The other relates to compositional factors particularly related to the characteristics of the babyboom generation as it moves in traditional ages of retirement.

In terms of individual ageing and skill loss, there is no question that proficiency declines with age. However, based on analysis of the third international literacy survey, Paccagnella (2016a) concludes:

*However, despite their lower levels of proficiency, older individuals do not seem to suffer in terms of labour market outcomes. In particular, they generally earn higher wages, and much of the available empirical evidence suggests that they are not less productive than younger workers. Older and more experienced individuals seem therefore able to compensate the decline in information processing skills with the development of other skills, generally much more difficult to measure. On the other hand, proficiency in information-processing skills remain a strong determinant of important outcomes at all ages: this makes it important to better understand which factors are the most effective in preventing such age-related decline in proficiency, which does not occur to the same extent in all countries and for all individuals.*

*Two broad interventions seem to be particularly promising in this respect. First, it is important to ensure that there is adequate and effective investment in skills development early in the life-cycle: as skills beget skills, starting off with a higher stock of human capital seems also to ensure smaller rates of proficiency decline. Second, it is equally important that policies be in place that provide incentives to individuals (and firms) to invest in skills across the entire working life. In this respect, changes in retirement policies can not only have the short-term effect of providing some reliefs to public finance, but have the potential to radically reshape incentives to stay active, to practice their skills and to invest more in training, thus helping to maintain high levels of proficiency.*

In terms of compositional effects, the post-war boomers were educated during a period of when the education system, particularly the postsecondary system, was growing rapidly and, in consequence, have much higher levels of educational attainment than the generation that preceded them. Today, in 2017, the baby-boomers are between the ages of 53 and 71, the traditional years when retirements take place. Since literacy is strongly influenced by education, this suggests that, the coming expansion in the numbers of older workers will result in a labour force with higher literacy skill levels.

This potential for major skill gains as old boomers work longer will, however, not last forever. The large generational gap in education levels is unique to the boomers and pre-boomers. The gap in education levels between the boomers and following generations is not nearly as large and, after about 2030, we can expect no large ‘skills bonus’ associated with people deciding to work longer.

# IS THE EDUCATION SYSTEM DOING ENOUGH?

This, and the next two sections, turn to strands of the policy story that deal with the acquisition of skills and asks whether educators, employers and governments are doing enough to support high levels of literacy and other essential skills. This section deals with the role of the education system. Earlier discussions about the skill loss among young people and the supply of skills from the education system suggest that all is not well here. This section reinforces those conclusions by using the kind of cohort analysis described earlier in Box 7.

Cohort analysis allows us to compare 16 year olds in 2003 (when most were in high school) with 25 year olds in 2011 in order to examine the effects of their educational experience during this intervening period (during which most of these young people had completed their subsequent formal education). As noted in Box 7, this approach is not as good as following exactly the same people over this time period, but it provides a much better picture than simply looking at broad averages.

Figure 8 compares the skills of 16 year olds in 2003 who had yet to graduate from secondary education with those of 25 year olds in 2011 (roughly the same cohort of 2003 secondary students who were then 9 years older).

The 2011 cohort of 25 year olds were divided into four groups: those that still had not competed high school, those that had completed but had no other certificate or degree, those with a certificate, and those with a university degree.

Two different kinds of result were assessed: the average results for each of these 4 groups compared with the entire group of 16 year olds in 2003, and the distribution or dispersion of the literacy scores in each group. In all cases, including both dropouts and those with a university degree, there is always a wide distribution of results with many low and high scorers as well as the much larger number with the middle-range scores.

### Those who did not complete high school by 2011

The group of people who had not complete secondary education by 2011 had, on average, significantly lower literacy skills than the overall average for the 2003 cohort. This represented a loss in equivalent earnings potential of $3,721 annually. The distribution of skills in this group

Source: Author’s calculations based on synthetic cohort described in the text.

HS stands for High School. PSE stands for Postsecondary Education.

*Figure 8. The change in literacy skill distributions from non-high school completers age 16 in 2003 with people age 25 in 2011 by level of education*

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| ***How to read this chart*** | |
| The rectangles – with vertical lines extended above and below them – represent the literacy scores of groups of young people. This is known as a ‘box and whiskers’ chart which shows the way the scores are distributed within each group.  The box shows the range of scores for middle half on these young people (the second and third quartiles).  The horizontal line that divides the box in two shows the median score. That is, half of those in the group had scores under this amount and half had scores above it.  The whisker lines extending above and below the box show the scores not only for those who are near the middle of the pack, but for the whole group. (In practice, outliers – those with the top and bottom 5% of scores – were dropped from this chart)  Literacy scores in principle could range from 0 to 500, although chart shows only scores up to 400. These scores are divided into five levels, as described in Box 3. The chart shows Level 3, the basic level of skills that are needed in the information age, as a shaded area in the chart’s background. | Take the box and whiskers shown on the left side of the chart as an example. It represents young people who were 16 years old in 2003 and who had yet to graduate from high school.  There was a wide range of achievement as one would expect given the diversity that exists in the population. There is a very wide range of scores between the ends of the up and down whiskers. Even the box, which shows the middle half of the population, covers a wide range of scores.  The scores are distributed in a reasonably normal manner, again as would be expected. The median divides the box about in half and the size of the whiskers (the two tails of the distribution) is about the same size.  The median is slightly below the bottom of the level 3 shaded area. That is, about half of these 16 year olds had achieved a decent level of literacy by this age, and about half had not.  Most of those who had not achieved Level 3 were at Level 2, but some (in the bottom whisker) were still at Level 1.  Only a small number were above Level 3, as shown by the top whisker. | |

is particularly worrying, with many people having skill levels that were below those for the entire 2003 group. That means that, in addition to the usual selection effects[[29]](#footnote-29), many drop-outs actually lost skills between these years.

### Those who completed high school but had no other certificate or diploma

The group that did complete secondary education before 2011, but that had not obtained any additional qualifications, did much better than those who dropped out. There were skills losses as well when compared with the whole cohort of 2003 students, but to a much smaller extent – amounting to only $549 in equivalent annual earnings potential.

When examining the distribution of the skills of these people in 2011, the spread between higher and lower scores was noticeably larger than was the case for among all 16 year old students in 2003. Most people had gained skills during this period (although not by much) but a small number lost skills. A likely explanation is that most people in this category graduated from high school shortly after 2003, leaving five or more years between graduation and the 2011 survey where lack of use of those skills could have result in a deterioration of scores.

### Those with postsecondary certificates and university degrees

The group who obtained a post-secondary diploma or certificate had higher skills than those with only a high school diploma, but not by much. Compared with the overall average in 2003, they, on average, had a quite small increase in in skills – associated with an increased earnings potential of $671 annually.

Those who attained a university degree by 2011 did considerable better, with increased skills that, on average, were the equivalent to potential earnings gain of $2,400 annually. As well, there is a wide spread in skill levels even at the postsecondary level, especially for those without a university degree.

More generally, the data suggest that the process of skill loss begins early after the point of secondary school leaving. They also suggest that the skill gains associated with postsecondary education increases are not as high as might be expected once selection effects are taken into account. That is, the scores reflect not only the skill gains that take place within the postsecondary system but also the fact that young people with lower literacy skills are less likely to participate in postsecondary education. In addition, there is significant variability in the amount of skill change associated with further education. A significant proportion of the 2003 youth cohort did not improve their literacy skill despite having received college education.

These findings, in conjunction with earlier findings about skill loss and about the need for higher literacy skills levels in in the future, raise a general concern over the overall low levels of literacy skills of young people leaving the education system when compared with the skill needs of life in today’s society and economy. This concern is tempered by the fact other countries face the same problem and, compared with most, Canada does relatively well. As well, the Canadian system of post-secondary education is, compared with most countries, inclusive with relatively high levels of participation. This is a real strength and, as noted earlier, may help explain why Canadian graduates have somewhat lower literacy scores than more elitist systems.

Section 10 will argue that the traditional policy response, which calls for major improvements in the literacy training provided by our education system based on that fact that some other countries are taking action on this front, needs to be taken with a grain of salt. Nevertheless, there are powerful social and economic reasons, including those related to the performance and cost of the educational system, for policy to be concerned with the failure to provide large numbers of young people with the literacy skills needed to lead a full life in today’s society.

# ARE EMPLOYERS DOING ENOUGH?

The discussion of skill mismatches in Section 5 raises the obvious question of why employers don’t do more to upgrade the literacy skills of existing employees to match the requirements of the jobs they hold.

* Section 8.1 shows that returns to more investment in literacy skills ought to be high, at least in principle.
* Section 8.2 takes a quite different perspective and shows that, when looked at in terms of comparisons with other countries, Canada’s position on training for workers does not look all that bad.
* Section 8.3 argues that we are near a tipping point. The problem is that we were missing an efficient and economical approach to literacy upgrading by employers. That now exists, and once effectively marketed, could result in the rapid spread of employer-based literacy training.

# The returns to upgrading are high

Using Canadian data, Murray *et al* (2009) have shown that raising the literacy skill levels of workers gets high rates of return. Higher skills make workers more productive, less accident and error prone and less likely to quit. The costs of upgrading, on the other hand, are moderate when compared to the wage premia that face a firm trying to buy the required skills on the open market.[[30]](#footnote-30) Investing in internal skill upgrading would therefore seem to make sense – at least for employees at higher skills. The ratio of instructional costs to the resulting increase in annual earnings is very high for workers at Level 2 literacy (instructional costs are almost five times more expensive than the gains in annual earnings) while they are particularly attractive at Levels 4 and 5 where instructional costs are only about 20% of the resulting gains expressed in terms of annual increases in earnings.

These are not only abstract calculations. The payoffs from investments in literacy and other essential skills have been clearly demonstrated in a large, carefully designed Canadian experiment called UPSKILL that took place in the accommodation sector of the tourism industry. Returns on investment proved to be very large in this experiment as can be seen in Box 10. From the firm’s perspective, returns on investment calculated on a one-year basis were 23% and were much higher than that from the perspective of the government. Although the methods used in the earlier research in Murray et al (2009) were different (and that research dealt with bringing the whole population up to level 3 literacy levels), their calculation of returns on investment are in the same ball park – suggesting that there could be rates of return of about 36% over a five year period.

If this is so, then why do employers in fact not do more training? Why do market forces not solve this problem?

# Canada’s overall record in adult training is not bad when compared with other countries

The first observation to make is that when compared with many other countries, Canada’s record on structured adult learning is at least average, as is the extent to which that learning is provided by employers.

* The 2011 international survey described in Box 1 shows that some 60% of Canadians between 25 and 64 participated in some form of formal or informal education[[31]](#footnote-31) in 2012. This is above the OECD average of 50%, but below the levels found in Scandinavia and New Zealand. (OECD 2016).
* Not surprisingly, both literacy proficiency and educational attainment seem to have a mutually-reinforcing effect on participation in adult learning. On average across all OECD countries, those with high literacy scores and who frequently use reading skills

***Box 10. UPSKILL: An experiment that demonstrates the high returns to investments in literacy and essential skills training***

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| ***Background***  Funded by Employment and Social Development Canada and directed by the Social Research and Demonstration Corporation the UPSKILL project was launched in 2010 as a pan-Canadian research and demonstration project. UPSKILL utilized a randomized control trial to provide the most reliable measures of the impacts of literacy and essential skills training in the workplace. Over 100 firms and nearly 1,500 workers in the Accommodations sector of the Tourism industry participated in eight provinces.  In addition to the average results reported below, the study also found that the pattern of impacts varied among firms and workers in ways that have important implications for the design and delivery of effective training programs. Many practical lessons were learned that will facilitate both larger employer investments in training and higher return on investment.  ***Effects of training on workers***  Improvements in literacy skills occurred quickly after training, and increased subsequent to training, as individuals further utilize their skills and engage in literacy practice. The percentage of program group members with document use skills at Level 3 increased substantially, by over 20 percentage points, compared to the control group.  Significant improvements in job performance were also observed in nearly all areas of interest to employers – reflected in a greater breadth of service quality, improved relations with customers, and increased task efficiency. At the same time, LES training led to significantly higher success rates in industry certification. This may reinforce not only workers’ job performance but also their future training goals, career paths, and employment prospects.  The training led to significantly higher rates of job retention among program group members as well as improved health and well-being. They were also less likely to be unemployed within the year after enrolment. While there was no significant impacts on wage rates, the | increased employment levels provided higher earnings of approximately $1,900 per year.  ***Effects of training on firms***  Essential Skills training led to significant improvements in both drivers of firm revenue and reductions in costs. Program group firms experienced larger increases in customer satisfaction, customer loyalty and, ultimately, higher revenue compared to the control group, arising from both higher occupancy rates and increased ancillary spending.  The training also reduced error rates and increased the efficiency of workers within several departments, leading to significant cost savings for firms. Accompanying increased efficiency and accuracy of staff performance, were gains in the productivity of supervisors, as they reduced the time they spent on monitoring and correcting the work of employees.  Other costs savings included reductions in hiring costs associated with the increased job retention.  ***Return on investment***  UPSKILL results demonstrate that firms can experience a significant positive return on investment from Essential Skills training based on a one year time frame. The average cost of training was about $4,600 per participant. Benefits (in terms of increased productivity and reductions in hiring costs) amounted to $577 dollars more than this cost, for a short-term return on investment of 23 per cent. As indicated above, benefits will likely be greater over the longer run once lessons from the experiment have been put in place.  Governments also realize a positive return on investment, including gains in terms of increased income, corporate, and sales taxes, as well as a small reduction in transfers for EI benefits. These gains more than offset the costs of sector-level activities to support the launch of the training, (with a return on investment of over 200%) |
| ***Source:*** SRDC (2014), with most of the text above being taken directly from page 24, although with considerable summarization and editing by the present author. | |

in daily life are four times more likely to participate in formal and informal education than those with low literacy scores and who read infrequently in daily life.

* Earlier 2009 results show that 31% of Canadians participated in job-related non-formal training (which is of greatest interest in this context), about average for all OECD countries, but well behind the leaders. Moreover the participation of other countries was growing faster than in Canada.
* While fully consistent data are not available, it appears that Canada also ranks high internationally in terms of the percentage of non-formal training provided by directly by employers. 40% of the non-formal education and training of those 25 – 64 was provided by employers in 2012, well above the OECD average of 30%.

However, when compared with our largest competitors, such as the United States, we are lagging behind in some area of skills upgrading. In other words, whatever is wrong with employer-based skills upgrading in Canada is shared, to a greater or lesser extent, in many other countries. Moreover, other countries are also actively looking for solutions. The traditional policy prescription in cases such as this, namely that we need to do better in order to maintain and improve our competitive position, is almost certainly correct – although Section 10 suggests that the new Skills Agency may wish to sharpen analysis in this area.

# Employer-based literacy training – near a tipping point?

Part of the reason for lack of employer-based literacy training relates to the different human resources strategies of low-skill and high-skill employers discussed in Section 4. However there still appear to be many cases where it would be in the clear interest of employers to upgrade the literacy skills of their employers.

We seem to be near a tipping point that could result in a surge of employer-based training:

* The evidence is now available which shows that the costs of essential skills training to employers (and associated problems such a fear of poaching) will be clearly offset by the benefits from such training.
* The UPSKILL experiment discussed above demonstrates that this is so for the hospitality industry. Informal discussions employers have also suggested that there is much potential for literacy skills upgrading in the financial sector.
* Many steps have already been taken to strengthen other avenues for increasing the literacy and other skills of workers, as witnessed by recent efforts to bring government-sponsored adult training more into line with the needs of employers.
* Sector councils and similar bodies have long played a leadership role that could be quickly strengthened.
* The evidence on skills mismatches discussed in this paper and by internationals bodies such as the OECD means that relying on the education system to fix the problem is not a solution. (Even if their average skill levels were rising, current cohorts of school graduates are simply too small to have a material impact on aggregate literacy skill supply).

What may be the missing link to push us past this tipping point is clear evidence that that essential skills training by employers actually gets results and is efficient and affordable.

Unfortunately, research has shown than much of the literacy skill upgrading that is currently being offered is of such poor quality that it leads to very low levels of skill gain. Even in programs that generate significant average literacy skill gain, one sees very high levels of variance in skill gain across programs.

Even more problematically, that research also suggests that literacy skills gained through workplace instruction were ephemeral. In some work places, when workers were re-tested 6 months after the completion of skill upgrading, half of the literacy skill gained had evaporated. Analysis suggests that this skill loss is directly linked to the fact employees are not afforded an opportunity to apply their newly acquired skills even in jobs that notionally require the non-routine application of literacy skills at Levels 3, 4 and 5.

Together, these findings suggested a need to improve the efficiency and effectiveness of instructional programs. Happily, a workable approach has now been developed[[32]](#footnote-32) that yields consistently high levels of literacy skill gain at a reasonable price. The instructional recipe that has emerged is described in Box 11. The systematic application of this approach to instruction

*Box 11. A new approach to affordable, efficient literacy skills training by employers*

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| ***The instructional recipe that has been proposed***   * Work with the employer to identify business issues that might be addressed through literacy and numeracy skill upgrading. * The profiling of the levels of literacy and numeracy demanded of workers. * The development of curricula that explicitly focuses instruction on the factors that underlie and predict the relative difficulty of reading and numeracy tasks and that includes authentic occupational content. * The systematic assessment of learners at the point of intake to clarify their learning needs and to adjust the instructional focus to better fit the learner’s needs. Assessment results are also used to generate a score report for learners that serves to increase learner motivation levels and to generate a customized training proposal for the employer that includes information on instructional costs, expected benefits and implied rates of return on investment that serves to engage the employers. * The delivery of instruction by skilled and experienced instructors who receive 3 days of focused training on the assessment and instructional framework, training that equips them with the ability to introduce authentic content that maintains the link to the factors that underlie task difficulty * The active management of instructors and instructional quality. Instructors are obliged to reflect on instructional goals before and after each instructional session and to adjust the content and pace of instruction accordingly. * The systematic assessment of learners at the point of program exit, data that is used to generate a | score report for learners, a summary report for the employer that reports average skill gain and skill gain distributions and an analysis of instructor efficiency and effectiveness by instructor   * The partial reimbursement of employer’s training costs by government where the size of the proportion of training costs reimbursed depends on the average level of skill gain realized. These payments were designed to increase the level of employer engagement and to create incentives for training providers to realize significant skill gain. * Work with employers to ensure that workplace organization, processes and technologies are configured in a way that ensures that the newly created skill gets taken up and put to productive use. This element helps to reduce the rapid loss of skill observed when trainees return to jobs that do not provide them with an opportunity to apply their skill.   ***The results of a pilot test of the new approach***   * In terms of effectiveness, 15 to 30 hours of instruction generated average skill gains of 16 to 26 points, enough to move most learners from Level 2 to Level 3. * In terms of efficiency 15to 30 hours of instruction generated additional skill at roughly half the cost per point of conventional provision. * In terms of equity, the active management of the learning process reduced the variance in skill gain significantly within and among programs. * In terms of durability, the work with employers on the skill demand side reduced the level of skill loss experienced in earlier studies, something that should increase returns on investments in skill upgrading. |

was piloted in the Alberta Workplace Essential Skills Society ‘Skilling Up’ pilot, which has yielded impressive results. These too are summarized in Box 11.

These results, once they are properly marketed, should be sufficient to encourage other firms or sectors to follow this model without government subsidies. Certainly, if any government subsidies are involved, they should include commitments that the training follow this, or comparable, models. To anticipate the next section, governments, as the primary financiers of literacy skill upgrading in the unemployed and out of the labour force populations, should oblige the training providers who they fund to provide literacy training to apply the full instructional model.

# ARE GOVERNMENT DOING ENOUGH TO SUPPORT SKILLS ACQUISITION AMONG ADULTS?

In this section we examine the role of governments in supporting two quite different kinds of skills acquisition. One is the often expensive training and other interventions that are provided to unemployed people and other jobless people who often need significant support to gain the skills needed to enter or re-enter the work force. The other is the often inexpensive information provided to citizens that will allow them to undertake training on their own to improve their labour market prospects.

* Section 9.1 discussed a new technology based on big data and predictive analytics that has the potential to radically improve the effectiveness of Active Labour Market Programming.
* Section 9.2 describes how this same technology can transform this information that individuals, including both workers and post-secondary students, can use in taking better control over their own skills acquisition trajectories.

# The transformation of Active Labour Market Programming

The most complex and costly kinds of adult training can often be found in government-supported programs for those who are unemployed or out of the labour force. Literacy and other essential skills training can be a component of the ‘active labour market programs’ (ALMPs) that are design to help these people get jobs – and often get off Employment Insurance or social assistance. However, often essentials skills will be only part of the package of ALMP interventions. Other dimensions may include job search skills, occupational skills, a variety of more general life skills, counselling, subsidized on-the-job training, and/or mobility to supports to help the participant move to areas where their skills may be in greater demand – together with associated income support.

Canada has a long history of ALMP programming and has often been a world leader, including in the evaluation of these programs. Evaluations have shown that well designed ALMPs are cost effective – but not by much. Often one finds success rates in the 55 or 65 percent range, meaning that in even in the best of these projects, significant numbers of participants did not gain or were even worse off as a result of participating.

Fortunately, ICT technology has reached a point where we are on the brink of a deep transformation in the delivery and assessment of training and related means of supporting individuals in acquiring skills through ALMPs. Big data and predictive analytic tools, which are now well established in many other areas, can now be used to calculate the probabilities of success of different kinds of training (or other intervention) at the level of particular individuals and in real time, i.e., at the time the decision is being made to undertake the training in question. These ‘what is likely to work best’ techniques can be used by the trainee, by the project administrator and by those who design interventions in order to develop a learning system that will gradually improve over time based feed-back loops which show what has been working best in different circumstances.

The opportunities for moving to an individually-based, ‘what works best’ approach are described at greater length in Hicks (2015) which also includes supporting papers that provide details and outline next steps. Box 12 is based on material in that paper, including borrowing many of its words.

# The same technology can radically improve labour market information for individuals

Today, a similar but improved technology can also be used to provide ‘what is likely to work best’ data not only to counsellors and case managers but also to individuals themselves, allowing people to take greater control of their skills acquisition pathways. The same technology will also provide vastly richer labour market information (known as LMI) to analysts and researchers. In essence, the main users of LMI in the future will be individual citizens and their advocates, with LMI directly supporting the individual decisions of both participants and those who provide the training and related services. The basic idea is that citizens will be able to get real-time information that is tailored to their individual circumstances on which types of actions that are open to them are mostly likely to get good labour market outcomes, based on what happened to similar people in similar circumstances in the past. Hicks (2015) described

Box 12. Big data and predictive analytics: the coming transformation of Active Labour Market Programming

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| The predictive analytic technology is most advanced in areas such as active market programming that provides training, counselling and practical work experience directed to people who are unemployed or otherwise in need of assistance in entering or re-entering the labour market or moving to better jobs. Progress is easiest here since there is quite good information on inputs and processes (e.g., the kind of training or intervention that is provided and its costs) and even better information exists on outputs and outcomes (such as information from tax files and other administrative sources on the subsequent employment and earnings of trainees and on their subsequent need to rely on programs such Employment Insurance).  The technology has been tested. In the 1990s, the predecessor of Employment and Social Development Canada (ESDC) played a world-leading role in developing and piloting a highly individualized, evidence-driven approach to the delivery of active labour market interventions. Their initial pilot study created a nine-year longitudinal file drawn from some 19 provincial and federal administrative datasets, covering more than 10 million clients across time. The data was cleansed in order to anonymously track clients against 250 different variables and outcomes, using tax, EI and other administrative records. From this combined dataset, the department was able to develop various equations that would estimate ‘what will work best’ for different types of clients, in different regions.[[33]](#footnote-33) This data could then be used to make appropriate referrals to each of the 25 ALMP interventions that were available in local areas at that time. The techniques that were used underwent a number of iterations based on lessons learned but, by the near the end of the decade, they were working sufficiently well that full-scale implementation was possible. | The system was designed such that an employment counsellor fed information about a client sitting in front of him or her into the database and, a few seconds later, obtained information about the type of available ALMP intervention that would likely work best for that client. The calculation of outcomes was based on information about the subsequent employment, earnings and receipt of social benefits of earlier participants based on characteristics that best matched the client. The system could also produce management information about what kind of interventions were working best overall and which were in greatest demand. Although crude by comparison to today’s standards, the calculations were still significantly better than anything that was otherwise possible at the time.  The pilot was abandoned for a variety of reasons that are described in more detail in Hicks (2015). However, it could be readily re-introduced in an even more powerful form through initially small-scale pilots as part of the federal-provincial-territorial labour market agreements that now exist in Canada[[34]](#footnote-34). In many ways, doing this would be an ideal way of introducing the technology gradually and on experimental basis, where one could learn from the experience of a small number of initial trials that could be gradually extended to other ALMPs and eventually to other forms of skills acquisition and, indeed, to other forms of service.  There would be large payoffs from the early, experimental, introduction of evidence-driven ALMPS in a few areas. The micro-level evidence that is used relates not only to individual outcomes, but also costs, processes and outputs. This means that, if well managed, it can evolve into an open, transparent system where, lessons learned can be readily transferred to other applications. This provides balanced, consistent evidence for all those who participate in the delivery system. It allows the development of feedback loops such that the quality of interventions improves over time – learning from the results of earlier experience. |

how this can eventually lead to the development of more efficient markets for the provision of skills acquisition services.

***And can be used to* calculate which postsecondary programs work best**

The technology can spread to other forms of skills acquisition as well. For example, in some areas of postsecondary education, we are getting close to having the data needed to trace students’ educational and learning pathways to calculate which pathways work best for whom, and to calculate returns to investments in particular fields of study.

For example, the Education Policy Research Initiative, a national research organization based at the University of Ottawa, has used administrative student data held by 14 post-secondary education institutions in four different regions of the country linked to tax files at Statistics Canada in order to track students’ post-graduation earnings from 2005 through 2013. This technology can be developed to provide good ‘what is likely to work best’ information that can guide students in their choice of field of study – at least as it relates to their subsequent experience in the labour market. The next steps in this kind of tax linkage research could include broadening the analysis to eventually include graduates from all post-secondary institutions, and digging deeper into the data to improve our understanding of how specific student characteristics and schooling experiences affect graduates’ earnings trajectories (Finney 2016).

In other areas of education, where outcomes are often far in the future and where outcomes cannot be so easily formulated and measured, we are far from being able to calculate probabilities of success at the level of particular individuals. Likely that will never be possible in many areas. However, that should not be an obstacle in moving forward on developing individually-based, evidence-driven approach in those areas where it is feasible, especially at the post-secondary level.

The New Skills Agency could play a most useful role in facilitating progress on these fronts, as will be discussed in the concluding chapter.

# CONCLUSION: IMPLICATIONS FOR THE NEW SKILLS AGENCY

As described in the first section of this paper, our goal has been set out the best answers that are now possible to a series of question about how policy-makers can use newly-developed understandings about the acquisition and use of essential skills (literacy or learning-to-learn skills in particular) to improve Canada’s wellbeing, particularly its economic well-being.

The goal was to help the New Skills Agency in planning its initial work plan, and developing its partnerships arrangements, by identifying gaps in the answers to these questions that it might help fill. A related goal was to suggest that the New Agency itself develop a more coherent narrative that encompasses the many strands of a skills story presented in this paper. This will not be simple, but the effort could help develop a sense of vision that would be internally useful, that could encourage transparency and public support, and that would underpin its essential partnership arrangements.

In this concluding section, we simply re-cast some of the main themes of the paper in light of these goals.

* Section 10.1 describes the need to create an empirically-based narrative that encompasses the often negative implications of research based on Canadian data and the often positive implications of research that compares Canada with other countries.
* Section 10.2 discusses the need to create a persuasive narrative about the market for skills that puts the demand and supply of skills in the context of an often complex and sometimes conflicting story that explains the inter-relationships among skills, earning, productivity and the different human resource strategies of employers. It would encompass the largely unfamiliar story of older workers as a major source of skills.
* Section 10.3 points out that a skills agenda has been edging towards the center of the policy stage for decades, but that it has been held back by lack of data and analytic tools. We are not quite ready for an evidence-based skills policy, but we are getting close. The section suggests that the New Skills Agency has an important role in making this happen.
* Section 10.4 discusses why the New Skills Agency might wish to play an active partnership role in promoting employer-based literacy training. The payoffs are potentially high and the agency might well add considerable value added by situating these initiatives in an overall strategic framework that also involves action by governments.
* Section 10.5 outlines the possibility of similar partnership role for the agency in supporting the use of new techniques of big data and predictive analytics that hold promise of gradually transforming approaches to providing labour market relevant skills to both those near the bottom and top of the skills spectrum.
* Section 10.6 concludes.

# Reconciling national and international perspectives

One challenge lies in the seeming inconsistency in the narratives that arise from analysis of the Canadian data in isolation and analysis that makes international comparisons.

The Canadian data point to seemingly major problems with a correspondingly large need for policy responses. These include, for example:

* The disappointing lack of success over recent decades in creating higher levels of literacy skills in the school system, especially given our large investments in postsecondary education. Only some of this can be accounted for by compositional effects such as aging or the increasing number of immigrants that do not have English or French as a second language. It is hard to avoid the conclusion that there may be basic problems in the education system itself, if indeed literacy skills are as important as the research seems to suggest.
* The mismatches that occur in the workforce with large numbers of people over-qualified and under-qualified in light of the literacy skills demanded for their jobs. The analysis in this paper suggests some reasons for this. Employers do not know a person’s literacy proficiency before hiring them. Demand, in the real world, is not only for literacy skills in isolation, but for a mix of different skills. Nevertheless, given the foundational nature of literacy skills, the extent of these mismatches seems to be much larger than one might expect even after making allowance for factors such as these.
* Employers seem to undertake essential skills upgrading of their employees to a much smaller extent than the data suggest would be in their own best interests.

On the other hand, international comparisons using the same kinds of data often tell a different story, one that mainly emphasizes the strengths of the Canadian system. Our adult learning system, taken as whole, seems to be at least near the middle of the pack in international comparisons, and our educational systems are near the top in terms of most proficiency scales. Literacy proficiency overall, including among young people, remains very high internationally and other countries have shared our lack success in making large improvements in these scores over time. Similarly, we compare quite favorably with most other countries in terms of the over-and under-utilization of literacy skills in the labour market.

Our traditional stance in reconciling what seem to be competing narratives is to say that our relative success internationally is no reason for complacency. We can always do better and doing better will improve our overall competitive position. As well, other countries are starting to improve their position and unless we take steps we will fall behind. There is no doubt that there is much truth in this rationalization of the two stories. Nevertheless the urgency of reform seems a lot less pressing based on international analysis than it does when looking at Canadian trends in isolation. And the rationalization seems a bit hollow without an examination of which countries are starting to do better in which particular areas and how this could actually change overall competitive positions.

The New Skills Agency might consider that one of its priorities might be the development of a consistent narrative that would use a comparative approach to show the severity of skills challenges and the potential of the skills opportunities that are open. This would certainly include international comparisons but would likely put these in a much richer context that also encompasses comparisons across provinces and regions in Canada, sub-national regions in other countries and comparisons based on industry and occupation as well geography. It might also launch a public process that establishes Canada’s collective economic and social objectives for the next decade and what skills investments are required to realize them.

# Understanding the market for skills

As noted, some 20 years ago the first international data on literacy set up a discussion that mainly centered on labour supply, particularly the skills that were produced the education system. As the data became more complete, a new story emerged that placed emphasis on skills losses as well as on skill gains. If skills are not used, they will be lost. The result is wasted potential both for individuals and to the economy, and a reduction of the benefits from the large investments of time and money that individuals and society have made in education.

The new emphasis on skill losses opened new avenues for investigation but it also had the unintended effect of reducing the pressure on the education system to improve the literacy skills of its graduates. There appears to be lots of room in the economy for people with both high and low skill levels and the data on large skills mismatches suggest that employers do not make effective use of the skills that are acquired.

The empirical evidence points both to persistent loss of skills through underuse and also to longer-run trends towards an increased demand for higher-level learning-to-learn literacy skills. While the two are not incompatible, it can be difficult to reconcile them in a persuasive story about the importance of skills to support competiveness, innovation and prosperity in a competitive international market. The argument of this paper, and of the OECD, is that a simple narrative based on aggregate literacy data, misses the fact that firms follow quite different strategies with respect to skills. In reality firms are on spectrum ranging from those that follow low-skill, low-wage competitive strategies to those that follow high-skill, high wage strategies. The ‘dumbing down’ strategy adopted by firms may, in fact, be a sensible response to the rapidly rising wage rates of workers with the required skill level.Little is known about the effects on the supply and demand of skills as a result of shifts over time in the balance among these two types of competitive strategies – and how these impact on overall earnings, productivity and wage inequality.

Traditional narratives have also failed to take account of the most dramatic shift in labour supply in the past twenty years – the rapid growth of employment rates among men and women in their 60s and the likelihood that this trend will continue for more than a decade into the future as the large cohort of baby boomers move into traditional retirement ages[[35]](#footnote-35). Many of these workers are skilled and experienced, again providing a source of supply that reduces the need for supply from young people or immigrants. This trend is obvious in the data but fails to reach most policy prescriptions – and they thereby miss important consequences such the effects of reduced demand for at least some of the skills of young people and, particularly important, the likely effects some 10 or 15 years from now when the older baby boomers will no longer provide such a large supply of skills.

Persuasive analysis that encompasses all of these factors will not be easy to construct yet doing so is essential if the work of the New Skills Agency is to be relevant to policy. It will have to construct its analysis of the supply and demand for skills in a broader economic context that also encompasses broader themes related to wages, productivity and the human resources and the strategic behaviours of firms. It will likely be necessary to create scenarios of how the future is could unfold, including making different assumptions about the sources of labour supply. The agency itself cannot be staffed to provide the needed expertise in all these areas. This raises obvious issues for the agency about how it undertakes its research, its partnerships and its capacity for developing scenarios about the future.

# The incomplete transition to putting skills at the centre of policy: the lack of needed data and analysis

For many decades policy, and the data and analysis to support policy, have increasingly recognized the importance of skills and competencies, especially generic or essential skills. This has been a major theme on educational, human resources and economic agendas worldwide. There have many reasons for this, including the recognition that the nature of work is changing rapidly in today’s global knowledge economy, along with the skills and competencies needed to undertake that work. Greater concern over labour mobility, and hence the need for common certification of skills, has become increasingly important in countries such as Canada that rely on immigration as a major source of labour supply and hence need an effective system for recognizing credentials and skills gained abroad. The need to promote effective mobility across EU countries has been a major global factor in the drive towards competency-based systems for measuring skills. For years, the problems faced by many young people to make a successful transition to the labour market has continued to create concern about the seeming failure of the education system to provide skills that match those needed in the workplace. As described in this paper, the past several decades have also seen much new attention paid to the problem of skills mismatches in the workforce.

New data and analytic tools have been gradually moving to a skills basis in response to this new interest. For example occupational classification systems have gradually moved to a more skills basis over the decades. The movement towards competency-based human practices in the private and public sectors was particularly strong in the 1980s and 1990s, as witnessed by the move towards skill-based job descriptions, hiring practices, and skill-based pay systems. In recent years, Europe has developed competency-based frameworks that link the worlds of education and work. The steps described in this paper towards directly measuring generic and essential skills have been an important part of the transition.

The New Skills Agency will likely want to take stock of where Canada now stands in this transition to a skill-based approach to human resources policies, both in government and in the private sector. It will want to carve out a clear role for itself in accelerating further evolution, taking account of the multiple dimensions of this transition. For example, in terms of developing the data and analytic tools that are needed to support skill-based policy:

* We have only a handful of direct readings of trends in essential skills over the past couple of decades, compared with the rich monthly and annual readings of characteristics such as labour force status, time use, occupation, industry or educational attainment. These scattered reading whet policy interest but are inadequate to support day-to-day policy decision-making in the many areas that could potentially gain from having a skills dimension, including decisions by organizations representing employers, workers and educators as well as governments. There is likely no simple, affordable magic fix on the near horizon. However, significant progress could almost certainly be made by a coordinated strategy of incremental data development and collection, including the use of techniques such as synthetic linkages of skills data to existing data sources and the projection of results to small populations and geographic areas.
* While there is a need for much more data, we still do not know how to effectively use the data that is available. It is always hard to make a convincing case for expanding data when existing data is not being fully used. For example, this paper has attempted to tell a relatively simple story by using what we have argued is the most fundamental of the new measures of essential skills – literacy proficiency. However, many other measures that are now available (such as numeracy, or problem solving or digital literacy) may be more appropriate in other circumstances. And even more potentially valuable information could be on the reasonably near time horizon, such as skills related to team work and leadership. Yet the existing readings are simply not being well used, either separately or in combination.[[36]](#footnote-36)
* Governments spend vast amounts of money in funding the education system, and in active labour market programming that provides skills to those who are unemployed or are otherwise in need of skills upgrading. This spending is, by and large, not associated with any accountability or assessment measures that take account of the effectiveness of that spending in terms of increasing the skills needed in the labour market, including literacy and other essential skills.
* Perhaps most centrally, Canada has seriously fallen behind other countries, especially in Europe, in developing the standard competency frameworks that are needed to provide a common approach to programs and practices related to skills. These provide standard, practical ways of describing both the skills that are held by individuals and the skills required by jobs. Given the importance of immigration and of pan-Canadian labour mobility, the lack of a comparable framework here is embarrassing; inter-provincial barriers appear to have been more difficult to breach than the inter-country barriers of the EU. However the good news is that we can now learn from the experience of others. The Canada West Foundation has, for example, provided a clear roadmap, including suggestions for next steps (Lane and Griffiths, 2017). In addition, application of tools such as Vametric’s Valid-8 system[[37]](#footnote-37) for certifying technical competences could greatly increase labour mobility.

These are major challenges and ones that involve many existing players. The New Skills Agency cannot, we think, avoid being a central player on issues such as these that are so near its central mandate. However, it equally cannot take ownership for all these difficult issues; its role must support and strengthen the role of the other actors that must necessarily be involved. The agency will likely want to give a good deal of thought at the outset of its mandate on how to achieve the right balance, and to form the right partnerships.

# Low-hanging fruit: literacy upgrading by employers

Automation and globalization will continue to reduce the demand for workers with literacy and numeracy skills below Level 3 and to increase the negative economic and social consequences associated with having inadequate levels of skill for individuals, firms and macro-economic performance. The earlier analysis suggests that some of the reasons for this lie in the human resource practices of employers. Some employers are coping with global shifts in ways that are suboptimal from the perspective of the economy as a whole, namely by dumbing jobs down to cope with large proportion of low skilled workers in their labour force and to avoid the high and increasing costs of recruiting workers with the required level of literacy skills. Some employers (not necessarily the same as in the group above) are failing to upgrade the skills of their existing workers even though the last section described a newly developed and tested training operation that will work well.

The New Skills Agency may wish to play a role in encouraging employers to adopt this new training agenda. It likely falls into the category of harvesting low-hanging fruit since, once it has been tried by a number of employers and shown to work, it could catch on quickly and spread through different industry sectors. This might require the development of a strategy directed not only to employers but also to government.

Canadian firms have seen it as the government’s role to provide them with the skills that they need and have, as a result, invested relatively little in skill assessment and upgrading. As part of an overall strategy that the New Skills Agency could help develop and promote, governments might be encouraged to induce firms to invest more in adult skill assessment and upgrading by:

* Providing firms with information on the costs, benefits and rates of return on investment associated with literacy skill upgrading.
* Subsidizing assessment and/or skill upgrading in special circumstances when this is clearly needed and where it does not discourage employers from funding their own training.
* Obliging the training providers that they fund directly to follow the “best practice” training recipe described above,
* Creating a nationally recognized set of Essential Skills credentials.
* Using its financing of the education system to encourage that system to reduce the number of youth leaving the system with literacy skills below level 3.

The New Skills Agency could also provide evidence-based information to governments on the type of training that is most needed. In this paper we have concentrated on literacy training, but in some situations numeracy or other essential skills training will be important. Governments also hear calls to increase levels of investment in STEM (Science, Technology, Engineering and Mathematics) skills and the so called 21st Century skills. The New Skills Agency might assess the evidence on which these demands are made. As important as these skills are conceptually, it would appear that there is little empirical evidence of skill shortages in these domains. Perhaps more importantly, it is difficult to imagine that the supply of these skills could be increased much without reducing the proportion of workers with literacy and numeracy skills below Level 3. The New Skills Agency might wish to support research in this area, or encourage others to do so.[[38]](#footnote-38)

If only one government department were involved, then there might be little need for an active role by the New Skills Agency. It might just get in the way. However, several departments in most both orders of government have roles to play and the new agency might well add considerable value as a partner that can help bring things together.

# Evidence-driven skills acquisition: launching the transformation

Section 9.1 described an opportunity related the use of newly available big data and predictive analysis that will soon be able to transform the complex learning involved in Active Labour Market Programming and, in the not too distant future, to link post-secondary studies with the likelihood of future success in the labour market. The New Skills Agency might consider playing a role in an endeavor that could simultaneously support several different skills agendas:

* The development of far more effective ways of acquiring labour market skills in ways that could have large, visible payoffs in the medium term.
* The transformation of Labour Market Information by putting skills at the heart of a new citizen-centered, individually-tailored, real-time approach to providing that information.
* The use and development of leading edge data and analytic tools such as big data, predictive analytics, and micro-level analysis of longitudinal data drawn from both surveys and administrative sources.

The real puzzle associated with the transformation of active labour market programming described in Chapter 9 is why it has not already happened. The challenge is not in the technology, which was successfully tested (in a more rudimentary version than is now possible), some twenty years ago. Nor is it a matter of cost; funding can be handled using/adapting existing labour market agreements. Hicks (2012) argued that earlier development work stopped:

* For jurisdictional reasons (the shift of ALMP delivery from the federal government to the provinces, but with the federal government necessarily having a continuing responsibility for the administrative data that is needed for the big data and predictive analytics to work).
* For reasons related to privacy (that were never large and that have been since overcome).
* As a result of cyclical shift away from evidence-based policy and corresponding shift in strategic policy thinking away from longer-run issues of effectiveness and experimenting with new directions in favour of a safer, incremental approach based on status quo arrangements.

Things have changed. The new challenge seems to lies in developing the leadership and partnerships to move ahead, particularly in establishing a strong capacity to develop and manage the central information systems that are essentially to the success of an otherwise highly decentralized period of development and experimentation. This is an area where success depends on effective partnership among the provinces, the federal government, the non-governmental organizations and colleges who can provide individual interventions, and with employers. Moreover the project spills over into many other areas including quite radical implications for Labour Market Information programming, for the longer-term role of the national statistical agency, and for open government generally.

In summary the agency might play a useful role in partnership with many actors who appear to be currently without the coordination and leadership mechanisms leadership to pull together a practical implementation plan.

From one perspective, this is already a crowded field and it will be important that the New Skills Agency does not simply become one more actor that needs to be taken into account. From another perspective, the subject matter touches on fundamental issues for the New Skills Agency and it is hard to see it taking a back seat. Once again, we anticipate that finding the right balance between leadership and support will be a high initial priority for the agency.

# Conclusion

Our conclusion is that, in deciding on its initial priorities, the New Skills Agency should emphasize the development of comprehensive, empirically-driven policy narrative about the acquisition and use of skills and, in its selection of the specific initial projects to tackle, it should place attention on balance and partnership.

The balance in question could mean taking on projects that would promote both skills acquisition, skill recognition and skill use, and that would involve both immediate practical action and longer-term research. It would meant that some initiatives should have visible payoffs in the near future while others could lay the data and analytic foundations needed to gradually move skills nearer to the center of many policy agendas. Initiatives might cover skills acquisition that takes place through employer training, the education system and new approaches to individually-based skills upgrading.

Taking on a variety of discrete activities in many areas will help shape the partnerships that will need to be forged. A criterion for choosing the initial projects would be the value that the New Skills Agency could add in what is often a crowded field, with a stress on supplementing and supporting the work of multiple partners in all orders of government, in the private sector and in NGO communities.

The development of a comprehensive policy narrative, along the lines suggested earlier in this section, would provide the glue that holds that discrete projects and partnerships together. It would provide the overall vision that is needed.

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1. We bemoan the ‘literacy’ label since the new measures go far beyond traditional notions of the lack of ability to read and associated remedial educational programming. An ideal label would have focused on the foundational nature of these learning-to-learn skills for everyone, including their importance in the labour market. [↑](#footnote-ref-1)
2. The initial assessments found very few true illiterates. Rather they identified large proportions of adults who lacked the literacy and numeracy skill to cope with the daily literacy demands of work and life. [↑](#footnote-ref-2)
3. Development work is still needed in order to measure some generic workplace skills that were not included in the surveys: teamwork, ability to use information technology, practical intelligence and, even more difficult, a measure related to self-actualization or acting autonomously. [↑](#footnote-ref-3)
4. Much work was done in conjunction with the second round of international surveys to develop practical ways of measuring team work and practical cognition (i.e., common sense or street smarts, as opposed to what is learned in classrooms) since both are related to success at work and in life generally. These include many of the concepts associates with the so-called non-cognitive skills. However, at that time these efforts, which were based on exhaustive research and field testing were not successful. It did not prove possible to develop a method of measuring non-cognitive skills that met the same high quality standards that applied to measures of literacy, numeracy and problem-solving. [↑](#footnote-ref-4)
5. Since skills are lost through lack of use, policies that influence time spent on the job can also play a role. Examples include Employment Insurance, social assistance, child care, and age of eligibility for retirement benefits. [↑](#footnote-ref-5)
6. Although not covered in this paper, health is also an area where there are measureable payoffs from increased levels of literacy i.e., the application of literacy and other essential skills to acquire and apply health information. Murray *et al* (2012) provide evidence that shows that health literacy influences both health status at individual level and disease prevalence at the level of health districts. As well, Individuals with relatively high initial levels of health literacy accumulate advantage over time whereas individuals with relatively low initial levels of health literacy accumulate disadvantage. [↑](#footnote-ref-6)
7. Section 4 describes how the skill level of jobs is determined. [↑](#footnote-ref-7)
8. For example, the third set of international surveys measured literacy levels among Aboriginal populations which were not as high as among non-Aboriginals, but with large differences across provinces and territories. [↑](#footnote-ref-8)
9. Compared with other countries, Canada scores at the top for both groups. However, since immigrants here and in other countries have lower literacy scores than native born populations, and since immigrants make up a relatively larger percentage of the Canadian population, the combined scores are only average compared with other countries (Parkin 2015). [↑](#footnote-ref-9)
10. The analysis is based on the 2011 data on the incidence of skill shortages discussed in the next section, which shows a premia on wages that rises with the level of literacy skill demanded by the job. However, this analysis, which controlled for many variables that could affect wages, showed that shortages had no impact on wage growth in jobs that demand only Level 2 literacy skill. The level of impact rises as the literacy level demanded by the job rises. [↑](#footnote-ref-10)
11. For example, there is no agreement on the precise factors that affect productivity growth generally or that answer more specific questions such as reason for the relatively low productivity growth in Canada compared with the United States. (Sharpe 2017, Drummond 2016). Possible factors, in addition to skills and human capital, include use of ICT technology, investment strategies, trade arrangements, managerial capacity, regulatory regimes, the balance of power among different groups of workers, errors in measuring productivity and other factors. There would be little disagreement that a necessary factor in supporting productivity growth would be the generation and use of skills that are needed in the digital age – at least keeping up with progress being made in other countries. However it is difficult to measure the extent of this directly using national data.

    One of the difficulties in examining the precise role of skills in relation to the other factors that affect productivity lies in the use of educational attainment as an imperfect proxy for skills. Clearer results may be possible in the future by using direct measures of skills, such as the literacy measures used in his paper. However this is not yet possible; direct measures of skills are not yet available at the disaggregated level of industrial detail that would be needed to support this kind of analysis. [↑](#footnote-ref-11)
12. The analysis reflects what is known in the literature as manifestations of “practice-engagement” theory that posits that, once acquired, observed skill level is a function of the incidence of use, the frequency of use, the range of content used and complexity of use (Reder, 2009). [↑](#footnote-ref-12)
13. When looking at groups of people, there are two reasons why measures might show losses of skills between any two years. One relates to changes in the skills of particular individuals within that group – acquiring new skills or losing skills that have been previously acquired. The other relates to changes in the composition of that group, say with more people in an age group having higher levels of educational or changes in the size of different age groups as a result of population ageing – for example as the large baby boom generation made its way through the educations system into the work force and now into retirement. Both factors are important in policy analysis but it is the former ‘use it or lose it’ factor that adds a new dimension to policy making and, as will be discussed later in the paper, it these factors, not compositional effects, that are the main drivers of the data shown here. [↑](#footnote-ref-13)
14. As well, the simple effects of demography may make the changes seem larger than they otherwise would. Two offsetting factors may be at play, although the data do not allow us to disentangle their effects. The lower literacy rates of older people are mainly the result of lower levels of educational attainment than younger people. However there was a large increase in the educational attainment of the large baby boom generations which was starting to move into this age group by 2011. Both factors are at play when comparing the age and educational structure *within* the 56 to 65 age group in the two years being compared. [↑](#footnote-ref-14)
15. Technically a supply measure includes the unemployed (those without work but actively seeking work) as well as the employed. Similarly, a demand measure includes the number of filled jobs plus the number of unfilled jobs that employers are actively trying to fill. The data to construct such measures are missing however and the data in this report refer to employees and filled jobs only, which show fundamentally the same longer-term trends and patterns. [↑](#footnote-ref-15)
16. Recollect, however, that many of those with higher skills at levels 4 and 5 who are not employed will be still in school or will be people who retired before age 65. [↑](#footnote-ref-16)
17. The same analysis was also conducted for ‘experienced employees’ which are defined as current employees plus those who no longer in the labour market, but who had held a job within the preceding 5 years. This provides a broader definition of labour supply. However the results showed almost exactly the same patterns as was the as for employees. [↑](#footnote-ref-17)
18. The North American Industrial Classification is used. [↑](#footnote-ref-18)
19. Additionally the author recalculated the OECD numbers so the literacy mismatches includes not only literacy mismatches in isolation but also mismatches caused by a combination of literacy with qualifications and/or field of study. [↑](#footnote-ref-19)
20. There are other gaps as well in the analysis of the Canadian data conducted this study, including the fine industry detail needed to examine productivity directly, the lack of variables relating to institutional factors such as the state of collective bargaining and supply side variables such as field of study. As well, there are questions about the occupational data that are addressed in the next section. [↑](#footnote-ref-20)
21. Green and Sand particularly cite works co-written by D. Autor, including Acemoglu and Autor (2011). [↑](#footnote-ref-21)
22. Here Green and Sand are citing Fortin and Lemieux (2015). [↑](#footnote-ref-22)
23. A decline in labour's income share and a deterioration of labour's purchasing power accounts for the remaining half. [↑](#footnote-ref-23)
24. Compare with the Green and Sand argument above that wage polarization only began around the year 2000. [↑](#footnote-ref-24)
25. It will also depend on an assessment of the extent to which policy actions will make a difference. This is where comparisons across jurisdictions, in Canada and internationally, are so important. It allows us to see whether policy has, indeed, made a significant difference in some jurisdictions. [↑](#footnote-ref-25)
26. The number of employees in each small occupational grouping was multiplied by the peak skills requirements that are associated with that occupation. The calculations were carried out using microdata files at the 4-digit occupational level. [↑](#footnote-ref-26)
27. The Educational Testing Service in the United States equated the IALS and PISA scales. [↑](#footnote-ref-27)
28. Data on shares of total employment can be misleading since it is the result of two quite different factors: changes individual behavior (individuals staying employed for longer periods) and demographic factors (the large numbers of baby boomers moving into their pre-retirement and then their retirement years). The behavioural changes are likely to persist into the future resulting in increasing supply of labour from older people. The demographic changes work in other direction shrinking the supply of older people in the labour market once large numbers of boomers reach traditional retirement ages. Hicks (2012) shows that if existing employment rate trends continue into the future, the behavioural changes will be considerably larger, leading to a significant increase in the supply of labour from older people. [↑](#footnote-ref-28)
29. Some, but not all, of the decline in scores is simply a selection effect (i.e., those who drop out likely had lower skills when still in school in 2003 and those who did not drop out increased their skills by further schooling). [↑](#footnote-ref-29)
30. Cost vary greatly depending on existing skill levels, but a market segmentation analysis showed that costs could be under $500 for simple cases, and under $5,000 for the most complex cases. Employers hiring workers with Level 4 literacy skills in the open market would be obliged to pay $7200 per year to get the skills they need. [↑](#footnote-ref-30)
31. Formal education is that which takes place as part of the regular operation of the school system such a obtaining a high school diploma, a college certificate or university degree. Informal education includes other structured learning including, for example, job training. [↑](#footnote-ref-31)
32. This approach was developed by SkillPlan, a nationally recognized leader in workforce development programs, working in partnership with DataAngel the company responsible for the Canadian research on which this present paper is based. For more information see <http://www.skillplan.ca/> and <http://www.dataangel.ca/> [↑](#footnote-ref-32)
33. For a more detailed overview of this pilot program, its history and why it was terminated, see Colpitts and Smith (2002). [↑](#footnote-ref-33)
34. ESDC continues to use similar, but updated, techniques in their current evaluation of these programs. [↑](#footnote-ref-34)
35. Indeed many accounts have got the story about the baby-boomers upside down. It is often argued, by those who have failed to look at actual employment rates of older workers, that the aging of the babyboom generation will result in a decrease, not an increase in the supply of labour. [↑](#footnote-ref-35)
36. To date much less analysis of the PIAAC cycle of assessment has been published than was the case with earlier cycles. [↑](#footnote-ref-36)
37. Valid-8 is a UK-developed software tool that does a legally defensible, authentic and inexpensive job of certifying technical skills and knowledge and managing the associated learning process. Although the system can use any form of evidence its innovative feature is its use of time indexed video to document competency. A UK government audit concluded that the use of the system reduced certification costs by 75% and time to full certification by 40%.  [↑](#footnote-ref-37)
38. It would be wise to undertake research that clarifies the conditional probabilities that link the acquisition of the full range of skills and their productive application in work and other contexts. Where strong conditionality exists investments in higher order skills will fail to yield much until the shortages of lower order skills – language, literacy and numeracy – are dealt with. [↑](#footnote-ref-38)