

*The Reading Comprehension Skills Needed in a  
Fully Performing Workforce*

**A BREAKTHROUGH IN UNDERSTANDING:  
POLICY CONSEQUENCES FOR ALBERTA**



**January 2010 revision**

This summary was prepared by Peter Hicks with input from T. Scott Murray on behalf of Alberta Advanced Education and Technology. The summary is based on a much more detailed technical report produced by T. Scott Murray and Richard Shillington, *Understanding the Literacy Market in Alberta: A Segmentation Analysis*.

## Foreword

The following report has been produced by DataAngel Policy Research Incorporated under contract to Alberta's Advanced Education and Technology.

The report compares estimates of the demand for literacy skill to estimates of the available supply of literacy skill to provide estimates of literacy skill surpluses and shortages by detailed industry and occupation for Canada and each jurisdiction.

The report also provides an overview of what instruction would be required to eliminate the revealed literacy skill shortages, first order approximations of what such instruction would cost and estimates of the direct economic benefits that might be precipitated if the requisite investments were to be made.

For questions or matters of clarification readers are invited to contact:

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**An important note to readers on the scope of the paper and its use of terminology**

In ordinary language, when we refer to the skills used in the work force, we usually think of the skills used in specific occupations – the skills that plumbers, or airplane pilots, or high school math teachers need in order to do their jobs.

These occupational skills are obviously important, but they are *not* the subject of this paper.

Rather, the analysis here deals with those generic skills that are needed in all occupations: skills such as reading skills, oral skills, problem solving skills, number crunching skills, etc. These are technically referred to as ‘essential skills’.

More particularly, the paper focuses on the demand for, and the supply of, what is perhaps one of the most important of these essential skills: ***the skills that workers need in order to understand and apply information gleaned from print.***

Such skills are important in their own right and for the impact they have on the acquisition of other essential skills and the ability of workers to apply their technical skills in the most productive way. Along with oral language skills the skill to understand and apply information gleaned from print are the ‘learning-to-learn’ foundation upon which the acquisition of other essential skills are based.

Such skills enable workers to address problems that range:

- From the simple (matching a word).

- To the most demanding (drawing inferences from a complex document full of conflicting information).

That is, we are going far beyond mastery of the mechanics of reading. The reading comprehension skills discussed here include the processes of applying reading to solve the full range of problems encountered in a modern workplace.

In the technical language of those who collect the data, these reading comprehension skills are usually referred to as ‘prose literacy’ skills. However, among people in the general public, this phrase either conjures up no image at all or, worse, it may seem to refer only to those people who cannot read at all, or can only do so with difficulty.

Accordingly, in this paper, we have used the phrases ‘*reading comprehension*’, or ‘*prose skills*’ or sometimes even ‘*literacy skills*’ as synonyms. We use them interchangeably to refer to the skills that are the subject of this paper – i.e., those skills that workers need in order to understand and apply information gleaned from print at all levels of complexity.

The paper is about the demand and supply of these reading comprehension skills in the detailed occupations and industries that comprise the Alberta economy. It is about the economic and social consequences that can result when demand and supply are not in balance. And it is about the remedies that are possible given the large imbalances that, in fact, were found.

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# 1. Introduction: summary and structure of the paper

## Summary

New data on the supply of, and demand for, essential skills by occupation opens the way to a much more nuanced policy analysis. The paper focuses on the skills that workers in Alberta have in using prose documents, ranging from the simplest kind of document to the most complex. We refer to these as 'reading comprehension skills' or as 'prose skills'. Key questions include:

*What is the current demand for these reading comprehension skills (what prose skills do Alberta employers need) – and how is that demand expected to evolve over the medium term?*

*What is the current supply of these skills (how many existing and potential workers have these skills) – and how is that supply expected to change over the coming decade?*

*Which occupations and industries face shortages or deficiencies in these reading comprehension skills (i.e., where there are not enough people with the prose skills to fill the demand)?*

*In which occupations and industries are there surpluses (where the workers have greater prose skills than are actually required by their jobs)?*

*What would it cost to eliminate the skill shortages or deficiencies in different occupations? Which shortages would require the largest investments? Which shortages would yield the highest rates of return? Who should pay for these investments?*

*What are the economic consequences of failing to eliminate the shortages in reading comprehension skills that are identified?*

The analysis shows that:

- The demand for prose skills is expected to rise over the coming decade in response to a shift towards more knowledge and information intense occupations.
- Significant proportions of workers have reading comprehension skill levels below the level demanded by their current occupations.

- Depending on the occupation, shortages range from 20% to 80% of current employment – enough to suggest that they have a significant impact on productivity growth.
- As an illustration of the magnitude of the possible effects of policy interventions:
  - If Alberta were hypothetically to use remedial education in an attempt to eliminate all the reading comprehension shortages identified, the cost would be \$1.6 billion.
  - If successful, an investment of this magnitude would have the potential to precipitate significant increases in wages – enough to yield annual rates of return that average an astonishing 500%, at least in our hypothetical 'best case' scenario where all the additional prose skills would be used in the labour market.
  - And the demand exists to support additional prose skill use at this level.
- However, in the real world, policy interventions will be needed on more than one front. Government can also help employers and workers in matching demand and supply by providing better information on the need for reading comprehension skills and by developing diagnostic tools, curricula and other learning materials.
- Most workers that lack the needed reading comprehension skills have incomes that are high enough to absorb the costs of remedial instruction. The case for government investment therefore rests on the assumption that workers and their employers will not invest rapidly enough to maintain competitiveness in the global economy. Left to their own devices firms might choose other means of adjusting to increased foreign and domestic competition such as outsourcing and reductions in wage and benefit levels. Only skill upgrading will ensure wage and employment remain at current levels.

## ***Background***

We are on the threshold of dramatic and unprecedented improvements in our understanding of the skills, aptitudes and abilities that lie at the heart of our economic performance and social well-being. In particular, in the past decade or so, we have learned new, often quite surprising, things about how the skills and talents of workers are used by markets to produce a competitive economy and balanced equitable economic growth.

It seems reasonable to expect that, over the longer term, quite new insights into such a fundamental dimension of our society and economy could have large consequences on the operation of markets and the lives of individuals. It would equally seem reasonable to expect that there would be dramatic and immediate effects on the public policies that support markets and individuals in using and adapting to this new knowledge.

In reality, however, the link between new knowledge and new policy insights is not straightforward. There is much inertia built into existing systems, often with good reason. It is important to understand the robustness and limitations of new knowledge before rushing off to change policy on the basis of what might turn out to be a superficial understanding, no matter how dramatic the new data first appears to be.

## ***Purpose of the paper***

The purpose of this paper is to help build a practical, empirically-based link between our radically deeper understanding about the role of skills and skill imbalances and the potentially large policy implications of that new understanding.

The focus is on Alberta, but with comparisons to other provinces and territories and to Canada as a whole.

### ***This policy summary is based on a more detailed background paper***

The paper is based on detailed research and analysis, including ground-breaking new research and segmentation analysis developed especially for this project. Accordingly, the paper is supported by a background report that provides all the background and supporting data.

**Note:** the background paper also contains important citations to the literature, the correct names of surveys and other notes. These have been omitted from the present summary paper.

The background paper has sections on various indicators in Alberta related to reading comprehension:

- The economic demand for reading comprehension skills.

- The supply of literacy skill.
- Literacy skill utilization, shortages and surpluses.
- What would be required to overcome current literacy skill shortages.

And has annexes that show:

- Statistical tables.
- References.
- Methods.
- Acknowledgements.

### *Structure of the paper*

**Supply.** Section 2 of the paper presents data on those skills of Albertans that are of greatest interest for the operation of Alberta's labour markets. The section starts, however, with a more general summary of the importance of the new knowledge on the supply of skills that has been rapidly developing in recent years, both here and around the developed world.

**Demand.** Section 3 turns to the demand for skills by Alberta's employers. Having both demand and supply data is critically important for policy-makers. If policies do not take both into account, they can lead us in wrong, and potentially costly, directions. The section explains why Canada is one of the few countries in the world with data on the demand for, as well as the supply of, skills – including both occupationally specific skills and the generic skills discussed in this paper. If we make good use of this new knowledge in our policy decision-making, this could put us in a strong comparative position.

**Shortages and surpluses.** Section 4 provides disaggregated information on the demand and supply of skills in specific industries and occupations in Alberta. It focuses on the efficiency of labour markets in making use of available prose skills. The findings here are based on new kinds of analysis developed especially for use in this project. They mark a major step forward in our understanding of where policy interventions are likely to be most useful.

**A wide-spread problem or one that is concentrated in at-risk groups?** Section 5 looks at the distributional dimensions of skill shortages in Alberta – including an examination of skill gaps analyzed by people's age, immigrant status, etc. Policy responses depend on whether the shortages are wide-spread across people with different demographic characteristics or concentrated among at-risk groups.

**Projections and implications.** Section 6 goes further in making the new knowledge policy-relevant by looking at future trends. Projections are made of both supply and demand of prose skills. The basic conclusion is that there will be a skills shortage that cannot be filled by traditional means. The section ends with a list of the kind of changes that may be required if we are to build the skills needed to support a strengthening of Alberta's (and Canada's) place in the competitive global economy.

**Raising skill levels.** Section 7 explores remedial literacy training for Albertans who lack the skills that will be required by the market. The analysis shows the costs and benefits of remedying skills gaps by specific industries and occupations and for key segments among the potential learners. It shows that rates of return on investments in literacy training would vary widely by industry and occupation – but importantly that all investments could potentially yield impressive rates of return. While the analysis is indicative only (since it is based on simplifying assumption that this is the only policy intervention that is used), it nevertheless points to impressive potential payoffs from policy action in the area of worker literacy.

**Policy conclusions.** Section 8 concludes with observations on the more general use of the new data and new analytic techniques in policy analysis. It then turns to an examination of practical ways of further improving the knowledge described in this paper, particularly in making it even more relevant for policy analysis. Finally it addresses possible next

## 1. Introduction: Summary and Structure of the Paper

steps in developing a strategic plan that describes possible policy responses to the challenges that have been described in the paper.

## ***2. The reading comprehensions skills of Albertan workers***

### ***The 90's saw a major breakthrough in understanding the supply of skills***

Policy can only effectively deal with things that are measured. Accordingly, the paper started by observing that, 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 took place in the mid 1990s with the conduct of comparable international surveys that, for the first time ever, measured central aspects of people's skills, aptitudes, knowledge and talents. They measured people's capacity to deal with prose and other documents at all levels of complexity. These 'learning to learn' skills represent a large and central part of the total skills set that research had shown to be important in the labour market (and indeed in all dimensions of people's lives).

Canada supplied much of the leadership for this hugely successful and innovative international venture. It used highly-sophisticated, carefully-researched tools to ensure comparable results across countries and across provinces in Canada. Until the 1994 surveys, the only consistent measures of skills that had been available were based on crude proxies (e.g., educational attainment, or occupation, or length of experience) that provided no real understanding of how skills were acquired and applied to economic and social ends.

### ***... with the key data for policy coming from a subsequent round of surveys in 2003***

Canada again played a leadership role in mounting a second wave of international skills surveys in 2003. These surveys marked another big step forward by:

- Allowing analysts to make comparisons with the earlier round in order to get a sense of how fast skills were changing.
- Extending the definition of skills to include not only prose and document skills but also problem-solving skills and skills related to understanding and using numbers. We are now much closer to being able to measure all the generic skills that research has shown are used throughout the labour market<sup>1</sup>.

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<sup>1</sup> 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



### ***Box 1. The 1994 results: stage-setters for policy***

The first wave of surveys in 1994 did, of course, not have a large immediate effect on policy. It took researchers and analysts time to digest the results and to start probing their implications for policy. And there were many new things to learn:

- New light was brought to bear on the considerable differences in the results by geographic area, by different population groups (e.g., by immigrant, aboriginal or linguistic status), and even – perhaps surprisingly – by educational attainment level.
- Some of the conclusions (for example, that skills levels were very much a matter of ‘use it or lose it’) corresponded with common sense, but were difficult to integrate into traditional policy discussions that assumed that skills, once learned, were a static commodity.

Further, it typically takes more than one reading before one can be comfortable in considering major policy changes based on new data. It is important to verify the results and to see whether things are getting better or worse.

For example, comparison of data from the 1994 and 2003 assessment cycles yielded a remarkable and unexpected finding.

- Despite significant increases in educational participation at all levels, the analysis revealed no change in average skill levels. Something was eroding the supply of skills.
- Massive skill loss in the adult population turned out to be the culprit – our first hint that the level of social and economic demand for literacy skill use was below that needed to make full use of the available supply.

### ***The surveys had an unfortunate title, one that continues to hinder understanding***

The results of the 1994 surveys were well-reported in the press and became quickly known in policy circles. However, their practical application in labour market and economic policies was hindered by the unfortunate name given to the surveys (a name that is, unhappily, still in use). They were called ‘adult literacy’ surveys.

While technically correct, this use of the word ‘literacy’ gave the initial impression that the focus was on low skills – on people who could not read or who had difficulty reading.

And, indeed, the surveys did much to help us understand the characteristics of those with low literacy skills. These were important findings.

However, it took a large and only partly successful marketing effort to explain that the surveys were focussed just as much on the characteristics of those with middle and higher level skills – i.e., that the surveys were not only about whether people could read, but rather how well people at all skill levels could understand and apply the content of the material that they had read.

### ***Alberta looks good ...***

In 2003, Alberta scored above average on all four skills dimensions:

- ***Prose skills*** – or what are referred to in this paper as ‘reading comprehension’ skills. This is the knowledge and skills needed to understand and use information from texts including editorials, news stories, brochures and instruction manuals. Alberta scored 289 on this dimension using a scale that runs from 1 to 500. This is above the average Canadian score of 281.
- ***Document skills***. This is the knowledge and skills required to locate and use information contained in various formats, including job applications, payroll forms,

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intelligence and, even more difficult, a measure related to self-actualization or acting autonomously.

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transportation schedules, maps, tables, and charts. Here Alberta scored 290, higher than the average Canadian score of 281.

- **Number skills** or numeracy. This is the knowledge and skills required to apply arithmetic operations, either alone or sequentially, to deal with numbers embedded in printed materials, such as balancing an account, figuring out a tip, completing an order form or determining the amount of interest on a loan from an advertisement. Alberta scored 281 compared with the Canadian figure of 272.
- **Problem solving.** These are the skills involved in goal-directed thinking and action in situations for which no routine solution procedure is available. The understanding of the problem situation and its step-by-step transformation, based on planning and reasoning constitute the process of problem solving. Alberta again scored 281, compared with Canadian average of 274.

Alberta was not alone in scoring highly. Saskatchewan, British Columbia and the Yukon all scored higher than the Canadian average. There are clearly many skilled people in the west of the country.

Moreover, Alberta scored well in international comparisons as well, both in the mid 1990s and again in 2003. The scores for Alberta were in the same range as Norway and Bermuda which were the highest scoring countries in the 2003 round – and were well above those in the United States and Italy.

### ***... but are these scores good enough?***

Things therefore seem to look good when we look at the big averages. But are they good enough? Much research has shown that high level skills are related to economic growth and prosperity. Research has also shown that the cut-off level for the skills needed to fully function in today's labour market (and in society generally) is 276 points out of the 500 points. The Alberta averages are above that, but not by much.

For example, we find that some 40% of Albertans have prose scores of 275 or less and 48% have less than adequate skills in using numbers. This suggests that these Albertans would have less than adequate skills for fully functioning in today's knowledge society. While these percentages are below the Canadian average (48% and 54% respectively), there has been relatively little change in skills levels compared to the 1994 survey. In other words, Alberta may look relatively good when compared with others, but there are still large challenges.

In other words, Alberta may look relatively good when compared with others, but there are still large challenges.

The purpose of this paper is to provide a deeper exploration of the challenges, and opportunities, of these statistics for policy-makers, particularly with respect to their implications for the labour market and the economy in Alberta.

### ***Creating knowledge that can be applied at a detailed level***

Readers familiar with statistics will quickly understand that there is a big technical challenge in using the 2003 skills data, which came from a survey with a relatively small sample size in Alberta.

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High level averages from sample surveys can be a good starting point for policy discussions but, taken in isolation, they can hide more than they reveal. To really understand what is happening we need dig down to geographic areas within Alberta and to examine the supply and demand of skills for particular industries and occupations. We need to explore the skills situation within particular segments of the population. Doing that is not possible when using sample survey data in isolation; sampling error is simply too high.

On the other hand, Census data does not have the same problem of sampling error<sup>2</sup>. As well, the census contains a wealth of relevant detail, including the social and demographic characteristics of Albertans and information on their employment status, industry and occupation, and where people live.

The problem is that the census did not ask questions about reading comprehension skills. The solution developed for this project was to add skills data to the census file right at the level on the individual respondent to the census.

### ***Box 2. Adding new data to the census after the fact – Is there magic at play?***

How can we create detailed information about the reading comprehension skills of individual census respondents when the census never asked those questions in the first place? At the end of the day, are we not just guessing?

The answer is that, while we most certainly cannot create knowledge out of nothing, we can get a good approximation of the actual situation.

We do this by using several sources of data along with good research methods in order to find which of those characteristics that are included on the census are most closely related to the skill levels found in the 2003 survey.

The characteristics that are most closely related to reading comprehension skills turn out to be things like age, education level, immigrant status, employment and unemployment status and the average education levels of the geographic area in which one lives.

Calculations were made on these and other variables in order to estimate the skill level of everyone on the long census form in 2006.

The methods used are described in considerable detail in the background paper.

The calculations were made for reading comprehension skills only. This was done for several reasons:

- Research has found that reading comprehension and document skills are closely linked and that analysis can be simplified by using only one of them. The reading comprehension scores are the more basic in the sense that they are what one would first teach to learners with weak document skills.
- The number skills and the problem-solving skills from the 2003 survey were not taken into account since an important feature of the analysis is an assessment of both the demand and supply of skills. The data on demand, which is discussed later, is based only on measures of prose and document skills.

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<sup>2</sup> Of course, the long-form census is based on a 1 in 5 sample, and there is also some (small) sampling error associated with it, as described in the Background Paper. More important are non-sampling errors in the census. For example, it is difficult to collect high-quality fine-level data on the industry in which people are employed by asking questions on household surveys such as the long-form census.

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- There are no earlier readings of number and problem-solving skills and hence no data on how they change over time.

### ***The resulting data can be safely used in policy applications***

So how accurate are the results? How different would they be from a theoretically ideal set of numbers? (The ideal, but impossible to achieve, numbers would be obtained if we had actually asked every person on the long census a highly detailed set of quality-controlled questions about not only their reading comprehension skills but also about their document, number, problem-solving, teamwork, self-actualizing and other essential skills.) The answer cannot be known with absolute certainty. However, research described in the background paper suggests that the numbers developed for this paper are quite solid.

#### ***Box 3. How good are the supply data for use in policy applications?***

Suppose that the ideal, but unachievable, numbers described in the text were given a 'policy relevance' rating of A+. Given the kind of uses that are described in this paper, the approximations calculated for this paper might be given a rating of B, or possibly even a B+, for policy relevance.

After more years of research and data development, it will certainly be possible to develop better numbers. However, it would be hard to imagine that they would ever exceed an A-rating. Our measures will never allow us to completely see the whole real world.

#### ***Is a B rating good enough?***

##### ***It most certainly is!***

In many, perhaps most, policy applications there are major gaps in our empirical knowledge that must be compensated for by using common sense and political judgment.

It is a major step forward to supplement that common sense with good (if less than perfect) empirical evidence as the knowledge gap in the area of skills has been particularly large and difficult to fill by non-empirical means.

For example, one of the most commonly used proxies for skills is educational attainment. One only needs to think about the range of ability in your high school class to appreciate how poor high school graduation is as a signal of what adults know and can do.

Indeed, we routinely and happily use measures in our policy decision-making that would have ratings well under B.

For example:

- The projections that result from much economic modeling are greatly affected by assumptions that are built into the mechanics of the model itself.
- We often use out-dated data to project variables that (unlike skills) can change quite quickly over time.
- Because of limitations of much survey data, we often use high-level averages even in cases where there is much diversity in the unmeasured components of those averages.

In cases such as these, we are using measures that might have 'policy relevance' ratings of C or even D.

### ***The supply of reading comprehension skills in the Alberta labour market***

From this point on, the paper will use the new census-based measures that were just described. Note that the date of the measures now shifts to 2006, the date of the census and not of the 2003 skills survey. To re-emphasize points made previously, research has shown that the factors that determine the supply of prose skills change very slowly over

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time, so the difference in dates will have little effect. As well the findings would be little different from estimates derived for the current period.)

Table 1 examines the supply of labour in Alberta and Canada at different skill levels. Supply is defined as being the experienced labour force (current and recent employees).

**Table 1. Percentage of people at different levels of reading comprehension skills, by employment status, Alberta and Canada, 2006**

<b>Alberta</b>	Percentage at different levels of reading comprehension skills			
	Low	Medium	High	Total
Experienced labour force	42.0	24.2	33.8	100.0
Current employees	41.4	24.2	34.3	100.0
Recent employees	46.4	23.7	29.9	100.0
Others	60.6	20.2	19.2	100.0
<i>Total population age 16+</i>	<i>45.8</i>	<i>23.4</i>	<i>30.9</i>	<i>100.0</i>
<b>Canada</b>				
Experienced labour force	44.6	24.4	31.0	100.0
Current employees	43.9	24.5	31.6	100.0
Recent employees	49.5	23.7	26.8	100.0
Others	64.3	19.4	16.3	100.0
<i>Total population age 16+</i>	<i>50.2</i>	<i>23.0</i>	<i>26.8</i>	<i>100.0</i>

**Definitions**

The traditional measure of the supply is the labour force, which is defined to include both those who are currently employed and those who are without work but are actively looking for work.

However, because we are dealing with the richer census data, it has been possible to use an even stronger measure of labour supply. We refer to this as the 'experienced labour force' which consists of:

- Albertans aged 16 and over who were employed at the time of the 2006 Census.
- Recent workers, defined as those not currently employed but who worked in the 5 year period prior to the Census.

Three skill levels are used in the table:

- Those with low skills, defined as those having scores of 275 or less on the 500 point scale.
- Those with medium skills, defined as those with scores of 276 to 325 points. This interval is where the basic proficiency levels required for full participation in our knowledge-based society have been met.)
- Those with high skills, scoring 326 or more points.

**Overall, a highly skilled supply of prose skills**

The table shows us that Albertans have reading comprehension skill levels that are somewhat higher than the national average.

- For example, the table shows that 33.8% of the experienced labour force in Alberta has high skills, compared with the national average of 31%.
- Correspondingly, 42% of the experienced labour force in Alberta have low skills which, while still a large number, is somewhat lower than the Canadian average of 44.6%.

Table 1 shows that Alberta has a relatively skilled labour supply in terms of reading comprehension when compared with the rest of Canada. The table re-enforces what common sense would suggest, namely that:

- Current employees are somewhat more skilled than recent employees (those without current jobs but who were employed in the past five years).

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- Others (people without any recent work experience) have significantly lower skill levels than people in the labour market. Although even here, this ‘other’ inexperienced group has a higher skill level than their counterparts in the national figures.

It is also interesting to look at the proportion of the experienced labour force that is currently employed. Here Alberta leads the country with 89% being employed though some other provinces are not far beyond. (The national average is 87%).

- These utilization rates are somewhat related to skill levels, but perhaps not as much as might be expected. They range only from 87% for those with very low reading comprehension skills to 91% for those with very high skills. In other words, even those with weak skills have a very high probability of being employed in Alberta.
- A high rate of using its experienced work force is obviously positive. However, this does mean that Alberta may have to do a bit more than some other provinces in order to find the needed skills in areas beyond its existing experienced labour force if the demand for such skills rises. Particular emphasis may have to be placed on new entrants from schools and people coming from out of province.

The initial conclusion is simply that Alberta is in a reasonably healthy position with respect to the supply of prose skills available for use in its labour force when compared with other provinces and countries. The later analysis will suggest a number of challenges and opportunities, but the starting point for Alberta is positive.

Table 1 provides only a taste of the use of the census-based data. Its real strength is in analysis at the level of specific industries and occupations – as will be seen later in Section 4 where we examine the combined effects of demand and supply.



### ***3. The demand for reading comprehension skills in today's Alberta labour market***

*Policy requires data on the supply and demand for skills*

Having data on the supply of skills is clearly important, but by itself it is of limited use in policy analysis. For example, we learned that 33.8% of Albertans have high reading comprehension skills. But is 33.8% a sign of success or does it point to possible problems for the labour market? Should it be even higher? Should we be investing more in equipping people with even higher prose skill levels, or would returns be higher if the same funds were invested in other areas? To answer questions of this sort we need to know about the demand for these skills. What kind of reading comprehension skills are actually used and needed in the Alberta labour market?

*...much of that data is available in Canada*

Once again, Canada is in a fortunate position in understanding the demand for skills. For a many years, the federal department of Human Resources and Skills Development Canada (HRSDC) and its predecessors have wisely invested in research and development in the area of skills and occupations – including both supply and demand dimensions.

As a result, Canada is among the few countries in the world that can start to answer questions about the level of basic skills that is needed in order to support satisfactory job performance. Compared with most countries, we are in a relatively good position to calculate the level of investment in generic skills development that is most likely to get the highest payoff in the labour market.

*Where Alberta stands*

Box 4 on the next page shows the way in which demand is calculated.

- The calculations create a total, aggregate score by multiplying the number of people in, for example, an occupation by the reading comprehension skill level of that occupation. These scores often run to millions of points.
- Skills at five levels of proficiency are used in calculating these scores.
- Two sets of calculations are made. One is for peak demand levels – the reading comprehension skills that are required during those periods when workers are required to deal with the more complex tasks of their jobs. The other is for typical demand levels – those skills that are used on a day-to-day basis.

The results show that:

- At peak demand levels, the Alberta economy generates an aggregate demand for 529.2 million points in prose skills, or 12% of the total peak demand in Canada, close to Alberta's share of total employment in Canada.
- On a per employed worker basis, the Alberta economy demands an average prose score of 287 points at peak demand. A five-point scale, described in the following box, has been constructed to measure the level of proficiency in the prose skills that

### 3. The Demand for Prose Skills in the Alberta Labour Market

are in demand. The 287 point lies in Proficiency Level 3 – the ‘satisfactory’ level). In fact, some 54% of Alberta’s peak prose demand is at Proficiency Level 3.

- Alberta’s aggregate peak demand is 7.4% higher than typical demand (the ordinary skills, slightly less than the 8% gap between typical demand and peak demand found in other provinces.

#### **Box 4. How the current demand for reading comprehension skills is measured**

The key tool for measuring the demand for skills is the Essential Skill Profiles developed by HRSDC. These profiles show the demand for nine ‘essential’ skills including reading text and document use that are associated with satisfactory job performance in each of the many occupations identified in Canada’s National Occupation Classification.

#### **Peak and typical skills**

Two measures have been developed:

- The level of proficiency that is associated with satisfactory performance in the usual or **typical** tasks associated with the job.
- The higher level of proficiency that is required on occasions when the job gets tougher and more complex. This is referred to here as the **peak** or complex demand for skills.

#### **Proficiency levels in reading comprehension skills**

As discussed earlier in this paper, we will examine only the essential skills related to reading comprehension in order to allow comparisons with the data on the supply of labour.

In order to make consistent comparisons of the demand for reading comprehension skills, we simply multiply the typical (or peak) level of proficiency for an occupation by the number of employees in that occupation.

The level of proficiency is based on the 500 point scale that was referred to in the last section.

The actual calculations are based on dividing the skill levels required into 5 groups:

- *Very low level of prose skills.* Proficiency Level 1 (0-225 points) where the tasks involve reading only short texts and simple tasks using that text.
- *Low level of skills.* Proficiency Level 2 (226- 276 points) where some low level inferences are required.

- *Satisfactory level of skills.* Proficiency Level 3 (276-325 points) where lengthy texts are involved and more difficult inferences are required. Previous research suggests that this level is required in order to deal satisfactorily with the challenges associated with today’s knowledge-based economy.
- *High level of skills.* Proficiency Level 4 (326-375 points) requires synthesis of information from complex or lengthy texts
- *Very high level of prose skills.* Proficiency Level 5 (376-500 points) involves high-level inferences from dense, distracting texts and, in some cases, the use of specialized background knowledge.

#### **Adding things up – the aggregate demand totals**

Suppose that there were 1,000 employees in a particular occupation and that the *typical* prose skill level required for the occupation was Level 2. That would give a total score of 226 (the minimum points for level 2) times 1,000 – for a total of 226,000 points for that occupation. We refer to this large number as the ‘aggregate typical demand for reading comprehension skills’.

Computing the aggregate demand totals in this way, i.e., using the lower bound of the demanded skill level, yields the lowest possible estimate of skill demand. True demand levels are likely to be higher.

‘Aggregate demand for reading comprehension skills’ is a cumbersome title and the number itself has limited interest when looked at in isolation. Its power comes through its use in allowing us to make comparisons across geographic areas or across industries and occupations. It also provides a useful way to reflect on the efficiency of Canada’s labour markets at various levels – to answer questions such as “How much of the available literacy supply is being put to economic ends? Does current demand fully utilize the prose skills of workers needed to cope with the reading demands of their jobs? How much more reading comprehension skills would need to be created? Of those workers with more reading skills than demanded by their jobs, how much surplus is there that could be put to economic ends?”

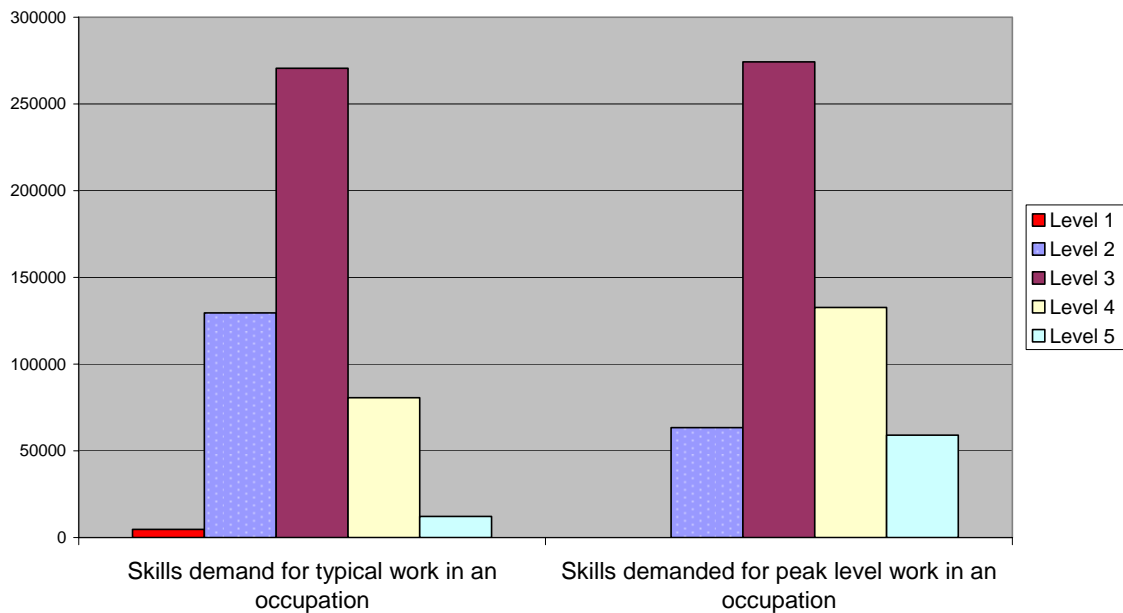


### 3. The Demand for Prose Skills in the Alberta Labour Market

Figure 1 puts some of these findings in graphic form for Alberta.

- Proficiency Level 3 is the main category of prose skills demand at both typical and peak levels of work. However there is also a reasonably large demand for Level 2 skills for typical work and for Level 4 skills for peak work.
- There is little demand for Proficiency Level 1 (very low level) skills, even when job requirements involve only the typical tasks, and no demand for people at Level 1 when employees are working on the more complex peak tasks that they occasionally face.
- The need for very high skill levels (Level 5) is mainly limited to workers doing peak level work.
- Put another way, the use of peak demand, rather than typical demand, reduces the demand for Proficiency Levels 1 and 2 and increases the demand for Levels 3, 4 and 5. This is more pronounced in Level 4 and 5 jobs.

**Figure 1. Total aggregate demand for prose skills, by level of skill proficiency, for typical work in occupations and for work at peak levels, Alberta, 2006 occupational data and 2008 essential skills profiles**



#### *Demand by occupation and industry*

The real usefulness of these demand numbers is seen when we look at the situation in specific industries and occupations in Alberta.

We find, naturally, that there is a need for a mix of people at different skill proficiency levels in each industry and each occupation.

For example, Figure 2 shows details for the proficiency levels for prose skills at peak demand for those industries where there is an overall demand for high level skills (Level 3 and over). Skill level 1 is not shown because there is virtually no demand for it.

### 3. The Demand for Prose Skills in the Alberta Labour Market

- In an industry such as primary and secondary education, the demand is mainly at level 5. Teachers need to be very good with prose skills.
- In most other industries, such as publishing, hospitals or public administration, there is a more even distribution of the demand for different levels of prose skills.

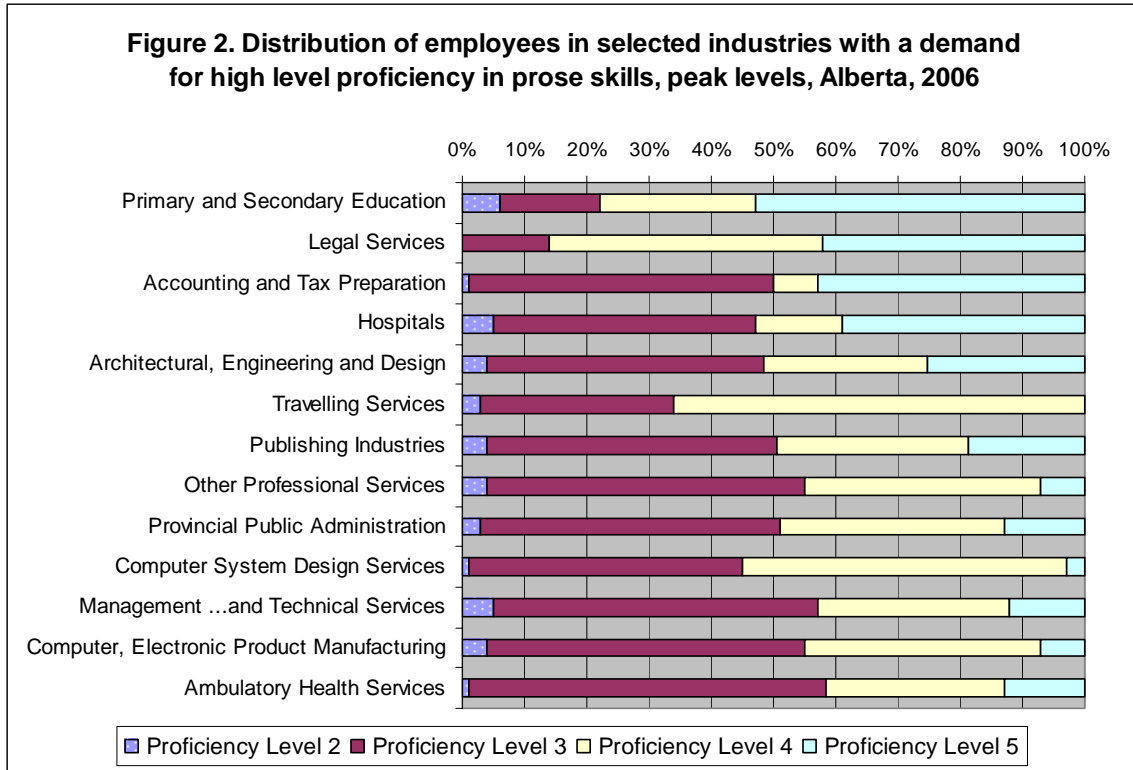
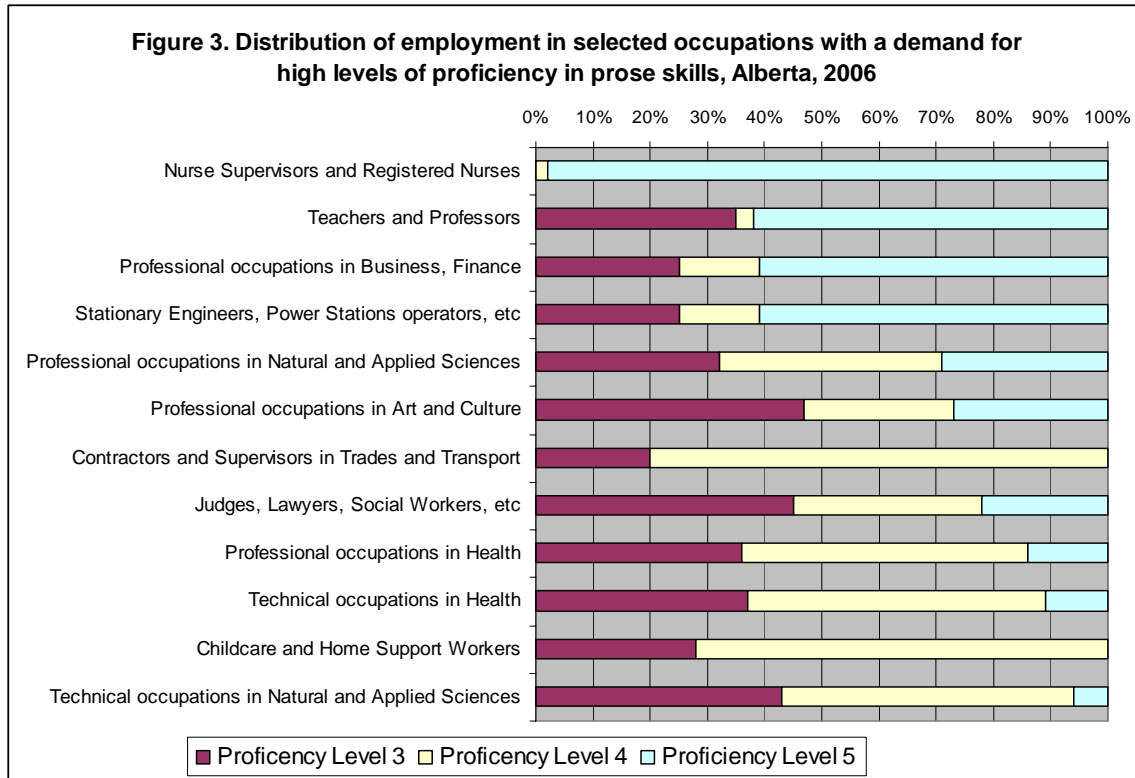


Figure 3 provides similar information for occupations where the overall demand is high (Proficiency Level 3 and over). Naturally, occupations are more homogeneous than industries which typically employ a range of people in different occupations. For example, we have omitted Levels 1 and 2 on the occupation chart since there is no demand for them in these occupations. Nevertheless, there is still a considerable variation across occupations in the level of proficiency in the prose skills demanded.

- Nursing supervisors and registered nurses are an exception in that nearly all demand is at level 5.
- The demand in most other of these high-skilled occupations is for a mix of people at levels 3, 4 and 5 of proficiency in prose skills.

The data on the demand for prose skills remind us of the heterogeneity of the real world and confirm our common sense understanding. What will be of more interest for policy is a comparison of demand and supply and a look at future trends. These are the topics we turn to in the next sections.

### 3. The Demand for Prose Skills in the Alberta Labour Market



#### **Box 5. How good are the demand data?**

In the last section, we assigned a B or B+ rating in terms of the policy-relevance of the data on the supply of skills. Measuring demand is harder than measuring supply because of the following factors:

- In theory, demand consists of both the skills of existing employees and of the job vacancies that employers would like to fill, but have not yet done so. In reality, we have no reliable data on current job vacancies – although this may not be a large gap in a period of economic downturn where there are fewer vacancies.
- There are some gaps in the Essential Skills Profiles that are discussed in the Background Paper. These have been filled using essentially arbitrary, but conservative assumptions.
- The reading comprehension or prose skills used in these calculations are foundational, learning-to-learn skills. They are of central importance, but they are not the only essential skills required to do a job.

Our reliance on only prose skills results from their importance and also allows later comparisons of demand and supply. However it may result in the need for some caution in the subsequent discussions of priorities for investing in skills development. There is a tendency to develop programs that relate to the things we can measure, and to ignore those that we cannot.

#### **And the rating is...**

Taking all the limitations into account, there might be a 'policy relevance' rating of C+ or B- for the data on the demand for reading comprehension skills. As the background paper explains, the bottom line is that, if anything, the demand data may be a little too conservative as they may result in relatively low estimates of skills shortages related to prose.

Although not ideal, the demand data are still very good. As noted earlier, less reliable data are often used routinely in policy-making.

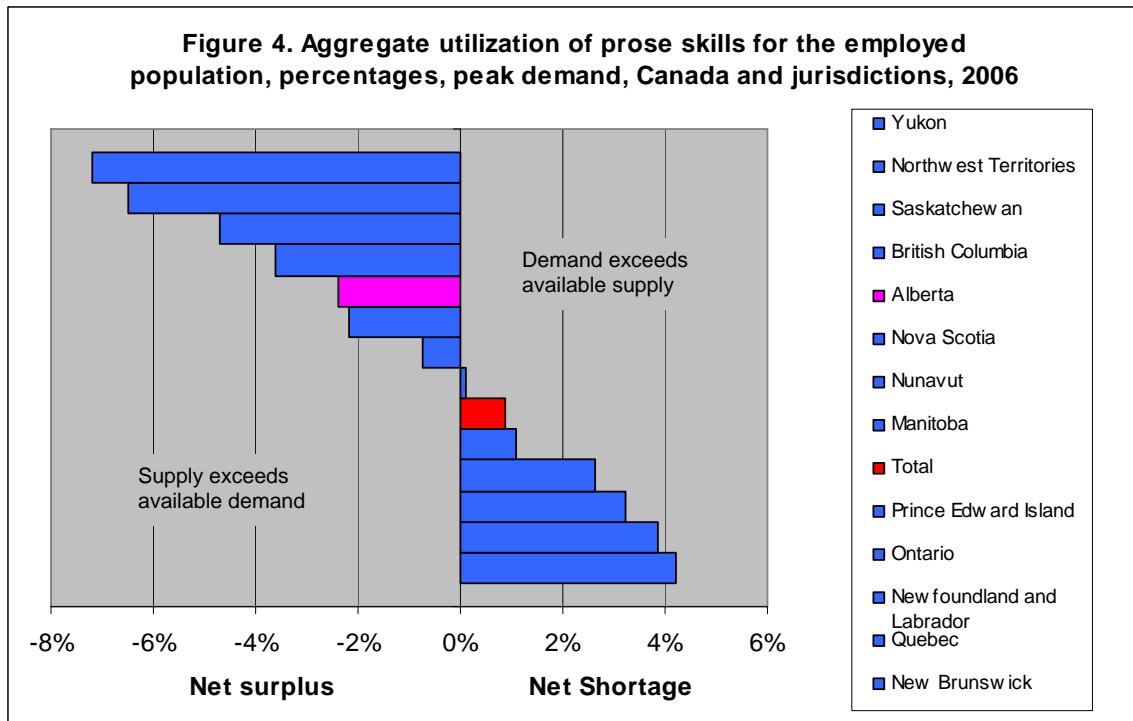
#### 4. Matching current supply and demand: surpluses and shortages

Based on both the supply and demand data, we find that the Alberta economy is one of the most efficient in Canada at putting the available stock of reading comprehension skills of the experienced labour force to use. (Recollect that the experienced labour force consists of both current and recent employees.)

- The Alberta labour market currently makes use of 71% of the available supply of prose skills at peak demand, the highest rate of utilization among all provinces and territories. The Canadian average is 66 percent.
- To put it the other way around, these figures mean that 29% of available prose skills goes untapped by the Alberta economy at peak demand, suggesting a considerable surplus of prose skills, although a lower surplus than elsewhere in Canada.

*How well do different provinces and territories make use of the existing skills of employees?*

Figure 4 provides a different kind of context by looking at the utilization of reading comprehension skills at peak demand for the employed population only (as opposed to the experienced labour force). This is a measure of labour market efficiency. It answers the question “To what extent does the current distribution of employment by occupation make full use of the skills of employed workers?”



#### 4. Matching Current Demand and Supply: Surpluses and Shortages

The figure shows that:

- For the employed population at the Canada level, demand exceeds the supply of reading comprehension skills by 39,746,506 points, or roughly 1%. Thus, Canada faces a slight shortage of prose skills – at least at peak levels of demand.
- However, the rate of prose skill utilization varies by jurisdictions, ranging from a high of 93% in the Yukon to a low of 104% in Newfoundland. Jurisdictions with utilization rates below 100% have skill surpluses, those with rates above 100% face skill shortages.
- Alberta has a net surplus of prose skills (an aggregate prose skill surplus of 13,409,350 points at peak demand, or roughly 20 points per worker). That is, employees have more skills than are actually in demand, although not by much. The Alberta economy demands 97% of the available aggregate supply of literacy skill in the employed population.

We can dig behind these numbers and look at demand and supply imbalances by the proficiency level of individual employees in Alberta working at peak demand:

- The surpluses are at levels 2 and 3 in skills proficiency, more than offsetting shortages at these levels.
- On the other hand, there are net shortages of prose skills at Proficiency Levels 4 (an average of 45 points per worker) and at Level 5 (68 points per worker).
- As explained earlier, there is virtually no demand for Level 1 skills at peak demand.

In other words, policy in Alberta must deal with the existence of both some shortages and some surpluses of reading comprehension skills, at both the individual and aggregate level, and that situation varies considerably by industry and occupation.

*... the main analysis is at the level of industries and occupations*

Once again, the paper must deal with a presentational dilemma. There are a very large number of industries and occupations and some of the most interesting analysis is at the level of those specific industries and occupations. Higher level averages can conceal more than they reveal. Yet a full analysis at the detailed level would take hundreds of pages and would be virtually unreadable.

The compromise we have chosen is to refer readers interested in particular industries and occupations to the more specific analysis and the many detailed tables that were included in the Background Paper. In this overview we will simply attempt to give a flavour of the situation.

- Figure 5 looks at workers below the required prose skills for selected Alberta industries at peak demand. The top half of the figure is a ranking of industries by the percent of employees in that industry with prose skills that are below the required level. The bottom half is a ranking by the absolute number of such employees.
- Figure 6 provides the same information for occupations.

#### 4. Matching Current Demand and Supply: Surpluses and Shortages

**Figure 5. Shortages of prose literacy skills at peak demand, selected industries, Alberta, 2006**

<b>Industries with the greatest shortages on a percentage basis</b>	<i>Percent of workers below required skill level</i>
Primary and Secondary Education	62%
Private Households	62%
Legal Services	61%
Hospitals	56%
Accounting and Tax Preparation	56%
Travelling Services	56%
Clothing Manufacturing & Leather & Allied Product Manufacturing	55%
Personal and Laundry Services	53%
Furniture and Related Product Manufacturing	53%
Publishing Industries	52%
Printing and Related Support Activities	52%
Nursing and Residential Care Facilities	51%
Trade Contracting	51%
Electrical Equipment, Appliance and Component Manufacturing	51%
Textile Mills & Textile Product Mills	51%
<b>Industries with the greatest shortages – numbers of employees</b>	<i>Number of workers below required skill level</i>
Retail Trade	91,941
Mining and Oil and Gas Extraction	50,483
Primary and Secondary Education	44,833
Transportation	43,829
Trade Contracting	41,415
Wholesale Trade	38,432
Food Services and Drinking Places	38,352
Prime Contracting	35,294
Hospitals	31,898
Crop Production	27,036
Architectural, Engineering and Design Services	25,824
Ambulatory Health Care Services	25,790
Repair and Maintenance	17,901
Local, Municipal etc	15,656
Social Assistance	14,716

#### 4. Matching Current Demand and Supply: Surpluses and Shortages

**Figure 6. Shortages of prose skills at peak demand, selected occupations, Alberta, 2006**

<b>Occupations with the greatest shortages on a percentage basis</b>	<i>Percent of workers below required skill level</i>
Nurse Supervisors and Registered Nurses	81%
Stationary Engineers, Power Station Operators, etc	70%
Retail Salespersons and Sales Clerks	69%
Professional Occupations in Business and Finance	65%
Contractors and Supervisors in Trades and Transportation	65%
Other Trades N.E.C.	64%
Childcare and Home Support Workers	63%
Assemblers in Manufacturing	60%
Teachers and Professors	56%
Technical and Related Occupations in Health	55%
Supervisors in Manufacturing	54%
Occupations in Protective Services	54%
Wholesale, Technical, Insurance, Real Estate Sales Specialists, etc	52%
Professional Occupations in Art and Culture	52%
Professional Occupations in Health	51%
<b>Occupations with the greatest shortages – numbers of employees</b>	<i>Number of workers below required skill level</i>
Clerical Occupations	76,026
Retail Salespersons and Sales Clerks	52,015
Sales & Service Occupations N.E.C.	46,413
Professional Occupations in Natural and Applied Sciences	37,511
Teachers and Professors	34,920
Transportation Equipment Operators and Related Workers	33,490
Professional Occupations in Business and Finance	30,081
Construction Trades	29,956
Technical Occupations Related to Natural and Applied Sciences	28,521
Nurse Supervisors and Registered Nurses	25,275
Occupations Unique to Agriculture Excluding Labourers	23,485
Other Managers N.E.C.	22,570
Mechanics	21,663
Wholesale, Technical, Insurance, Real Estate Sales Specialists, etc	18,853
Childcare and Home Support Workers	18,851

#### 4. Matching Current Demand and Supply: Surpluses and Shortages

From a public policy perspective, it is interesting to look at occupational shortages that are large in both absolute terms and in relation to the overall size of the occupation in question. Pressures for remedial action will likely be strongest when shortages are large on both a relative and an actual basis.

- Perhaps the most obvious shortage that emerges from Figure 6 is in prose skills among nursing supervisors and registered nurses, both in terms of absolute numbers and, dramatically so, on a percentage basis.
- Other shortages in Alberta that are large from both a relative and absolute perspective are retail sales and teachers and professors.

*... recall that the analysis is at the level of the demand for peak prose skills*

It may be thought that the extent of shortages may have been exaggerated by calculating demand at the peak skills levels which are only used occasionally – as opposed to the more ordinarily used typical skills levels. The analysis can be done at the typical level and does result in somewhat fewer shortages and more surpluses. However, it would not make sense to plan human resources on the assumption that workers will be unable to handle the more complex problems that do occur in the workplace, if not every day<sup>3</sup>.

***...tentative conclusion: a large mismatch***

This examination of the combined effect of demand and supply points to the existence of both large shortages and large surpluses of prose skills across the occupational and industrial spectrum in Alberta. In the next section we look more carefully at areas of shortage, balance and surplus.

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<sup>3</sup> On a more technical level, the basic numbers used in the analysis may result in a small underestimate of shortages, as mentioned earlier. It would be unhelpful to worsen this potential problem by using typical, not peak, demand in our analysis of shortages.



## ***5. Distributional dimensions: are mismatches in reading comprehension skills a wide-spread or a concentrated problem?***

The last section found that there were mismatches in prose skills in many occupations and industries in Alberta. In this section, we see whether these mismatches are concentrated in at-risk population groups or whether they are spread across all workers. The answer will have a significant effect in shaping the resulting policy responses.

*Why look for high risk groups among people who have been successful in finding jobs?*

Most distributional analysis – identifying and assessing the needs of under-served or at-risk groups – is done at the level of the population as a whole and not for people in the labour force. The greatest disadvantage is found among people who have not been successful in finding a job. Equally, most people in the labour force are not in need of targeted, remedial social programs.

Nevertheless, there are good reasons for attempting to identify particular at-risk groups among employees with low skills, especially those with prose skills that are lower than those needed to do their jobs in a satisfactory manner. If the reading comprehension skill shortages are located in groups with specific demographic or other characteristics, then it will be easier to identify the kind of remedial action that is needed, if any. For example,

- If shortages were concentrated among older workers in their pre-retirement years, then it might be felt that no remedial action need be considered, at least as it relates to work in the labour force.
- If shortages were concentrated among, for example, immigrants, Aboriginal or similar population groups, then that information may be helpful in identifying the kind of targeted remedial training that would get good results.
- If shortages and mismatches were fairly evenly spread among all groups of workers, then a very different kind of more broadly-based information dissemination and training programs would be required.

*The data show that mismatches are widespread, not concentrated in at-risk groups*

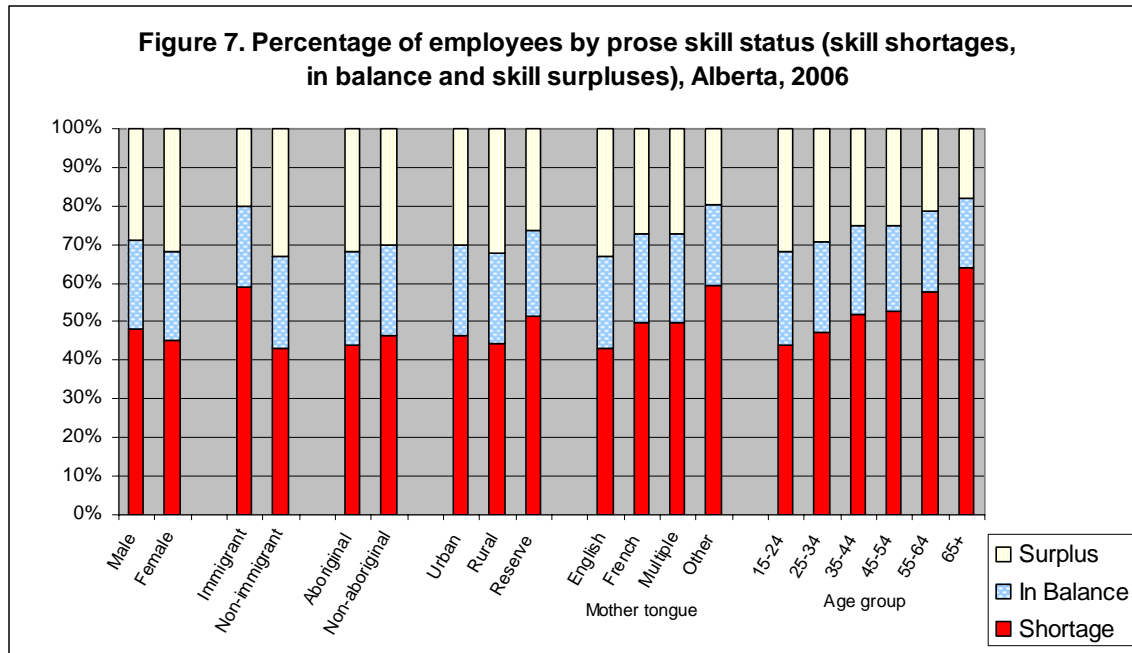
Figure 7 looks at the percentage of people in different groups that are:

- In skill shortage, where people do not have the full reading comprehension skills that are needed on the job.
- In balance, where demand and supply are in accord.
- In skill surplus, where people have higher level prose skills than demanded by the job.

The figure shows that:

- Skill shortages in the area of reading comprehension are about the same for men and women. Women are a little less at risk, no doubt reflecting the fact that women, as a group, have higher average scores than men in dealing with prose.

## 5. Distributional dimensions: a wide-spread or a concentrated problem?



- Shortages are also about the same for Aboriginal and non-Aboriginal people. This may be due to the fact that many Aboriginal people with low skills are not employed or are in jobs that demand low skills.
- Immigrants and people whose mother tongue is not English are at a higher risk of having a prose skill shortage.
  - While immigrants have higher levels of educational attainment than non-immigrants, their English and French language prose skills are lower.
  - The skill shortages among immigrants represent significant proportions of employment in some industries and occupations.
  - The skill shortages described here helps explain the poor performance of recent cohorts of immigrants that has been noted in other research that has studied the relationship of literacy skills on employment and wages. (See the Background Paper for more information.)
  - A higher portion of immigrants are also likely to be in skill surpluses, with a smaller percentage being ‘in balance’. Again it is not surprising to find that the right balance between supply and demand is harder to find for immigrants, particularly recent immigrants.
- Urban density does not appear to play a large role, with shortages in reading comprehension skills being similar in both urban and rural areas – although shortages are higher on reserves.
- The data by age show that older people have more shortages and fewer skill surpluses. This is what one would expect as:
  - It mirrors the link between literacy and educational attainment, as well as the skill losses that occur over time when skills are not fully used.

## 5. Distributional dimensions: a wide-spread or a concentrated problem?

- It also mirrors the shorter time period in which investment in learning can be recouped by workers and employers.

Perhaps the most interesting finding is that there are high levels of shortages of reading comprehension skills at all ages, including among young people just starting out in the labour force. Some 40% of employees aged 16 to 24 have prose skill shortages.

Regression analysis<sup>4</sup> was used to show where the risks of being in prose shortage are greatest. The highest odds of being in prose skill shortage jobs in Alberta are associated with:

- Having less than high school education (the highest risk factor).
- Being an immigrant.
- Mother tongue other than English or French.
- Having no training.
- Having a high school education only.

These calculations also show that risks are highest in Newfoundland and the east of the country generally and are lowest in British Columbia, Saskatchewan and Alberta.

***The real surprise is in the small size of the reading comprehension skills that are ‘in balance’***

When we look back at Figure 7, we see that there only small numbers of people in all groups that are ‘in balance’. This suggests that the market may not be doing a good job in matching supply and demand – at least as it relates to prose skills. The ‘in balance’ numbers are swamped by not only by shortages but also by surpluses.

*...Is the imbalance a real worry?*

While such a large imbalance might be surprising, it is not necessarily all that worrying. After all, many factors must be balanced in the market in addition to reading comprehension skills. In the short run, issues such as finding people with the more technical skills that are necessary for specific occupations, or finding the bodies needed to fill job shortages in a rapidly growing economy, may take on greater urgency.

On the other hand, prose skills are critical ‘learning to learn’ skills. Large shortages and imbalances must raise questions about the flexibility of the labour force to adapt over the longer-term. They are needed in order to maintain a competitive edge in the rapidly changing global economy.

The true import of skill imbalances for public policy rests on a few crucial assumptions about competition in a global market. These are:

- The knowledge and information intensity of Canadian employment must rise as firms adjust to increased competition from equally skilled foreign workforces.

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<sup>4</sup> See background paper of details. These calculations also include educational attainment as a variable that affects skill levels.

## 5. Distributional dimensions: a wide-spread or a concentrated problem?

- A partial alternative to a more skilled work force would be greater use of advanced production technology<sup>5</sup>.
- However, since foreign workers will still work for less than Canadian workers, foreign firms can offer goods and services of equal quality at lower prices. In this case, Canadian jobs would be lost at the bottom end of the wage and skill distribution – either through out-sourcing by Canadian firms or loss of market share. Moreover, displaced workers would still need higher essential skills in order to adapt and apply their knowledge and experience in good replacement jobs.

The level of concern will be greatly influenced by how we think the situation might change in the future. Are imbalances in prose skills like to get better or worse? That is the subject of the next section, Section 6.

*...Policy responses must be based on the reality that the shortages are wide-spread*

With respect to the more immediate question of the location of reading comprehension skills shortages, the main conclusion is that the risk of shortages is high in all the groups examined, and is not highly concentrated in only a few groups. The data seems to suggest that the only plausible case for highly-targeted interventions might be for immigrants in the labour force, particularly those whose mother-tongue is neither English nor French. The implications will be discussed later.

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<sup>5</sup> However, it has been argued this route no longer offers the competitive edge it once did as foreign firms can buy the same equipment, and still have a less costly labour force.

## ***6. Projecting ahead – and a first look at policy implications***

The last section concluded that there were very large imbalances between the supply and demand for reading comprehension skills. The extent to which this is a big policy worry depends on one's view of what is likely to happen in the future – whether the imbalances are likely to continue or whether they are likely to get smaller over time.

We can learn from the past, but policy can only affect what might happen in the future. The discussion to date on current and past supply and demand provides important context. However, there is evidence to suggest there could be major changes ahead in the demand for skills, including reading comprehension skills, in a rapidly changing global economy.

### ***Future demand for prose skills at the Canada level***

The future demand for reading comprehension skills will be a result of:

- Changes in the mix of occupations that are in demand.
- Changes within particular occupations such that more of the jobs in that occupation, or particular aspects of those jobs, will require higher or lower levels of reading comprehension skills.

Two key questions emerge. Which will grow more rapidly: occupations that have higher requirements for prose, or ones that need only lower level skills? Second, are jobs within an occupation, whether they be in clerical, blue collar or in the trades or professions, likely to require more, or fewer, prose skills?

In the absence of evidence, the answer to these questions is far from self-evident. Technological change is a major driver of change and could have two quite different effects on skills.

Take for example, changes across occupations. Some have argued that technological advances will increase the number of people working in highly skilled occupations in Canada and Alberta, with a tendency for less skilled jobs to go to other countries. However, others have argued that the higher productivity that will result from technology, together with an aging population, is likely to result in an increase in lower-skilled service jobs, such as care-giving for older people.

A similar debate occurs for likely future changes within occupations. Some argue that most jobs will become more complex, and require more reading comprehension skills to manage that complexity, as technologically-induced change becomes the norm in most jobs and occupations, including so-called lower-skilled jobs. Others argue just the opposite. Technology may be complex to start with, but increasingly it makes things simpler, as is readily seen by developments in home computers and the Internet. There is increasingly less need to refer to complex manuals and instructions; more advanced technology is more intuitive, meaning less need to use complex written documents. There may be less need for prose skills.

## 6. Projecting Ahead – And a First Look at Policy Implications

### *Future directions in the mix of occupations*

Fortunately, Canada is in a good position to bring evidence to bear on the first of these two potential future shifts in skills demanded: the change in the composition of occupations. The main tool is known as COPS (Canadian Occupational Projections System) which has been developed and maintained over the years by HRSDC and its predecessor departments. It uses a rich set of data as well as sophisticated modeling techniques that take both demand and supply into account in making occupational projections. Most other countries do not have tools for looking at the demand side of occupations, a huge weakness.

#### **Box 6. How useful is COPS for analysis in Alberta?**

COPS is far from perfect. No tools exist, or ever could exist, that would allow the possibility of predicting the future with certainty. Further,

- The data used by COPS is not always complete or up-to-date.
  - Like many models, its usefulness becomes very limited for projections of more than about 10 years into the future. Yet it is frequently used to forecast over longer periods.
  - COPS projections do not capture the most important source of change in skills demand over time i.e. shifts in the knowledge and skill intensity within occupations. Although there is limited data on these shifts, the data that is available suggests rapid increases in the skills demands placed on existing workers.
- Its findings are mainly at the national level, not for Alberta or the other provinces and territories.

This limitation to national level analysis is, however, less a problem than it first appears. The reality is that, when one takes a longer-term point of view, it makes sense to start with analysis at a national level or even global level as:

- Worker mobility in Canada is very high and shortages in one part of the country tend to result in people moving to those areas from parts of the country with skill surpluses.
- Many employers in Canada are national and even global in their scope and outlook. Human resource planning at the level of industries as a whole tends to be done through sectoral bodies that can take a regional and national perspective.

*... COPS suggests mixed trends, with somewhat greater growth in occupations with higher skills*

The COPS projections show a mixed picture of the likely effects of changes in the occupational composition on the demand for prose skills. Figure 8 illustrates this by showing the 10 occupations that are projected to have the largest and smallest growth in Canada between 2006 and 2016.

- In each of the highest and lowest growth occupations, there is a mix of occupations at different levels of proficiency in the use of prose skills.
- For example, clerical occupations (with relatively low levels of skills) heads the list of growth occupations, while some professional occupations with high skill levels (lawyers, judges, ministers, as well as policy advisors!) are among those that are expected to grow the least.
- On balance, skills are higher on average in the fastest growing occupations. The differences in the averages between the two groups (2.9 versus 2.7), is not large, but is still important. An increase of this magnitude is roughly equivalent to the additional

## 6. Projecting Ahead – And a First Look at Policy Implications

literacy reading comprehension skills that are associated with an extra half year of formal education.

These findings are reinforced by regression analysis. When looking at total projected changes over the period until 2016, we see a small net growth in skill levels. The regressions suggest that the demand for prose skills will increase in smaller occupations that are projected to grow quickly, but that the effect of this on overall skill levels will be partially offset by projected increases in employment in some large lower-skilled occupations.

**Figure 8. Ten highest and ten lowest occupations for projected growth, and average level of skill demanded, COPS projections, Canada, 2006-2016**

	Projected increase in employment	Level of average prose skill demand
<b>Ten highest-ranked occupations for projected growth in employment</b>		
Clerical Occupations	523,000	2.6
Teachers and Professors	328,000	3.7
Paralegals, Social Services Workers, etc	324,000	2.7
Sales & Service Occupations N.E.C.	278,000	2.2
Professional Occupations in ... Sciences	268,000	3.8
Transportation Equipment Operators, etc	246,000	2.0
Managers in Retail Trade, Food and Accommodation	237,000	2.7
Professional Occupations in Business and Finance	232,000	3.7
Other Managers N.E.C.	228,000	3.0
Retail Salespersons and Sales Clerks	192,000	3.0
<i>Total of 10 highest growth occupations</i>	<i>2,856,008</i>	<i>2.9</i>
<b>Ten lowest-ranked occupations for projected growth in employment</b>		
Other Trades N.E.C.	13,000	2.8
Supervisors in Manufacturing	15,000	2.7
Labourers in Processing, Manufacturing and Utilities	15,000	2.0
Heavy Equipment and Crane Operators, etc	19,000	2.1
Primary Production Labourers	25,000	2.0
Judges, Lawyers, Psychologists, Social Workers, etc,	25,000	3.8
Machine Operators in Manufacturing	31,000	2.5
Machinists, Metal Forming, Shaping and Erecting	39,000	3.0
Occupations in Travel and Accommodation, etc	40,000	2.8
Secretaries	42,000	3.0
<i>Total of 10 lowest growth occupations</i>	<i>264,000</i>	<i>2.7</i>

*The situation in Alberta in the more immediate past – and in the nearer-term future*

As discussed above, it makes sense to look at occupational forecasts at the provincial level only after an examination at the national level. The available data can only support long-term occupational projections at the national level. However, we can get a good



## 6. Projecting Ahead – And a First Look at Policy Implications

sense of what is likely to happen in the more immediate future by examining changes that have taken place in more immediate past. What has happened recently often provides a signal of what is most likely to happen in the near future.

The monthly labour force survey is an excellent source of changes in employment in Alberta for period after the 2006 census. We have attributed reading comprehension skills to this survey's files using similar techniques to that used with the Census. Regression analysis of job gains by occupation between May 2006 and September 2008 show a noticeable rise in average prose skills levels that were in demand by the Alberta economy during this short period.

These monthly data show that the occupations in Alberta that have been growing fastest have higher demand for skills, while those where employment has declined have lower level skills. This shorter term growth in the demand for skills in Alberta is more pronounced than the earlier, longer-term COPS results for Canada that were referred to above.

**Figure 9. Ten highest and ten lowest occupations for projected growth, and average level of prose skill demanded, Alberta, May 2006 to September 2008**

	Increase in employment	Level of average prose skill demand
<b>Ten highest-ranked occupations for growth in employment</b>		
Sales and Service Supervisors	14,100	3.1
Technical Occupations Related to ... Sciences	12,300	3.6
Professional Occupations in Business and Finance	11,300	4.4
Construction Trades	10,400	3.1
Professional Occupations in ... Sciences	9,700	4.0
Retail Salespersons and Sales Clerks	9,400	4.0
Wholesale, Technical, Insurance, Real Estate Sales, etc,	8,700	3.4
Heavy Equipment and Crane Operators Including Drillers	8,700	3.1
Occupations Unique to Forestry, Mining, Oil and Gas, etc	8,400	2.3
Technical Occupations in Art, Culture, Recreation, etc,	8,300	3.1
<i>Total of 10 highest growth occupations</i>	<i>101,301</i>	<i>3.4</i>
<b>Ten lowest-ranked occupations for growth in employment</b>		
Secretaries	-9,400	3.1
Technical and Related Occupations in Health	-9,400	3.7
Cashiers	-8,700	2.0
Machine Operators in Manufacturing	-7,900	2.8
Clerical Occupations	-6,100	3.2
Labourers in Processing, Manufacturing and Utilities	-5,400	2.0
Mechanics	-3,500	3.2
Machinists, Metal Forming, Shaping and Erecting Occupations	-3,100	3.2
Primary Production Labourers	-2,700	2.0
Supervisors in Manufacturing	-2,500	3.1
<i>Total of 10 lowest growth occupations</i>	<i>-58,700</i>	<i>2.9</i>



This is illustrated in Figure 9, which mirrors the earlier Figure 8, except that it shows trends over the near past and it is for Alberta only.

Figure 9 shows that:

- The situation in Alberta is still mixed, as in the earlier figure for Canada, with lower- and higher-skilled occupations found among those that have grown the most, and those that have declined the most.
- The average prose skill levels for the fastest growing occupations are significantly above that for the bottom group. The Alberta economy has been shedding low reading comprehension skills and increasing high-level skills in recent years. This increase in skill demand is equivalent to the skills that would be gained through an additional full year of initial education.

Whether that increase in the demand for reading comprehension skills will continue in the future depends on many factors, including the effects of the recent recessions and recovery. However, the data do suggest that it would be reasonable to anticipate a significant increase in the demand for prose skills arising from changes in the mix of occupations in the Alberta labour force over the coming few years.

### ***The reading comprehension skills required within occupations***

To this point, we have been examining likely trends across occupational groupings. Unfortunately, there is no comparable evidence or projection technique that will help us better understand the changes of prose skills that are likely to take place within occupations. As discussed above, in the absence of evidence, seemingly reasonable cases can be made for each of the opposing views that technology will increase, or decrease, the need for reading comprehension skills. We simply do not know.

*... a topic where it is hard to separate demand and supply pressures*

When we look to the longer-term future, especially at trends within occupations, we are entering an area where there is an intermingling of demand and supply factors. That is, the demand for skills in the long-run will be greatly affected by expectations about the supply of skills that will be available. Much research suggests that over time employers will structure their work to make best use of the skills of the people that are available to them.

- If there are many people with low skills looking for work at lower pay, then employers will tend to organize the way they do their work in order to use these lower-cost resources.
- Similarly employers will organize their work to make best use of more highly-paid, but more productive people if there are many highly-skilled people available.

*... resulting in the need to make prudent assumptions about the future*

These factors, and others, will influence the future demand for prose skills in ways that cannot be easily forecast. In the absence of solid evidence, it is prudent to assume that there will be offsetting patterns of increased and decreased demand for higher-skill level

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within different parts of many occupations, but with the dominant trend being toward an increase in the demand for skill levels.

Making such an assumption – that there will be a growth in the demand for prose skills both within and across occupations – also makes good economic sense in terms of economic competitiveness and prosperity. This follows from the discussion above that employers will tend to shape the way in which they do business at least partly in light of the available supply of skills. The productive use of higher-level skills will provide a competitive international advantage. We return to this discussion in Section 8 which addresses the more general policy implications of the empirical findings.

### *Projecting the supply of reading comprehension skills*

We now turn from the difficult task of projecting demand to the (slightly) simpler task of projecting supply<sup>6</sup>. The factors that need to be taken into account in projecting the future supply of skills are discussed in Box 7 on the next page.

#### *...Projections of prose skill levels to 2016*

The basic finding at the Canada level is disconcerting – the absolute numbers of adults with proficiency in reading comprehension at Levels 1 and 2 skills rises over the period. By 2016 the projections suggest that there will be about a million additional adults with prose skills that are below proficiency level 3. In other words, the proportion of adults whose skill level is judged to place them at risk remains virtually unchanged up to 2016. This spells trouble for Alberta given the degree to which Alberta employers have relied on attracting workers from other jurisdictions in Canada.

In Alberta the absolute numbers of adults with reading comprehension skills below proficiency Level 3 is projected to grow by 180,000, or 17%, from 2006 to 2016. The projections suggest that, by 2016, there could be about 1,250,000 million Albertans with less than satisfactory prose skills. However, the Alberta population is forecast to grow by a much larger amount (43%) over the same period. The result is that the proportion of adults with skills below Proficiency Level 3 is forecast to shrink by 3%.

- In Calgary population is forecast to grow by 33% over the same period. The proportion of adults in Calgary with skills below Proficiency Level 3 is forecast to shrink by 1% from 41% to 40%.
- In Edmonton the population is forecast to grow by 29% over the same period, with the proportion of adults with prose skills below level 3 being forecast to shrink by 3% from 44% to 41%.

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<sup>6</sup> The projections of supply that have been calculated for this report are based on an analysis of the relationship between reading skills and individual characteristics (such as age, gender, education and immigrant status), with the results being applied to population projections developed by Statistics Canada. The results show all five levels of proficiency in prose skills for provinces, territories and some sub-provincial geographic areas for the period 2001 to 2031.

**Box 7. What determines the future stock of skills?**

*[The size of the future stock of skills] = [the present stock of skills]*  
 + *[the skills of new entrants from schools, less the skills of retirees]*  
 + *[the skills of in-migrants, less the skills of out-migrants]*  
 + *[skills gained through adult education]*  
 - *[skills lost through lack of use]*  
 + *[skills gained through practical experience]*

**The size of the future stock of skills**

**Equals** the present stock of skills (reading comprehension skills in this case).

The present stock or supply of prose skills in Alberta was discussed in Section 3.

**Plus** the prose skills of those joining the labour force from the education system – partially offset by the loss of skills through retirement or death.

The news here seems good. The prose skills of young people entering the labour market are higher than those leaving it. Data from the 2000 cycle of the OECD Programme for International Student Assessment (PISA) reveals that Canada's 15 year olds have among the highest average levels of reading skills in the developed world, something that augurs well for their ability to compete in the global economy.

Alberta's 15 year olds compare favourably to other countries and to other Canadian jurisdictions, displaying average scores that are among the highest in the world.

**Plus** the skills of people who join the labour force from out of province – partially offset by the skills lost through out-migration.

Again, there is good news. Alberta attracts many skilled migrants from other provinces.

Alberta also attracts many immigrants, although fewer than some other provinces. However, it is difficult to make projections with regard to the skills of immigrants from other countries. Country of origin makes a significant difference and that could well change over time.

Immigrants tend to have lower reading skills than native-born Canadians with similar characteristics. It has been estimated that it takes about 11 years on average before immigrants eliminate the gap in prose skills.

**Plus** the skills added by participation in adult education.

We do less well here. Alberta compares reasonably well with other provinces in participation in formal adult education and training during the course of a year. However the Alberta figures are still close the national average and Canada as a whole does not compare favourably in this area – participation rates are below those attained by other countries and the intensity of training is lower than observed for many of Canada's trading partners.

It is reasonable to assume, therefore, that the flow of skills being added to the supply from this source will be modest in the absence of some major policy initiative.

**Minus** the skills lost by lack of use – partially offset by skills gained through practical experience.

The news here is surprising and discouraging.

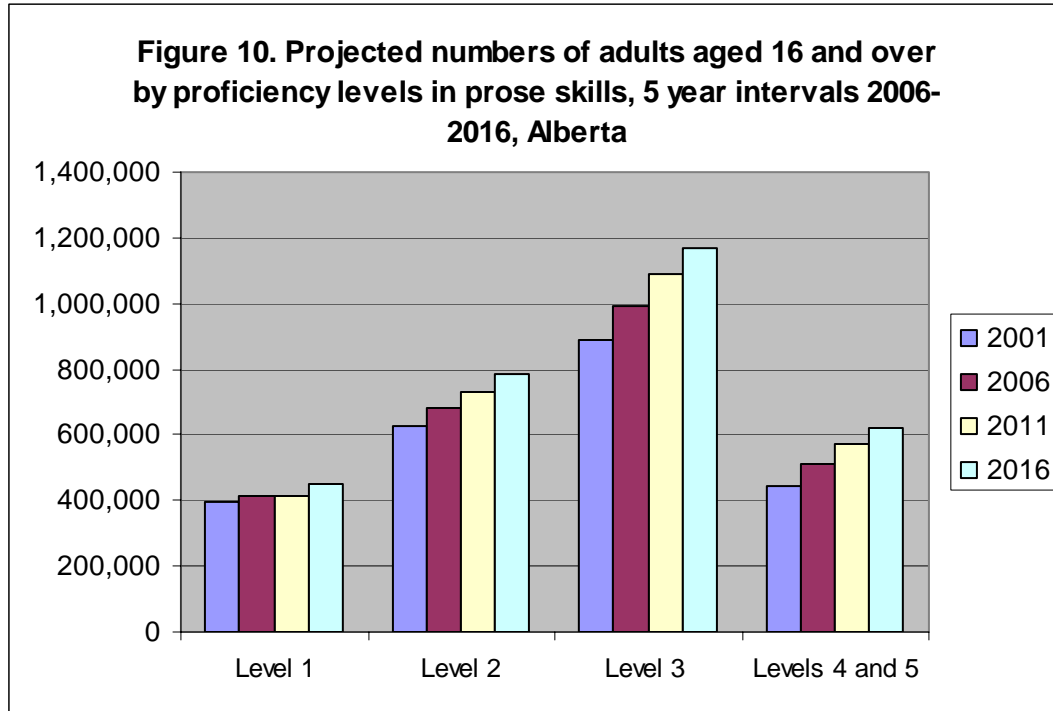
Comparison of data from the 1994 and 2003 international skills surveys that were described earlier confirmed a significant number of adult Canadians lost an appreciable amount of their reading skills over the intervening 9 years, enough to eliminate the positive impact of higher levels of educational attainment on the average reading score. The situation in Alberta is similar, mirroring the low level of skill use in some Alberta industries.

Figure 10 shows the projected supply of people in Alberta at different proficiency levels in prose skills from 2001 to 2016, shown at five year intervals. The figure suggests that, in the absence of policy change or other major shock, the trends toward higher levels of reading comprehensions skills will be slow, but relentless.

***Projecting supply and demand imbalances into the future***

There are always uncertainties in any projections into the future and, the longer we try to see into the future, the more the uncertainties and risk of error grow.

Moreover, the uncertainties and risks in the demand-side projections are different from those in the supply-side projections. So are the strengths of the two types of projections. For example, the demand-side projections were able to explore some aspects of likely future demand in different occupations. On the other hand, the supply-side projections were able to examine some of the demographic and geographic dimensions of supply.



We have also pointed out the added risk of making projections at the level of an individual province such as Alberta, given the high mobility of workers in Canada and the increasing globalization on the employer side.

*...A big, clear message for policy-makers*

Despite all these cautions, one big, convincing message does come out of this analysis of likely future trends in demand and supply.

That message is that ***the Alberta economy, if it is to be competitive, will require higher levels of reading comprehension skills in its labour market than will come from traditional sources.***

*... something will therefore have to give*

The obvious conclusion is that something will have to happen on the skills front if Alberta is to move forward on the economic front. Some combination of the following will be needed:

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- Increased labour market efficiency in matching jobs with people with the right skill levels would be important, but would not be sufficient. The Alberta labour market is already relatively efficient as was discussed earlier. The more fundamental problem lies in the lack of people with the needed reading comprehension skills.
- The education system may be able to further improve the reading comprehension skills of its graduates. However, Alberta already does a good job here relative to others. As well, the demographic structure of the population means that the numbers of young people entering the labour market will be relatively small.
- There may be ways of improving the worrisome loss of prose skills among adults who lose the skills they do not use. For that to happen, employers would have to restructure their jobs in a way that results in higher skill levels. Jobs would need to be designed in such a way that people would be expected to fully use their skills.
- Government policy in support of the above would have to centre on provision of information and assessment tools related to prose skills. As well more focus is needed on more general policies in support of a competitive, innovative, high-value economy that fully uses the skills of the workforce.
- People with high skill levels might stay longer in the labour market before retiring or moving outside of Alberta. Retirement patterns can make a very large difference in the retention of skills in the market.
- It might be possible to attract more workers with the requisite literacy skills from other provinces, other countries or attracting immigrants with lower literacy skills than needed. This will require additional language and literacy training to raise them to the needed levels.
- There may be concentrated pockets of people outside the labour force with low reading comprehension skills. They could be helped in finding employment through more focused social policy, including selective remedial prose training.
- As suggested by the analysis of Section 5, more could perhaps be done in the general area of adult learning for employees where prose skills fall below the level that is required. Possible solutions include remedial literacy training across a broad spectrum of occupations.

Many of the items on this list are primarily matters where decisions are made in the market and in the family, not by government. However, even here governments can help by providing the information on which rational individual and market decisions can be taken. This could include information about the demand and supply of skills as described in this paper, other labour market information and, perhaps most important, provision of skill assessment tools.

Section 7 takes an illustrative look at the implications of the last item on the list of possible changes above: a major policy offensive focused on remedial literacy training to bring all workers up to the level of proficiency in prose skills that is required by their jobs.

Section 8 will conclude with a more general discussion of policy implications.

## 7. A comprehensive program to eliminate prose skill shortages: how it might look once fully developed

This section illustrates how new data on the demand and supply of reading comprehension skills might be used in the design of policies. We analyze a hypothetical policy whose objective was to train all employees in Alberta that have prose skill shortages with a view to raising their skill levels so that they match the minimum requirements of their jobs.

*The policy that is examined is illustrative only*

This application is, of course, illustrative only. In reality, we would never rely on only one policy response. A concerted approach to tackling skill shortages would undoubtedly involve a number of the actions listed at the end of Section 6. To repeat,

- Some might involve interventions in the education system, before young people joined the labour market.
- Others might involve programs addressed to ensure that immigrants had the necessary skills, before they joined the labour force.
- Governments would likely develop programs to market the new data on skills shortages to individuals, employers and educators so that they could take the needed action with less need for direct government interventions. This could be supplemented by the development of information-based tools such as language and literacy assessment tools.
- Helping the market work better through information is a potentially powerful part of the solution, particularly since the market also creates large skills surpluses as well as shortages. That is, in the real world it would not be necessary to train all those in shortage. With an efficiently-operating labour market, some of the shortages might be filled by people that now have skill surpluses.
- In some cases, the practical answer would simply be to do nothing at all. For example, there may be little need to address the prose shortfalls of older workers who will be retiring soon.

As well, to the extent that the solution did involve cross-the-board literacy training of employees, practical programs would not attempt to tackle all the problems all at the same time as is the case in the hypothetical policy examined in this section. We would proceed slowly in a selective manner, monitoring success, building capacity and learning from experience. We would take into account other essential skills as well as prose skills – and perhaps some of the more specialized skills associated with particular occupations. Given the relative importance of non-official language immigrants and Aboriginal people as sources of net labour force growth, language training would have to play a part.

*So why use an example that seems to be unrealistically ambitious?*

We use such an ambitious project as an illustration for several reasons.



## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

First, the example is being used in order to demonstrate in a relatively simple manner how we can use the new data on skills in order to better undertake policy design work. One of the fundamental concerns motivating this analysis is that the literacy learning market in Canada is in failure. Key considerations include:

- Individuals have no way to know what their skill levels are and what skills they will need to remain employed.
- Firms have few ways of understanding the skill levels of their workers and where upgrading is required, there appears to be a large disjuncture between the products and services on offer and the needs of the majority of potential learners.
- Government policy makers have only vague notions of who has what kinds of learning needs and what it would cost to fix their problems.

As described in Box 8, our hypothetical example allows us illustrate a five-step policy design process that maximises the use of this important new knowledge to help solve this information deficit. It has potential for use in many practical remedial applications, large or small.

### **Box 8. The five-step design process**

The five-step design process illustrated here is one that attempts to make full use of the new data that has become available on the supply and demand for skills:

- In Step 1, we use the new data sources to identify the skills-related problem. In this example, it is the total prose skill shortages that have been identified in earlier sections.
- In Step 2, we take the total number of people that have these skill shortages and divide them up in various 'literacy learning segments' such that people with similar learning needs are grouped together. This is important because people learn in different ways and require different types of interventions.

If we attempted a one-size-fits-all approach to training, we would fail badly. In effect, in this step, we do a segmentation analysis of literacy learning market<sup>7</sup>.

- In Step 3, we identify best practice program responses for each of literacy learning segments and calculate the costs of providing those interventions. The costs are calculated at the level of specific industries and occupations.
- Step 4 consists of calculations of costs and benefits, resulting in figures showing returns on investments made.
- Step 5, which is only briefly touched on in this paper, consists of an analysis of who should pay for the needed training – the employee, the company, the government or some combination.

Second, by taking a highly ambitious and clearly hypothetical example, we can simplify our explanation.

- A full-scale program that, at its end state, aims at eliminating all skill shortages would be unrealistically ambitious, but it is relatively simple to describe. (As noted, in the real world a mix of different instruments would be used.)
- In particular, it avoids the huge complexities that occur when we attempt to calculate the costs and benefits of changes that are introduced selectively and gradually.

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<sup>7</sup> Readers may have noticed that the paper has avoided the use of the word 'literacy' to this point – for reasons that were given in the box at the start of Section 2. However, we now use the term in conjunction with the kind of remedial training needed to raise reading comprehension scores to satisfactory levels. In the real world, the word 'literacy' is routinely used in conjunction with remedial learning of this sort.

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

Finally, by being so ambitious, the example highlights the underlying reality that the skills shortages problem is indeed very large – one that does merit the consideration of big solutions. Further it illustrates that big solutions could have unusually high cost-benefit ratios in the end state, after a period of development and transition.

### *Segmenting the literacy learning market (Step 2)*

We have already made the Step 1 calculations – the identification of the target audience for possible interventions. These are current employees without all the prose skills required by the occupation in which they work. This step assumes productivity will be highest if all workers were able to work at the proficiency levels identified in the Essential Skills profiles.

In Step 2, we divide the target audience into reasonably homogeneous 'literacy learning segments' that share common sets of learning needs.

This segmentation into learning clusters was carried out through the use of some quite sophisticated analytic techniques that have developed recently and which were tweaked for purposes of this report.

The basic technique is known as 'latent class analysis', a tool that clusters people according to their learning characteristics as they relate to reading. These characteristics come from various sources, including from an in-depth 2005 International Survey of Reading Skills.

The specific analysis undertaken for this paper involved:

- Changing the target audience to those whose skills were not at the level associated with satisfactory job performance. (The earlier work had simply examined the costs of raising people generally to Level 3). The level of labour market skill demand has been shown to exert a significant influence on literacy skill acquisition and maintenance.
- Breaking out immigrants as separate learning segments, consistent with the findings described in Section 5.
- Extending the analysis to adults who need to move from Level 3 to 4 and from Level 4 to 5 – in those cases where skills shortages were at those higher levels.

Figure 11 describes the literacy learning clusters that have been identified. The column 'technical description' shows that the clusters were created using the following variables<sup>8</sup>:

- Different levels of prose proficiency levels. These are the five levels described in Section 3. Recollect that proficiency level 3 is the minimum level associated with leading a satisfactory life in today's global society.
- Different levels of comprehension skills, a critical factor in learning.

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<sup>8</sup> Another variable, whether the learning takes place in English or French, is also critical at the Canada level and in some provinces. However, rather than create 16 segments, we have simplified things by creating two sets of 8 segments – one for the English language literacy learning market and the other for the French. The Background Paper describes the market in Alberta for both French and English literacy learning, but the French market is very small and is omitted in this paper.



## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

**Figure 11. Description of literacy learning segments**

<b>Examples of people in the Literacy Learning Segments</b>	<b>Technical description</b>
<p align="center"><b>Learning Segment 1</b></p>	
<p>Segment 1 consists of adults whose mother tongue is English and who have such limited literacy skills that it is very difficult for them to gain new information from print.</p> <p>Almost all are male. Most are under the age of 35 and more than half have not completed high school. These adults have very limited print and limited vocabulary skills, as well as poor spelling skills. Their vocabulary can support very basic day-to-day interactions with print such as grocery shopping or watching television. Reading scores are so low that likely many of them are reading disabled to various degrees.</p>	<p>Prose proficiency below level 3</p> <p>Limited comprehension skills</p> <p>Very limited print skills</p> <p>Native-born</p>
<p align="center"><b>Learning Segment 2</b></p>	
<p>Individuals in Segment 2 do not have English as a mother tongue. While they share the same reading levels as those in Segment 1, they are considerably older on average. Many have had very limited or no exposure to formal education in their own language.</p>	<p>Same as Segment 1 except for immigrants with mother tongues other than English or French</p>
<p align="center"><b>Learning Segment 3</b></p>	
<p>Segment 3 consists of those with English as a mother tongue who have limited print and comprehension skills. They require the language and literacy skills necessary to integrate various sources of information and to solve more complex problems. They generally need to develop the literacy skills associated with secondary school completion and college entry.</p> <p>They are relatively young with most aged between 16 and 25. The majority has completed high school but has not pursued post-secondary education. In the population as a whole, most people at this learning level are found outside the ranks of the employed (only 23% are employed).</p>	<p>Prose proficiency below level 3</p> <p>Limited comprehension skills</p> <p>Limited print skills</p> <p>Native-born</p>
<p align="center"><b>Learning Segment 4</b></p>	
<p>Members of Segment 4 do not have English as a mother tongue. While their reading comprehension skills are similar to those in Segment 3, they tend to be older than their Canadian born counterparts. Almost three-quarters are over the age of 46. However, in sharp contrast to those in Segment 3, most of these people (82 per cent) are employed.</p>	<p>Same as cluster 3 except for immigrants with mother tongues other than English or French</p>
<p align="center"><b>Learning Segment 5</b></p>	
<p>Most Segment 5 adults (73 per cent) were born in Canada and have English as a mother tongue. Their proficiency level in prose skills is around the middle of Level 2. Their ages of these adults are relatively evenly distributed. About 28 per cent of the group has completed high school.</p> <p>In the population at large, most of these adults in this group are employed, although those born outside Canada are more likely to be employed (80 per cent) than those born in Canada (55 per cent).</p>	<p>Prose proficiency below level 3</p> <p>Adequate comprehension skills</p> <p>Limited print skills</p>
<p align="center"><b>Learning Segment 6</b></p>	
<p>Segment 6 is the largest and youngest learner group. They operate near the top of level 2 in prose proficiency. The majority are under the age of 45, have either a high school diploma or less. While they still do not have adequate reading comprehension skills, most have the primary reading component skills needed to help them become successful, independent, lifelong learners.</p> <p>In the general population, two-thirds are employed. As in Segment 5, immigrants are more likely to be employed (82 per cent) than those born in Canada (60 per cent).</p>	<p>Prose proficiency below level 3</p> <p>Adequate print and comprehension skills</p>
<p align="center"><b>Learning Segment 7</b></p>	
<p>These are employees who do have the reading skills that are generally satisfactory for most activities of life in today's society, but who fall short of the needs for their particular occupation. They are not dominated by any population sub-group.</p>	<p>Prose performance at level 3 but who need levels 4 or 5</p> <p>Adequate print and comprehension skills</p>
<p align="center"><b>Learning Segment 8</b></p>	
<p>These people are in a similar situation to those in Segment 7, but whose skill level is even higher.</p>	<p>Prose performance at level 4 but who need level 5</p> <p>Adequate print and comprehension skills</p>

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

- Different levels of what are referred to as print skills which also play a large role in learning. These are decoding skills – e.g., letter recognition, real word recognition, pseudo-word recognition and receptive vocabulary.
- Immigrant status (in the first four segments only) because experts suggest that immigrant learners are more motivated to learn and hence less expensive to treat.

Table 2, a couple of pages ahead, shows the size of the English language segments for Alberta.

- 53% of workers in English literacy skill shortage are in Segments 6, 7 and 8. These learners display no weakness in the mechanics of reading. That is, they have adequate decoding and comprehension skills. They can read to learn.
- Conversely 47% have discernible weaknesses in their decoding and comprehensions skills. That is, they have to learn to read.
- 9% of the market is in segments 2 and 4, the class dominated by immigrant women.

### ***Identifying interventions and their costs (Step 3)***

People in the different literacy learning clusters need different kinds of interventions, interventions that vary considerably in their cost. What we did at this step was to identify 'best practice' interventions and their costs for each segment. These were developed by a group of Canadian experts that are actively involved in delivering various sorts of efficient and effective remedial literacy programs. The best practice interventions are published in *Reading the Future: Planning for Canada's Future Literacy Needs* (CCL, 2008) and the unit costs are published in *Addressing Canada's Literacy Challenge: A Market Segmentation Analysis* (DataAngel, 2009).

Box 9 on the next page describes how the costs were calculated. All cost estimates are based on the average costs that are thought to be reasonable approximations for the segment in question. While actual costs will vary considerably for specific groups of learners, the experts judged that the amounts allocated were sufficient, on average, to achieve the desired result.

Table 2 provides data on the number of learners and the estimated costs. It shows that the cost of raising all employees to the skill level of their job would be very expensive, some \$1.6 billion for Alberta. This represents a one time investment of \$1666 per learner, roughly one fifth of what Alberta spends annually on the provision of health care per person. The table also shows the very large differences in the relative costs of training for the various segments:

- Segment 1 accounts for only 7% of all the potential learners, but training them would take up 19% of the entire cost of all training.
- The largest percent of learners are in segments 5 and 6 (61% of all learners) but they account for only 49% of the cost.
- Segments 7 and 8, where people have mastered the learning to read skills, accounts for 21% of the learners but only 1% of the costs.

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

### **Box 9. Estimating the costs for each cluster**

First, the direct costs of instruction are estimated by multiplying the estimated average number of hours needed to raise learners to the next level by the estimate of the number of learners in the respective group. The model assumes a standard rate of pay for instructors of \$35 per hour, the prevailing rate for the Foundations Program delivered by Douglas College<sup>9</sup>.

Second, the indirect costs of supporting instruction are estimated. Separate estimates are derived for:

- Recruitment costs: costs associated with securing participation in programs including marketing, outreach and basic program intake operations.
- Diagnostic costs: costs incurred in undertaking formative assessment to establish learning goals, learner needs and to establish baseline skill levels.
- Retention costs: costs that are incurred to provide sufficient learner support to ensure retention to completion such as personal contact throughout the program and for incidental expenses such as daycare, transportation, etc.

- Certification costs: costs incurred at program exit to establish, through comparison to initial skill level, learning gain.
- Facilities costs include things such as classroom rentals.
- Participant supplies include instructional resources such as paper, pens, workbooks, etc.
- Other infrastructure costs include institutional overheads.

Direct and indirect costs are then converted to a per point basis. Aggregate cost estimates are then derived for each segment by multiplying the average number of points to the desired proficiency level by the per point unit costs for each segment.

The cost estimates are meant to reflect the average costs of bringing each group of learners to the level demanded by their occupation. For groups with average skills at prose literacy Level 1, this involves estimating the cost of first raising the learner's skills to prose literacy Level 2 and then estimating the cost of raising learners the same learners to level 3.

### **What is not covered**

Language training, such as ESL training for immigrants, has not been included in the cost estimates.

As well, the program described in this section is about a hypothetical end state. It describes how a full-blown program might operate at maturity, after a period of development and gradual implementation. It therefore does not include development costs such as:

- The cost of training the instructors that will be needed to deliver the programs.

- The cost of developing and administering a system of instructor certification.
- The costs of providing general system supports such as the development of more efficient and effective curricula and delivery systems.

In reality, such costs would be large if the program were to be introduced quickly on a large scale. They would be more easily managed with a gradual phase-in, building on the considerable experience that already exists.

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<sup>9</sup> Readers should not take this as an endorsement of a college-based solution to Canada's literacy problems. The fact that this rate is considerably higher than many literacy instructors currently get paid means that the cost estimates presented in the report are on the high side, with the result that the estimated rates of return to literacy investments are conservative. At a minimum the \$35 rate is high enough to attract and retain instructors of the requisite quality.

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

**Table 2. Cost and market share of English language literacy market segments, Alberta, 2006**

	<b>Number of potential learners</b>	<b>Proportion of total literacy shortage market</b>	<b>Cost of remedial instruction</b>	<b>Share of cost by market segment</b>
Segment 1	64,250	7%	\$303,000,000	19%
Segment 2	53,650	6%	\$121,000,000	8%
Segment 3	29,050	3%	\$143,000,000	9%
Segment 4	25,550	3%	\$154,000,000	10%
Segment 5	280,750	29%	\$534,000,000	33%
Segment 6	303,750	32%	\$261,000,000	16%
Segment 7	161,500	17%	\$68,000,000	4%
Segment 8	39,800	4%	\$13,000,000	1%
<b>TOTAL</b>	<b>958,300</b>	<b>100%</b>	<b>\$1,597,000,000</b>	<b>100%</b>

It is interesting to note that the cost estimates here are much higher, and more realistic, than those previously estimated. This is because the costs were derived by multiplying the estimated number of points that the learner would have to gain at *each* level by a cost per point for each level. This approach increases the estimated costs at Proficiency Level 1 where costs per point are roughly 10 times those in Proficiency Level 2.

### *Costs for different industries and occupations*

As always, much of the real interest in these cost figures is at the level of specific industries and occupations in Alberta. And, as always, it would take too much space to display them all here in this report. Once again, we refer readers interested in specific industries and occupations to the Background Paper.

Figure 12 is intended to give a flavour of the full analysis by showing the 20 industries and 20 occupations that would require the largest investments to eliminate their skill shortages.

### ***Calculating benefits and rates of return (Step 4)***

The benefits of raising the skill levels through remedial training would depend entirely on how these new skills were used by employers and employees.

### *Worse case and best case scenarios*

It is relatively simple to calculate a worst case scenario. Here employers would simply ignore the new skills that had been acquired. Employees would do exactly the same work that they did before the training took place. Here the benefits and rates of return would, obviously, be negative. The entire 1.6 billion dollar investment would be lost, as would the time that workers spent on training as opposed to working.

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

**Figure 12. The 20 industries and occupations that would require the largest investment to eliminate their skill shortages, Alberta 2006**

<b>Industries needing the largest investments</b>	<b>Cost</b>	<b>Occupations needing the largest investments</b>	<b>Cost</b>
Retail Trade	\$184,000,000	Sales & Service Occupations N.E.C.	\$119,000,000
Food Services and Drinking Places	\$95,000,000	Clerical Occupations	\$116,000,000
Mining and Oil and Gas	\$93,000,000	Transportation Equipment Operators etc.	\$111,000,000
Transportation	\$87,000,000	Retail Salespersons and Sales Clerks	\$90,000,000
Trade Contracting	\$82,000,000	Occupations Unique to Agriculture	\$71,000,000
Crop Production	\$76,000,000	Construction Trades	\$57,000,000
Prime Contracting	\$72,000,000	Machine Operators in Manufacturing	\$51,000,000
Wholesale Trade	\$71,000,000	Wholesale, Technical, Insurance, etc	\$48,000,000
Primary. Secondary Education	\$63,000,000	Mechanics	\$46,000,000
Hospitals	\$49,000,000	Professional Occupations in ...Sciences	\$41,000,000
Ambulatory Health Care	\$39,000,000	Trades Helpers, Construction Labourers, etc	\$39,000,000
Architectural, Engineering, etc.	\$38,000,000	Teachers and Professors	\$39,000,000
Repair and Maintenance	\$34,000,000	Professional Occupations in Business, Finance	\$37,000,000
Local, Regional Govt, etc	\$28,000,000	Other Managers N.E.C.	\$37,000,000
Building Services	\$27,000,000	Nurse Supervisors and Registered Nurses	\$36,000,000
Food Manufacturing	\$26,000,000	Technical Occupations Related ....Sciences	\$36,000,000
Social Assistance	\$24,000,000	Machinists, Metal Forming, Shaping, etc	\$36,000,000
Nursing and Residential Care	\$24,000,000	Chefs and Cooks	\$35,000,000
Persona, Laundry Services	\$23,000,000	Childcare and Home Support Workers	\$31,000,000
Federal Public Admin etc.	\$23,000,000	Stationary Engineers, Power Station Operators	\$31,000,000

It is more difficult to:

- Calculate the benefits associated with a best possible case, i.e., one where the Alberta economy would be able to fully use all the new skills that had been created.
- Make an assessment of the most likely response of employers. It would be somewhere in between these best and worst case extremes, but it is not self-evident whether it would be nearer the best or worst end of the spectrum.

In this section of the paper, we address the first of these tasks – finding a way of calculating the best case scenario where employers would maximise their economic objectives by making fullest use of the available supply of skills. We turn to the second question, about actual behaviour, in the more speculative final Section 8.

## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

### *A best case scenario for returns on investment*

We calculate a best case scenario using a technique that makes use of the new data on skills that has been discussed in this paper. The technique is quite simple. Regression analysis is used to estimate the additional earnings that have been associated with a one point increase in prose skills (after controlling for the effects of age, gender, immigrant status, aboriginal status and mother tongue). Earnings increases, in turn, are used as a proxy for the full economic benefits that would result from the investment in training.

The regressions found that for every one point increase in actual literacy scores, average earnings increased by about \$155 in the real world. Remarkably, this earnings yield is stable over the entire wage and skill distribution, something that suggests that increases in reading comprehension have a direct impact on the productivity of workers. We use this figure to calculate earnings increases brought about by the new literacy training in each industry and occupation in Alberta.

In other words, because the goal is the limited one of calculating a first approximation of returns on investment in a best case scenario for a mature end-state program, we simply assume that:

- The costs are the \$1.6 billion in remedial training in Albert that is needed to eliminate all prose skill shortages.
- The new skills are acquired instantaneously.
- The market will absorb all of the newly acquired skills and that productivity increases will result in consequence.
- Higher productivity in turn leads to a more efficient and effective production of goods and services that lie at the heart of Alberta's prosperity and economic competitiveness.
- The higher productivity will become translated into higher wage rates for individual workers and the increase in earnings can therefore act as a good proxy for the broader economic benefits of the investment in training that result from productivity increases.

### *... a staggering best case pay-off*

When we run these calculations we find that, in the best case scenario, the investment of \$1.6 billion in Alberta leads to a staggering increase in additional earnings of \$9.7 billion a year. That implies an overall return on investment of over 500%. In other words, while the worst case scenario is dismal, the best case scenario is almost unbelievably high. That leaves a lot of middle ground!

Rates of return would vary greatly by industry and occupation. In this best case scenario, rates of return of around 500% or better would be found in:

- Industries such as Transport, Hospitals, Retail and wholesale trade, in most manufacturing industries and many others.



## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

- Occupations such as construction trades, administrative occupations in, for example, finance and insurance, child care and home support workers, clerical occupations and many others.

Again caution is obviously required. These are best case outcomes only, and made with many simplifying assumptions. Nevertheless, the payoffs are still surprising large. Even if the real world results were only half, or even a quarter, as good, we would still be talking about significant returns on investment.

### ***But who would make that investment (Step 5)***

With such potentially large payoffs, it is important to consider who gets the benefit and who should make the investment. Is it employers, the workers themselves, or governments?

Clearly society at large would benefit from having a stronger more competitive economy. However, society at large, through governments, already funds the huge proportion of skills acquisition – in schools and colleges before people enter the labour market. And governments also take on a major role for remedial skills training for the unemployed and those others who are outside the labour force.

The calculations of expected benefits were based on increased productivity, and hence earnings, meaning the main beneficiaries are employees and employers. Economic theory suggests that they should pay the cost. But in what proportion and with what kind of supporting role from government? Unfortunately the new data on skills that we have been using throughout this paper do not provide much insight on the answers to these questions, although we do return to them briefly in the final section.

The data sources do, however, allow us to examine an important related question – whether the employees with the skill shortages in question would have the financial capacity to pay for the training themselves. Table 3 provides data on the percentage of people in the various learning clusters in Alberta that are below Statistics Canada's low-income cut-off line.

Only some 8% are below the low-income cut-off, suggesting that government support may not be needed to precipitate high levels of participation and investment.

**Table 3. Proportion of learners below the low-income cut-off, Alberta, English language segments, 2006**

Segment 1	9%
Segment 2	14 %
Segment 3	7%
Segment 4	14%
Segment 5	9%
Segment 6	8%
Segment 7	6%
Segment 8	3%
<b>TOTAL</b>	<b>8%</b>



## 7. An 'End State' View of a Program to Eliminate Prose Skill Shortages

### ***How good is the data on returns to investment? – A 'Conditional C' rating***

We assigned a B or B+ 'policy relevance' rating to the data on the supply of prose skills.

The data on the demand for those skills got a B- or C rating.

The data that matched supply and demand in order to come up with shortages and surpluses could certainly not be better than either of these two. And most certainly the projections would have to be less accurate still – depending on how far into the future we are trying to forecast.

In this context, readers may be surprised to see that we give the seemingly high rating of a 'Conditional C' for the data on returns to investment, since even more arbitrary assumptions had to be used here and since the actual results seem to be so unusually high.

The answer lies in the word 'conditional'.

The techniques used in this section to calculate rates of return make sense given the quite hypothetical nature of the question being addressed. The goal was not to project actual returns on investment in remedial training, but only to give a first order approximation of the returns that might exist in a hypothetical 'best case' scenario.

In this kind of application, the methods used in this section seem reasonably solid. More sophisticated approaches might give different answers, but they would all likely be in the same ball park

The word 'conditional' is a signal that users will want to carefully examine the application in question before calculating rates of return. The results will vary greatly depending on the assumptions that are made.

## 8. Conclusion: using new evidence to shape policy

This concluding section deals with three topics:

- A summary of how the paper has used knowledge breakthroughs in the area of skills to support policy analysis.
- An assessment of the quality of the new knowledge and suggestions for improving its usefulness.
- Considerations related to possible action on the policy front in response to the new knowledge.

### *A. How the paper has used new data and new analytic tools to support policy analysis*

The paper began with the premise that a major improvement in our knowledge about the skills of employees might be expected to lead – over time and via routes that are sometimes indirect – to equally large improvements in the way we manage our human resources and in the way in which government policy supports skills development and labour market adjustment.

*The gains in knowledge have been huge...*

The paper illustrates this “big knowledge change = big potential policy change” premise by exploring the policy potential of the two recent knowledge breakthroughs:

- The first resulted from the direct measurement of the essential, generic, skills held by adults, using methods that were consistent and reliable. These came from international surveys in the mid 1990s and again in 2003. The paper also drew on other radical improvements in our knowledge, including the international PISA surveys of the skills of students and more in-depth surveys that allowed us to understand the various educational and social determinants of reading and essential skills and their impact on individual and collective outcomes, including the long-term rate of GDP growth.
- The second breakthrough is in the use of recently-developed tools of analysis that have allowed us to use data from different sources in an integrated manner. For example, the paper used information from the international skill surveys to add a skills variable to the 2006 census file, allowing analysis for the first time ever of skills by occupation and industry for smaller geographic areas.

Taken in combination, these are powerful new tools. No other aspect of the operation of the labour market and the economy has been so powerfully and suddenly illuminated by new knowledge, at least in recent decades.

*... but that knowledge is only now starting to lead to deeper policy understanding*

Policy analysts typically live in a world characterized by small incremental gains in knowledge and small incremental changes to policy. As indicated in the paper, it takes

time to digest the much more radical gains in knowledge that have taken place in the area of essential skills and to understand their consequences for policy.

*The transformation of the new knowledge into deeper policy diagnosis...*

The paper attempts to apply the new information in ways that demonstrate some of its policy potential. First, the paper used the new knowledge in several ways that are important to policy diagnosis:

- It used the international survey findings, in conjunction with new analytic techniques, to create new information on the supply of reading comprehension skills (perhaps the most fundamental of the essential skills) at the level of industry and occupation for Alberta, and other provinces and territories. That kind of disaggregation has never been done before.
- On the demand side of the skills equation, it was possible to use these new data sources in conjunction with a powerful set of essential skill profiles developed by HRSDC. This allowed the creation of never-before available data on the labour market demand for reading comprehension skills, by industry and occupation for Alberta. Few other countries have the tools to develop such information.
- Comparing demand and supply allowed the first ever calculations of skill shortages for prose skills (and surpluses, as well as cases where demand and supply are in balance) at the level of industry and occupation and also for groups of employees with different demographic characteristics, such as age, immigrant and aboriginal status, or population density.
- And finally, the same new information was used to make demand and supply projections of reading comprehension skills for Alberta and Canada. In doing this, important additional information was incorporated into the analysis, information that came from HRSDC's national occupational projections, from Statistics Canada's monthly labour force survey and from still other new sources of data on the demographic and educational determinants of reading skills.

*...and into powerful tools that support policy and program design*

In addition, the paper also provided a worked-through example of how the new data sources and methods could be used not only in diagnosis but also in policy design – in this case, the design of a major, but hypothetical, policy that had been suggested by the analysis above. In this hypothetical policy, remedial training was used to provide skill to all employees in Alberta such that they would gain the prose skills needed to operate at the level demanded by their jobs during periods when the job required working at peak skills.

- The diagnostic information discussed above provided estimates of the intended target audience for the interventions.
- At the next step, the diagnostic information was combined with still other data sources – and with still another analytic tool (latent class analysis) – in order to segment the target audience into homogeneous groups of employees that shared the need for similar kinds of learning interventions.

- Next, the costs of the needed interventions were calculated, once again using the same data sources, but this time augmented with qualitative information. This integrated use of qualitative and quantitative information is an important characteristic of the finely-grained integrated policy analysis that is likely to become dominant in the coming decades. In this case, the qualitative data was based on the views of expert practitioners in the literacy training area about the best-practice interventions for each of the learning segments and of their cost.
- Next, the same new data sets were used to calculate the benefits of the interventions, and hence allow calculations of returns on investment. This time regression tools were used that allow a link to be made between increases in skills and increases in earnings.
- Finally, the data were used to shed some partial light on the ‘who pays’ issue, namely the capacity of workers themselves to pay for the training. This was done by still another use of tools that allow integrated use of data from quite different sources, in this case by combining the learner data with Statistics Canada’s data on low-income cut-offs.

### ***B. How good are the findings? How might they be strengthened?***

The paper assigned a B or B+ ‘policy relevance’ rating to the newly-created supply data, a B- or C rating to the demand data, and a “Conditional C” rating to the data on returns on investment.

These ratings were a crude attempt to make the point that the new data and new analytic tools described here, while imperfect, represent a huge advance over status-quo policy analysis.

- We are far from the ideal (but unachievable) situation where there was perfect knowledge (which would get an A+ rating).
- However, we have advanced far beyond the knowledge that has existed to this point. Our current knowledge to support policy in this area would likely get an E rating on this scale. Why?
  - There is virtually no skills data at all on a sub-provincial basis, and only very limited provincial data by industry and occupation.
  - In many current applications, there is still a reliance on crude proxies for skills such as educational attainment or occupational attachment.
  - We have no information on what is happening with respect to skill trends within occupations – a weakness that continues.
  - Many applications today still rely on separate analysis of different data sets, and have not yet made use of the new analytic techniques that enable integrated analysis based on multiple data sets. As noted in the text, the high-level averages that traditionally result from single-application analysis can be quite misleading in situations where there is much diversity in the component elements of those big averages.

*How could analysis be improved?*

Because the data are so new, and because they point to some perhaps unexpected conclusions, people will naturally, and properly, be cautious about the use of the new knowledge. They will need to understand its limitations as well as its strengths before they act on it.

There are six areas at least where additional developmental work could have important payoffs and, in particular, could increase comfort levels in using the new knowledge in policy applications.

1. ***What's happening within occupations?*** Likely the biggest weakness in the data is that it measures changing skill levels at the level of occupations as a whole, and does not look at the changing skill requirements that are taking place within occupations.

No obvious sources of within-occupation data are currently available. However, it should be possible to at least develop a stronger understanding of how to best manage the risks created by this gap in our knowledge.

The paper suggests that the best approach is to assume that there is likely to be at least as much skill change within occupations as there is across occupations. That seems, intuitively, to be reasonable and prudent advice. However it is not supported by any in-depth analysis. With some further developmental work it may be possible to add some empirical evidence to support or modify that intuition.

2. ***How reliable are the industry and occupation data at finer levels of detail?*** Analysts will almost certainly worry about the accuracy of the finely-detailed industry and occupational data on prose skills by province – as well as data by sub-provincial regions. Nothing like it has ever been seen before. Questions about its quality are inevitable and appropriate. Will analysts in sectoral councils or unions be able to see themselves in the data? How does it compare with other sources of data? While the concern is real, the question may not always be well-framed:

- Traditional survey research places great emphasis on sampling error and there is a tendency to rely on measures such as standard error. However, there is relatively little sampling error in conjunction with the 20% sample used in the census. It will not create a big problem in terms of ultimate policy uses.
- There is also error associated with the imputation to the Census files of the skills information derived from other sources. The extent of that error can also be measured. The Background Paper describes the methods used and shows results both for sampling error and imputation error. The bottom line is that, given the policy uses in question, the data appear sound from these perspectives.
- A potentially larger concern lies in the non-sampling error associated with the original census data by industry and occupation. A household interview may not be the best possible source of information that can result in fine level coding of the industry where the respondent works, or even on information needed for detailed occupational coding.

Working with Statistics Canada, it would likely be possible to develop a user-friendly way of helping people engaged in policy-related analysis to better understand the quality issues that are associated with disaggregated occupational and industrial data.

- 3. *To what extent are prose skills a good proxy for all essential skills?*** Most policy applications will not be about prose skills in isolation, but on shortages and surpluses of all essential skills. For example, work-place remedial training would not likely not be limited to prose skills alone in those workplaces where the problems related to say, oral language and numeracy skills as well as prose skills.

As noted in the text, prose skills are clearly the best starting point; they are the essential learning-to-learn skills and are closely correlated with success on other skill fronts, certainly including document skills. However analysis has shown that there is not a complete correlation with number skills, and little work has yet been done in examining the new data on problem-solving skills. In addition, for at least two of the segments – Segments 2 and 4 – weak official language skills would appear to be a co-factor.

Further development work could certainly be carried out using the new data on numeracy and problem-solving skills. Such new analysis could indicate occupations where prose skill shortages were dominant, those where numeracy skill shortages were dominant, and those that experienced both types of shortages. It might be possible to also add a dimension dealing with problem-solving skills.

These findings might well be important in designing remedial interventions in those cases where a significant number of workers experienced shortages in more than one of the essential skills. It might also be useful to conduct additional development work using qualitative data from experts on the best approaches to learning when shortages exist in more than of the essential skills.

- 4. *What is the role of migration?*** At different points, the paper referred to the importance of migration and geographic mobility. However, no attempt was made to quantify the effect of mobility on the demand and supply of skills. Do inter-provincial migrants help to decrease the size of skill shortages or do they increase them? The Census mobility questions should allow for an analysis of these flows and their impact on the problem.

Further developmental work could be undertaken to quantify the role of immigrants and workers from other provinces in the skills market. The results might be particularly interesting for policy analysis in a province such as Alberta whose economy draws so heavily on workers from other provinces.

- 5. *Does demand really follow supply in the long-term?*** If we want to understand the future effects of today's policies then it is imperative that we move beyond mechanistic forecasting techniques that simply project past trends into the future. We need to look at what motivates the actual behaviour of both individuals and firms.

In particular, it is critical to better understand the workings of supply and demand in the longer term. The paper has suggested that it would be wise to assume that, over the longer-term, demand for skills will follow the supply of skills. This is particularly true if it can be assumed that a large percentage of low age/low skilled jobs will move

to lower cost countries. If that is the case, then increasing the supply of higher level skills will lead, eventually and often indirectly, to employers shaping the content of their jobs to make use those higher-level skills, resulting in higher productivity and, in consequence, higher wages and greater competitiveness in a global market. The alternative is not an attractive one. Faced with high proportions of low skilled workers employers are likely to “dumb down” their production processes and work organizations, a move that moves them away from the production frontier and thereby exposes them more to competitive pressure.

Accordingly, once again, the advice that we should assume that demand follows supply seems to be both intuitively sound and prudent. If we fail to raise ‘learning to learn’ skill levels, there is a risk that we will fall behind in the global economy. However, not all the evidence supports this line of thinking.

- While most critics would agree about the importance of a skilled labour force, some would argue that other factors are even more important to developing a competitive economic position – namely the roles played by capital, natural resources and a climate of innovation and risk-taking.
  - At a minimum the analysis suggests that governments should consider the introduction of tax measures that make human capital investments as attractive as technology investments that receive very attractive accelerated depreciation schedules.
  - And, for interventions for those who are not employed, it suggests that governments should reduce the amount of resources that they devote to passive income support and employment creation programs that are devoid of any skill content.
- As well, it might be argued that if the market does not do a good job of matching the supply and demand for skills in the short-run (and this paper suggests that it does not do a good job, at least for prose skills), then why should we assume that it will do so in the long-run<sup>10</sup>?
- And, even if skills are critical to longer-term economic success, that still leaves the question of the specific role played by essential skills (as opposed to job-specific skills) – and of the role played by prose skills within essential skills.

There are many considerations to be taken into account here, including theoretical questions about the determinants of economic growth and some tough questions about the meaning of the very large size of the prose skills imbalances that are seen in the 2006 data.

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<sup>10</sup> The answer may that we have just experienced a fundamental shift in the underlying terms of trade brought on by massive educational investments in the developing world, the knowledge intensification of work brought on by the diffusion of ICT’s into the production process, the globalization of markets for other inputs and falling barriers to trade. Such a shift increases the relative importance of average workers skill as a source of productivity growth. More simply put, when foreign workers have access to all the same inputs at the same cost, have the same skill levels and are willing to work for less then what will drive productivity growth is finding a way to get higher skills.



Additional development work in this area could not, of course, attempt to answer fundamental questions about economic growth. However, it might be useful to disentangle the many factors at play in understanding demand and supply issues in the short- and long-run. Such analysis might, for example, allow the development of different scenarios about how investments in essential skills could play out in terms of the skill structure of tomorrow's labour market. What are the risks associated with different skills investment strategies, in so far as existing knowledge allows us to calculate those risks?

6. ***Can we make access to the new knowledge more user-friendly?*** It might also be possible to develop more user-friendly outputs to help users navigate this largely unexplored and somewhat complex territory. We have introduced many unfamiliar data sets and analytic techniques. Much of the data at the detailed level is quite new and lacks familiar points of comparison.

We are thinking of a standard profile that could be automatically generated for any specific industry or occupation. Take a small level industry breakout for example. In addition to the prose skills data (demand, supply, shortages, surpluses, projections), the standard profile could provide information on:

- The occupations that made up that particular industry breakout and the skill data associated with those component occupations.
- Comparisons with industries at higher and lower levels of aggregation (if there are any at lower levels).
- Comparisons with the same industry in other provinces and for Canada.
- Descriptions of the methodology used in deriving the data, and information about its quality and about caveats on its use.

Such documentation could, of course, be voluminous and users could suppress those parts of it that they did not need.

### ***C. Developing a policy action plan***

The additional development work discussed above would be important. However, it is most unlikely to change the basic findings of this paper, namely that:

- Different occupations and industries experience both large shortages and surpluses of prose skills (and in all likelihood other essential skills).
- Overall, the future demand for higher level skills will almost certainly grow faster than can be met by traditional sources in the absence of policy interventions.
- Government policies in support of future competitiveness will therefore need to focus on raising the supply of essential skills. However, they will also need to pay attention to demand-side issues and on the efficiency of the labour market in matching supply and demand.

... *Many policies would be included*

For purposes of thinking about policy implications, the list of possible responses that is found at the end of Section 6 can therefore be re-organized along the following lines:

- Policies that could affect the supply of skills, including:
  - Policies directed to improving the essential skills of graduates from the schools and colleges. However, as noted, Alberta already does a relatively good job here. As well, population aging means that the number of young people entering the labour market will be relatively small.
  - Active labour market programs aimed at providing the unemployed and other at-risk groups with the skills needed to re-enter and succeed in the labour market<sup>11</sup>.
  - The provision of remedial learning for employees with skills shortages, either directly or through provision of incentives and information to encourage such activities by employees and employers.
  - Marketing activities designed to use the new information in order to increase the migration of highly-skilled people to Alberta from other provinces.
  - Policies to increase the flow of skilled immigrants to Alberta, including possible language training prior to entry into the labour force.
  - Policies that encourage skilled people to stay longer in the labour market and to retire later.
- Policies that could affect the demand for skills. These include:
  - General economic and fiscal policies that support competitiveness and innovation. It would be desirable to developing a better understanding of firm behaviour, particularly as it relates to how employers adjust their choices of work organization, production processes and production technologies to workforces with large proportions of weak skills. This would help understand the processes that underlie skill loss.
  - Marketing the kind of information found in this report to representatives of employers, employees and educators. People cannot respond to problems if they do not know that the problem exists.
- Policies that affect the efficiency of the labour market in matching the demand and supply of skills by:
  - Providing the necessary information on the current situation with respect to supply and demand, as above.
  - Providing diagnostic tools to measure the extent of skill shortages and surpluses, including those that could be used at the level of individual employees.

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<sup>11</sup> While not explored in the paper, the new data raise some interesting questions that go to the heart of remedial social programming. Now the main form of social support to those at risk is financial – EI, social assistance, tax credits, workers compensation, CPP disability. Training is usually an add-on to one of these forms of financial support. Is it possible that more emphasis could be placed on learning as the key resource for at least some at-risk groups, with financial resources in these cases being seen as the complementary resource needed in order to support the effectiveness of the more primary learning intervention?

- The provision of curricula that have been optimized to the needs of different groups of learners

*... with most of its component policies being well supported by the new knowledge*

A strategic policy response would almost certainly include initiatives on all three fronts. The new knowledge discussed in this paper will obviously be central to initiatives related to the demand for skills and to labour market efficiency in matching supply and demand. The new knowledge can also throw interesting light on many of the supply-side initiatives as well:

- The size of the potential skill pools – for example, the number of older workers with the needed skills who might work longer given the right incentives to postpone retirement, or the number of potential out-of-province migrants with the right skills, or the potential skills of people who are now unemployed or out of the labour force.
- The skills levels that exist in these potential supply pools and the costs that are associated with bringing people from those pools into the labour force at needed skills level.

*The next step – the first iteration of a strategic plan?*

Perhaps the most useful next step might be the development of a first cut at a strategic plan for developing policy responses along these lines. It could set out:

- Contextual information that identified the scope of the exercise and the challenges and opportunities that required policy action.
- Longer-term and shorter-term objectives of such policy action.
- A methodology for measuring whether those objectives had been met.
- An assessment of the possible roles and responsibilities of the many actors involved.
- A high-level assessment of the pros and cons of a wide range of particular policy interventions that would be included within the overall strategic framework and, especially, how different program components might work together.
- An assessment of the risks and uncertainties involved in the design and implementation of program components that appear to be essential to success – and an outline of a plan for managing those risks and minimising those uncertainties.
- The development of a consultation and consensus-building strategy.