



The Conference Board  
of Canada

Le Conference Board  
du Canada

# PSE Skills for a Prosperous British Columbia.

2016 Edition



**REPORT** DECEMBER 2016

## **PSE Skills for a Prosperous British Columbia: 2016 Edition**

Matthew McKean, Veldon Coburn, and Cameron MacLaine

### **Preface**

Skills gaps cost the B.C. economy up to \$7.9 billion in foregone GDP and over \$1.8 billion in lost tax receipts annually. This report presents findings from original economic and labour market analysis; a survey of B.C. employers; interviews with employers in four major economic sectors in B.C., accounting for more than 50 per cent of the economy. The report identifies the economic impact of skills shortages as well as the skills, occupations, and credentials that employers need to meet the province-wide drive toward higher levels of skilled labour. Included are recommendations for stakeholders on how to address the skills challenges.

To cite this report: McKean, Matthew, Veldon Coburn, and Cameron MacLaine. *PSE Skills for a Prosperous British Columbia: 2016 Edition*. Ottawa: The Conference Board of Canada, 2016.

©2016 The Conference Board of Canada\*

Published in Canada | All rights reserved | Agreement No. 40063028 | \*Incorporated as AERIC Inc.

An accessible version of this document for the visually impaired is available upon request.

Accessibility Officer, The Conference Board of Canada

Tel.: 613-526-3280 or 1-866-711-2262 E-mail: [accessibility@conferenceboard.ca](mailto:accessibility@conferenceboard.ca)

©The Conference Board of Canada and the torch logo are registered trademarks of The Conference Board, Inc. Forecasts and research often involve numerous assumptions and data sources, and are subject to inherent risks and uncertainties. This information is not intended as specific investment, accounting, legal, or tax advice. The findings and conclusions of this report do not necessarily reflect the views of the external reviewers, advisors, or investors. Any errors or omissions in fact or interpretation remain the sole responsibility of The Conference Board of Canada.

# CONTENTS

## **i EXECUTIVE SUMMARY**

### **Chapter 1**

- 1 Introduction**
- 2 B.C.'s Economy Continues to Shine
- 3 B.C.'s Demand for Skilled Workers Continues to Rise
- 4 Demographic, Economic, and Technological Challenges
- 6 Sources of Labour Market Participation
- 7 The Implications of Changing Skills Requirements
- 9 B.C. Employers Face Ongoing Technical, Employability, and Leadership Skills Challenges
- 10 B.C.'s Economic Future Depends on a Well-Educated, Highly Skilled Workforce
- 10 Project Objectives
- 13 Report Methodology and Structure

### **Chapter 2**

- 14 The Impact of Skills Gaps in B.C.**
- 15 Economic Impacts
- 17 The Economics of PSE and Work
- 19 Scenarios
- 20 Analysis
- 23 Closing the Gap Through Actions

### **Chapter 3**

- 24 The Shape of B.C.'s Skills Situation**
- 25 Employer Demand for PSE-Educated Workers
- 25 The Educational Profile of the B.C. Labour Force—Past and Present
- 27 Job Growth in the Last 10 Years
- 29 Up-Skilling and the “Great Recession”
- 30 Supply of PSE-Educated Workers in the B.C. Labour Market
- 33 Wages and the Price of PSE-Educated Labour in B.C.
- 34 The Demand for PSE-Educated Workers in B.C.
- 36 Forecasting the Educational Profile of B.C.'s Labour Force, 2016–25

### **Chapter 4**

- 38 What B.C. Employers Want**
- 39 Past and Planned Up-Skilling
- 41 Concerns Over Retirement and Competition
- 47 Conclusion

### **Chapter 5**

- 49 Conclusion: Addressing Skills Needs in B.C.**
- 51 Recommendations
- 55 Conclusion

### **Appendix A**

- 56 About the Finance, Insurance, and Real Estate Industry**
- 57 What Are the Skills Needs?
- 58 What Is Being Done to Address the Skills Needs?

## **Appendix B**

- 61** About the Technology Industry
- 62** What Are the Skills Challenges?
- 66** What Is Being Done to Address Them?
- 70** What Can the PSE Sector Do?

## **Appendix C**

- 74** About B.C.'s Transportation and Warehousing Sector
- 77** Addressing Skills Challenges

## **Appendix D**

- 80** About Natural Resources and LNG in B.C.
- 82** What Are the Skills Gaps?
- 84** What Is Being Done to Address the Skills Gaps?
- 86** What Can the PSE Sector Do?

## **Appendix E**

- 90** Bibliography

## Acknowledgements

The report was written and researched by Dr. Matthew McKean, Veldon Coburn, and Cameron MacLaine, with contributions from Dr. Michele Mastroeni, Doug Watt, Kareem El-Assal, and Melissa Lalonde.

Many thanks to our internal and external reviewers, especially Dr. Rob Annan, formerly Chief Research Officer at Mitacs, now Fellow at the Public Policy Forum.

The report was prepared with financial support from the Research Universities' Council of British Columbia, the BC Association of Institutes + Universities, and BC Colleges.

The Conference Board of Canada is solely responsible for the content of this document, including any errors or omissions.



## EXECUTIVE SUMMARY

# PSE Skills for a Prosperous British Columbia: 2016 Edition

### At a Glance

- British Columbia's economy is forging up to \$7.9 billion in GDP and over \$1.8 billion in lost tax revenues annually, because too few people have the education and skills needed to help businesses innovate and grow.
- Reliance on workers with post-secondary education (PSE) has grown in recent decades. In 1991–92, the share of jobs held by individuals with PSE and those without was evenly split. Today, approximately 70 per cent of all jobs in B.C. are held by workers with PSE. By 2025, that is expected to rise to 77 per cent.
- B.C. employers have strong concerns about the future availability of highly educated workers in the face of an aging population and rising retirement rates.
- B.C.'s public PSE system will produce 421,000 skilled workers over the next decade. The rate of growth in demand for PSE-educated workers is outpacing the growth in supply, leaving a potential shortfall of 514,000 skilled workers in the province.
- B.C. employers are looking for employees with “soft skills” and competencies important for workplace success. Critical thinking and problem-solving skills are identified as the most challenging skills to find in new workers.

**This report, which updates The Conference Board of Canada’s February 2015 report *Skills for Success: Developing Skills for a Prosperous B.C.*, presents findings from original economic and labour market analysis using the Conference Board’s proprietary macro-economic model; a survey of more than 300 B.C. employers; interviews with employers and experts in four major economic sectors in B.C., accounting for more than 50 per cent of the economy: finance, insurance, real estate; technology; natural resources and liquefied natural gas (LNG); and transportation and warehousing; as well as a review of relevant literature and current data.**

The report identifies:

- the educational and skills credentials that B.C. employers need in their employees today and in the future;
- the impact of education and skills gaps on the B.C. economy;
- the actions that PSE institutions, employers, governments, and individuals can take to ensure that B.C. has a highly educated, productive, and skilled workforce.

## **Skills, PSE, and B.C.’s Labour Market**

B.C.’s labour force relies heavily on PSE-educated workers. As of March 2016, 70 per cent of B.C.’s jobs were filled by workers with PSE, while the remaining 30 per cent were filled by medium- and low-skilled individuals without PSE. This was not always the case. As recently as 1991, the share was evenly split, 50/50. Since then, the province has emerged as a hub for knowledge-, technology-, and culture-based industries as well as major infrastructure and natural resource projects, and the demand for skilled, PSE-educated labour has grown strongly.



**B.C. employers will continue to rely on PSE institutions to produce the talent needed.**

Since the early 1990s, the demand for PSE for most jobs in B.C. has been rising at an annual rate of 1.75 per cent, steadily displacing jobs not requiring PSE.<sup>1</sup> This “conversion rate” has outpaced the growth of jobs, which was 0.98 per cent annually over the same period; low-skilled positions also saw negative annual growth, at a rate of -0.6 per cent per annum. As a result—and in step with population growth—the number of employed individuals in B.C. with PSE has almost tripled since 1985, increasing from about 564,000 to more than 1.6 million in 2015.<sup>2</sup>

## Labour Outlook

The Government of British Columbia WorkBC’s *British Columbia 2024 Labour Market Outlook* estimates that as many as 935,000 jobs will open up in the province from 2014–24 through retirements and new job creation.<sup>3</sup> The challenge lies in how the province will go about filling these positions. Significantly, the province’s latest labour market outlook report notes that over three-quarters of the job openings to 2024 will require PSE.<sup>4</sup>

The Conference Board’s projections show that the proportion of jobs in the B.C. labour market that will be filled by PSE-educated workers will continue to rise. (See Chart 1.) Over the next 10 years, the current share of 70 per cent will rise to about 77 per cent.

Consistent with the long-term shift toward high-skilled, PSE-credentialed workers, B.C. employers have noted that they will continue to rely on PSE institutions to produce the talent needed in the workplace. B.C. employers overwhelmingly identify colleges, institutes, and universities as the sources of talent and credentials needed for the jobs comprising much of the B.C. labour force.

1 See Chapter 4.

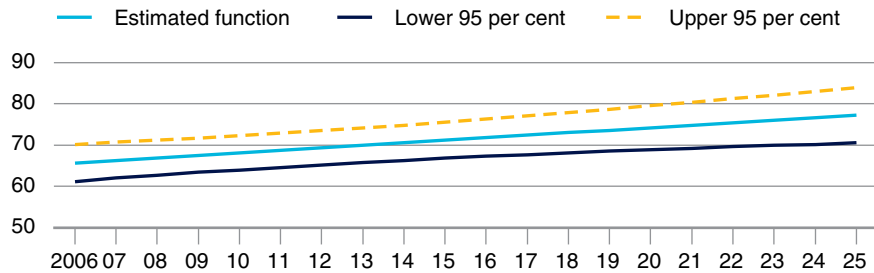
2 Calculations based on estimates developed in Chapter 3 and seasonally adjusted data from the July 1985 and July 2015 Labour Force Survey.

3 WorkBC, *British Columbia 2024 Labour Market Outlook*, 8.

4 *Ibid.*, 12.

Chart 1

**Projected Share of PSE-Educated/Skilled Occupations, 2006–25**  
(per cent)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of March in each of the years 2006 through 2016.

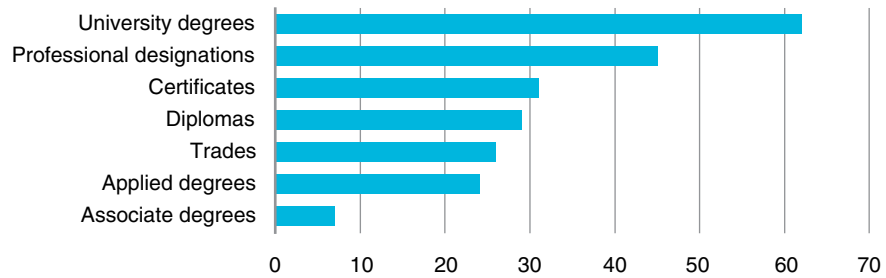
Over 60 per cent of employers we surveyed say that they require workers with university degrees and approximately one-half of employers note that post-secondary professional designations are also needed to meet their occupational requirements. There is also considerable demand for PSE certificates, diplomas, trades, and applied degrees with 31, 29, 26, and 24 per cent of B.C. employers acknowledging as much, respectively. (See Chart 2.)

Many B.C. employers want the province's PSE institutions to place more emphasis on work-integrated learning, including co-operative education, internships, mentoring, capstone projects, group work, and PSE-based consultancy opportunities.

Employers in B.C. indicate that broader aptitude is needed among workers, rather than a focus or specialization in one subject. Sixty per cent of B.C. employers surveyed for this project indicate that an emerging need among their workforce is the ability to work across multiple subjects. Half of the surveyed employers also indicate that social intelligence is a required skill-set, along with novel and adaptive thinking. More specific abilities include new media literacy, cross-cultural competency, virtual collaboration, and computational thinking.

**Chart 2****PSE Credentials Needed by B.C. Employers**

(per cent of respondents, n = 295)



Source: The Conference Board of Canada.

Employers are clear on the need for PSE-credentialed workers, but they are also clear when it comes to particular subject areas of PSE graduates. Business and management is the most preferred subject matter by B.C. employers. The second-most sought-after subject area is computer and information services, which is followed by engineering and electronics, communications, and sciences. These disciplines are closely followed in popularity by mechanical studies and the social sciences.

## Meeting the Increasing Demand for PSE-Educated Workers

Demand for PSE-educated workers in the B.C. labour force is rising, quickly and continuously. While the number of jobs filled by low-skilled workers fell by 2 per cent over the last 15 years, the number of jobs held by PSE-educated workers rose sharply by 32 per cent. However, B.C.'s education system is forecast to produce only 421,000 future workers over the next decade—leaving a potential shortfall of 514,000 skilled workers in the province. At the same time, other sources of labour supply are failing to meet this rising pressure, meaning that the rate of growth in demand for PSE-educated workers is outpacing the growth in supply.

---

Employers in B.C.  
will continue to  
transition toward  
higher-skilled  
workforces.

B.C. received nearly 36,000 immigrants as permanent residents in 2015, but this total is down 20 per cent from 2005 when the province welcomed about 45,000 permanent residents. While this should ease some of the province's skills deficits and human resources (HR) challenges, it will not be enough to close the gap between supply and demand for PSE-educated workers.

Employers in B.C. will continue to transition toward higher-skilled workforces. According to our survey, 9 out of 10 B.C. employers will undertake up-skilling in their places of business in the next three to five years. Without intensifying their up-skilling efforts, B.C. employers worry that productivity and revenue will fall, costs will rise, and innovation will decrease. But up-skilling alone is not enough. In order to meet all their talent and skills needs, B.C. employers are looking for significantly more workers who have acquired PSE skills and credentials, including degrees, diplomas, certificates, and professional designations.

B.C. employers describe a wide range of consequences that would ensue in the case of a skills shortage or if they could not find enough employees with the right skills. Over half of the B.C. employers who we surveyed indicate that productivity would decline. Similarly, nearly the same number of employers reveal that sales would diminish or there would be a loss of new opportunities. Respondents suggest several other related outcomes, namely, reduced profitability (38 per cent), less innovation (30 per cent), and increased costs (29 per cent).

B.C. employers want to fill the jobs of today and those of the future with PSE graduates from a range of backgrounds, including universities, colleges, institutes, and polytechnics. Given demographic shortages and rising skills needs, leaders in education, business, and government are understandably concerned that B.C. will not have enough people with the right education, expertise, knowledge, and skills to seize and support new opportunities and find new markets.

## The Impact of Skills Gaps in B.C.

The business case for more post-secondary education lies in the fact that the gap between jobs filled by post-secondary-educated individuals and low-skilled, lower-educated workers has widened significantly over the last 30 years. Post-secondary-educated workers accounted for 100 per cent of the 217,000 new jobs created in B.C. between 2006 and 2016. From March 2006 to March 2016, B.C. employers added approximately 266,350 jobs filled by post-secondary-educated individuals, but shed about 41,750 jobs previously occupied by workers with high school or less education. Because those with post-secondary credentials are more likely to be in the labour force and are more likely to be working when they are in the labour force, the probability of a person contributing to provincial GDP increases with a post-secondary credential.

Based on 2015 data, The Conference Board of Canada estimates that skills deficits will cost the province upwards of \$7.9 billion in foregone GDP and over \$1.8 billion in lost tax receipts, split roughly equally between the federal and provincial governments.

These estimates are a significant increase from 2013–14, and the findings of our previous report, *Skills for Success: Developing Skills for a Prosperous B.C.* when we determined that the province's education and skills gaps at the time could cost B.C. up to \$4.7 billion in foregone GDP and an additional \$1.39 billion in lost tax revenues annually. (Lost tax revenues include \$775 million in federal tax revenues and \$616 million in provincial tax revenues.)<sup>5</sup>

Employers are willing to pay a substantial premium for PSE-educated labour: in 2015, the average wage for PSE-educated workers in their first five years in the labour market was 65 per cent higher than their lower-skilled, lower-educated counterparts. In other words, the price of PSE-educated labour—paid as wages and salaries—continues to grow: over the period of 2000–15, real wages for this group grew by 10.4 per cent.

5 Stuckey and Munro, *Skills for Success*, 30.

## What PSE Institutions Can Do

B.C.'s PSE system is doing a great deal already, including adding institutions, increasing enrolment, and offering and developing programs to address skills gaps. B.C. also has one of the best PSE inter-institution transfer systems in the country, thereby providing students with more options and choices.

It is not uncommon for students to attend a college or institute for one or two years and then transfer to a university to complete a degree or vice versa. The British Columbia Council on Admissions and Transfer (BCCAT) “facilitates admission, articulation, application, and transfer arrangements among B.C. post-secondary institutions for the benefit of students.”<sup>6</sup>

BCCAT offers numerous transfer agreements between B.C.'s colleges, universities, and institutes, including private and out-of-province institutions.<sup>7</sup> An ongoing Student Transitions Project estimated in February 2015 that there were between 52,500 and 55,000 mobile students in the province over the previous three years.<sup>8</sup> Student mobility, facilitated by a robust set of credit transfer and articulation agreements, such as BCCAT's guaranteed course-to-course agreements and block transfer agreements, enables students to move to where there is demand for their skills, talent, and training, and thereby plays a role in addressing skills gaps.<sup>9</sup>

Meanwhile, many B.C. employers would like to see the province's PSE institutions place more emphasis on work-integrated learning, including co-op, internships, mentoring, capstone projects, group work, and PSE-based consultancy opportunities. Supplementing coursework with

6 BCCAT, *What We Do*.

7 Ibid.

8 Government of British Columbia, “Highlights From the Student Transitions Project,” 3. The study found that the number of students moving between institutions has, nonetheless, been declining since 2008–09, even though the number of new students entering the system has remained stable.

9 BCCAT, *2015–16 Annual Review*, 10–11.

---

Many B.C. employers would like to see more emphasis on work-integrated learning.

business and industry-related training cultivates links between employers and PSE institutions, enabling both to identify and communicate in-demand skills. Experiential learning also enhances learning outcomes as well as creates opportunities for students to develop employability skills and employer-based connections.<sup>10</sup>

The tech sector is the most likely to seek increased PSE institutional emphasis on co-ops (43 per cent, compared with 22 per cent for all other sectors), paid internships (23 per cent versus 14 per cent), and research and development collaborations (49 per cent versus 10 per cent). This suggests that the tech sector is more engaged with post-secondary institutions than other sectors and that this engagement is spurring greater interest in collaboration.

Employers in the natural resources sector show a clear preference for co-op as a form of experiential learning. It is noteworthy that more employers in the natural resources sector use apprenticeships (25 per cent) for training than in any other sector, making the development of apprenticeship pathways in the natural resources sector an important PSE priority area.

Work in natural resources and liquefied natural gas (LNG) is becoming more technical, involving sophisticated machinery, equipment, and technology. This is creating a growing demand for university-educated forestry engineers and other forestry-related applied degrees, among other specialties. For example, The University of British Columbia offers a full suite of undergraduate and graduate forestry degrees, ranging from Bachelors of Science in Conservation, Wood Sciences, and Forest Operations through to Forest Sciences, International Forestry, and Urban Forestry.

10 Stuckey and Munro, *The Need to Make Skills Work*, 30–33.

## Summing Up

B.C.'s economic future will depend on a well-educated and highly skilled workforce possessing PSE. The demand for skilled labour will encompass a wide variety of industries and sectors across each of the province's seven development regions.

B.C.'s PSE institutions are producing many of the educated and skilled workers that the provinces businesses need. This is essential because an educated, highly skilled workforce with “the ability to adapt to changing economic and social circumstances and opportunities” is key to sustaining B.C.'s economy, pursuing new opportunities, and achieving its full economic potential. Immigration and interprovincial migration are important parts of the solution, but will be insufficient in themselves to meet demands.<sup>11</sup>

To address the province's ongoing skills gaps and to ensure that employers are able to hire the right people with the right skills, B.C. must increase access to PSE—or close the access gap—so that more people ultimately develop the skills and acquire the knowledge and PSE to meet the province's labour force needs. (See “Recommendations for B.C. stakeholders.”)

By failing to address and overcome their skills shortages, B.C. employers could find themselves without the human capital they need to sustain and build their businesses, let alone contribute to the province's employment tax revenues. Moreover, without sufficient skills training, too many British Columbians could find themselves under-or unemployed.

11 Stuckey and Munro, *Skills for Success*, ii.



---

## Recommendations for B.C. Stakeholders

### For PSE Institutions

1. Improve student access and provide places in PSE programs for under-represented and at-risk populations, including Indigenous students, students with disabilities, and students from low-economic backgrounds, to compensate for a decline in the traditional PSE source population.
2. Expand co-op, internship, apprenticeship, and other workplace opportunities for students to acquire practical experience.
3. Create communication channels for employers to communicate skills needs to students and PSE institutions and commit to being responsive to the needs of employers and future employees seeking credentials.

### For Governments

4. Fund additional programs in target disciplines to ensure that PSE institutions have adequate resources and produce enough graduates to meet B.C.'s labour market needs in sectors with rising skills demands.
5. Fund PSE initiatives that target improving access and providing places for under-represented and at-risk populations.
6. Assist businesses with financial and administrative support to increase the number of workplace experiential learning opportunities offered by employers.
7. Improve labour market information for students, PSE institutions, and employers to provide accurate and timely information about current and projected skills and labour force supply and demand.

### For Employers

8. Make workplace experiential learning a priority by developing an HR strategy for employee renewal and growth that includes PSE students and graduates.
9. Provide targeted management training to address increased retirement levels and meet the need for large-scale workforce renewal through employee hiring and development.

### For Individuals

10. Seek out workplace experience opportunities, including co-op, internships, mentoring, and volunteering, to gain practical experience and workplace skills.
-



## CHAPTER 1

# Introduction

### Chapter Summary

- B.C.'s economy is strong. However, growing demands for skilled and knowledgeable workers across most sectors is placing increased pressure on the province's sources of skilled workers. Immigration and interprovincial migration are not keeping pace with the demand.
- The Conference Board conducted a new survey of 330 B.C. employers—covering over 65,000 employees or 3 per cent of B.C.'s employees—to find out what skills, occupations, and credentials employers require in their employees to meet current and future needs.
- This report sheds light on the economic costs of B.C.'s skills gaps; identifies the occupations, credentials, and essential skills needed to address them; and recommends actions that could be taken to address the province's skills gaps.

## **B.C.'s Economy Continues to Shine**

**B.C.'s economy grew faster than any other province's in 2015 and all signs point to another two years of strong growth.<sup>1</sup> Even with a downturn in the province's resource sector, B.C.'s real GDP growth is forecast to be 2.7 per cent in 2016 and 3.4 per cent in 2017.<sup>2</sup>**

There are a number of reasons for the strong outlook:<sup>3</sup>

- a stable and growing goods and services industry;
- a strong manufacturing sector (including Seaspan Shipyards' multi-billion-dollar contract to build non-combat vessels under the National Shipbuilding Program);
- solid housing starts (which bodes well for the finance, insurance, and real estate industry);
- a relatively low Canadian dollar, which:
  - bolsters the province's export economy (in particular, the province's motor vehicle parts and aircraft and transportation equipment manufacturing sectors are in an upward trend);
  - strengthens the province's tourism industry (which, in turn, will spur the accommodation, transportation, and food services industries throughout the province).<sup>4</sup>

1 Fields, *British Columbia Fiscal Snapshot*, 3.

2 Bernard, *Provincial Outlook Executive Summary Winter 2016*, 5. The Conference Board's forecast includes Petronas' \$36-billion Pacific NorthWest liquefied natural gas (LNG) terminal, which adds approximately one percentage point to the 2017 forecast. From Fields, *British Columbia Fiscal Snapshot*, 3.

3 The Conference Board of Canada, *Stellar Outlook*, 73–75.

4 *Ibid.*, 71–72.

---

Respondents indicate a need for a mix of credential types.

## B.C.'s Demand for Skilled Workers Continues to Rise

Employment in B.C. is forecast to grow by 2.2 per cent in 2016 and 2.4 per cent in 2017.<sup>5</sup> Job openings will come from the province's economic growth and from the need to replace workers leaving the market due to retirement, death, or out-migration. This upswing in job creation places increased pressures on B.C. employers to find workers with the right skills, credentials, and experience.<sup>6</sup> Projections developed by the Government of British Columbia estimate that in 2024, 78 per cent of jobs will require PSE. This is consistent with forecasts developed by The Conference Board of Canada, which estimates that 77 per cent of jobs will be filled by workers with PSE in 2024.<sup>7</sup> (See Chapter 3 for a detailed analysis.)

To meet B.C. employers' current and future occupational and skills needs, graduates of B.C.'s PSE institutions need to have the right credentials and skills. It is in the interests of students, educators, and counsellors, therefore, to be aware of B.C.'s labour market needs and the specific requirements that B.C. employers look for in new hires.

Respondents to the Conference Board's 2016 B.C. Employer Skills Survey indicate a need for a mix of credential types—dependent on the specific needs of their own firms and sectors.<sup>8</sup> (See Chapter 4.) A majority of B.C. employer survey respondents (62 per cent) indicate a need for university degree holders and 45 per cent indicate a need for professional designations. Thirty-one per cent of employers say they will need people with certificates; another 29 per cent say they will require college diploma holders; and 26 per cent of B.C. employers will need workers with trades qualifications.

5 Ibid., 72.

6 WorkBC, *British Columbia 2024 Labour Market Outlook*, 8–12.

7 Ibid.

8 It should be noted that the findings from the 2016 B.C. Employer Skills Survey do not reflect the possible economy-wide needs for PSE credentials, skills, and related occupations. The findings reflect the credential, skills, and occupational needs of those employers who responded to the Conference Board survey only.

Management-related job openings requiring degrees and/or a significant amount of work-related experience will be numerous in retail and wholesale trade; finance, insurance, and real estate; construction; corporate sales; and facilities and maintenance.<sup>9</sup>

Occupations requiring a degree, college education, or apprenticeship education will see substantial openings in areas such as business administration; finance, accounting, and bookkeeping; information systems; higher education; carpentry; social and community services; food services; early childhood education; and engineering.<sup>10</sup>

## Demographic, Economic, and Technological Challenges

Demographic, economic, and technological changes will continue to shape B.C.'s labour and skills needs. But slow population growth combined with quickening retirements means B.C.'s labour force growth will not keep pace with the number of job openings.<sup>11</sup> The *British Columbia Labour Market Outlook 2010–2020* predicted that the number of job openings will surpass the number of available workers by 2016.<sup>12</sup>

The updated labour market outlook to 2024 estimates that supply will exceed demand by 35,800 workers by 2019, before tightening over the last half of the decade.<sup>13</sup> “More than three-quarters of the openings projected to 2024,” according to the outlook, “will require some post-secondary education and training.” In particular, colleges, apprenticeship training, and universities (along with work experience for management positions) will need to supply 78 per cent of the future job openings in the province.<sup>14</sup>

9 WorkBC, *Jobs in Demand*.

10 Ibid.

11 The Conference Board of Canada, *BC Provincial Outlook 2014*; WorkBC, *British Columbia Labour Market Outlook 2010–2020*.

12 WorkBC, *British Columbia Labour Market Outlook 2010–2020*, 3.

13 Ibid., 11.

14 Ibid., 12.

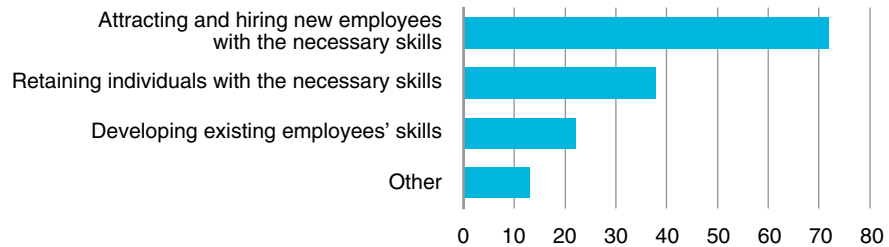
In addition to losing skilled employees to retirement, B.C. employers face other skills and labour challenges in the coming years, including:<sup>15</sup>

- attracting and hiring new employees with the necessary skills (72 per cent);
- retaining individuals with the right skills (38 per cent);
- developing existing employees' skills (22 per cent). (See Chart 3.)

**Chart 3**

**Sources of B.C. Employers' Skills Challenges**

(per cent of respondents, n = 86)



Source: The Conference Board of Canada.

Some employers we surveyed, for example, said it was becoming increasingly difficult to attract workers into occupations in the natural resources, transportation and warehousing, and construction sectors. Other employers operating outside of the Lower Mainland or Vancouver Island indicated that it continues to be more and more challenging to attract and keep workers in areas like Northern and Central Interior British Columbia.

15 Forum Research, telephone survey results, 2016.

---

Immigration and interprovincial migration remain important sources of skilled labour and talent for the province.

## Sources of Labour Market Participation

Employers look to several sources for workers, including immigrants (e.g., permanent residents, skilled trades immigrants, temporary foreign workers, provincial nominees, family class immigrants, and refugees), interprovincial migrants, the current workforce, and graduates from B.C.'s education institutions (including secondary and PSE graduates). However, B.C.'s need for skilled and knowledgeable workers exceeds current and forecasted immigration and interprovincial migration numbers. It is essential, therefore, that a made-in-B.C. approach to the education, skills development, and training of its current and future workforce remains strong and vibrant.

### Immigration and Interprovincial Migration

Immigration and interprovincial migration remain important sources of skilled labour and talent for the province. However, the number of immigrants, temporary foreign workers, and interprovincial migrants coming to B.C. with the skills, credentials, and experience needed to address current and projected talent shortages in B.C., while important, is insufficient to fill all its needs.

### Immigration

Permanent resident landings in B.C. have declined over the past decade, from a high of 44,770 in 2005 to 35,700 in 2015. This includes 3,710 provincial nominees; 2,625 skilled workers; 1,550 Canadian experience class applicants; and 75 skilled tradespersons.<sup>16</sup>

- Between 2013 and 2015, recent immigrants attained permanent resident status mostly through B.C.'s Provincial Nominee Program (33 per cent), followed by the Federal Skilled Workers Program (30 per cent), the Live-in Caregiver Program (17 per cent), and the Canadian Experience Class (11 per cent).<sup>17</sup>

<sup>16</sup> Immigration, Refugees and Citizenship Canada, *Research DataMart*, February 2016.

<sup>17</sup> Ibid.



- In 2014 and 2015, approximately 85 economic class principal applicants attained permanent residence in B.C. through the Federal Skilled Trades Program.<sup>18</sup>
- In 2014, 20,107 temporary foreign workers and 46,060 international mobility program applicants came to the province.<sup>19</sup>

### **Interprovincial Migration**

- Between 2008 and 2012, interprovincial migrants moving to B.C. trended downwards—with 2012 showing net negative interprovincial migration by almost 5,000 people.
- Only recently has this downward trend reversed, with over 16,000 interprovincial migrants choosing B.C. in 2014 (many interprovincial migrants coming to B.C. from oil-producing provinces such as Alberta and Newfoundland).<sup>20</sup>
- The Conference Board's forecast through 2020 shows net positive interprovincial migrant gains for the province.
- While this should ease some of the province's labour and skills gaps, many employers and sectors will continue to face skills deficits and HR challenges.

## **The Implications of Changing Skills Requirements**

Changing skills needs are an ongoing source of challenge for PSE, employers, individuals, industries, and governments. The Organisation for Economic Co-operation and Development (OECD) notes in its 2016 report *Getting Skills Right* that substantial costs ensue—including

18 Ibid.

19 The Temporary Foreign Worker Program exists solely for economic purposes, and an employer must receive a positive Labour Market Impact Assessment (LMIA) from the Government of Canada before a foreign national can apply for a work permit. The International Mobility Program exists for broad economic, social, and cultural purposes, and an LMIA is not required for a foreign national to obtain a work permit.

20 The Conference Board of Canada, *Stellar Outlook*, 72.

---

Skills-related policies need to involve many different stakeholder groups.

constraints on innovation, limitations on the adoption of new technologies, reductions in labour productivity and growth, and lost wages—where there are shortages of skilled labour.<sup>21</sup>

A significant challenge most jurisdictions face when looking to address their skills issues is that both the supply and the demand for skills often develop independently (in terms of actions and timelines); and often in response to different, sometimes contradictory, drivers and triggers.<sup>22</sup>

What is clear, according to OECD, is that skills-related policies need to involve many different stakeholder groups (interested in both the supply of and the demand for skills), including PSE institutions; different levels of government; different ministries; employers; labour organizations; industry associations; and community and regional economic agencies working together to inform the following.<sup>23</sup>

- “the development of occupational standards and worker training programs” (employment policy);
- “the design of educational programs ... and the allocation of funding” (education policy);
- the implementation of immigration programs for skilled workers, temporary foreign workers, skilled trades workers, provincial nominees, and international mobility workers (migration policy).<sup>24</sup>

The Conference Board’s 2016 report *Aligning Skills Development With Labour Market Need* presents a Canadian perspective on the complexities, inherent challenges, and opportunities associated with addressing and responding to the ever-changing skills needs of our economy. The report examines the need for Canada’s skills development ecosystem to be more responsive to both short- and longer-term skills demands, and what more might be done to improve alignment between

21 OECD, *Getting Skills Right*, 7.

22 Ibid., 26.

23 Ibid., 56.

24 Ibid.

skills development and labour market needs (e.g., improved labour market information systems, enhanced school-to-work transitions, and more effective partnerships between employers and PSE institutions).<sup>25</sup>

## **B.C. Employers Face Ongoing Technical, Employability, and Leadership Skills Challenges**

Results from the Conference Board's 2016 B.C. Employer Skills Survey show that B.C. employers expect to have the most frequent skills challenge over the next three to five years hiring and retaining employees with the technical skills they need (57 per cent). Another 50 per cent of B.C. employers say that it is increasingly difficult to hire and retain people with good employability/essential skills, such as critical thinking, communication, adaptability, information management, and working with others. Across all occupational categories and industry sectors, finding experienced managers and supervisors continues to be a significant challenge for 46 per cent of B.C. employers. This was also identified as a top concern identified by B.C. employers in our 2013–14 skills gap study.<sup>26</sup> (See Chart 4.)

## **B.C.'s Economic Future Depends on a Well-Educated, Highly Skilled Workforce**

B.C.'s economic future will depend on a well-educated and highly skilled workforce possessing PSE. The demand for skilled labour will encompass a wide variety of industries and sectors across each of B.C.'s seven development regions. The Business Council of British Columbia identified skills training and education as one of the key policy issues facing its membership in its collective effort to support economic growth and investment.<sup>27</sup>

25 Grant, *Aligning Skills Development*.

26 Stuckey and Munro, *Skills for Success*, v.

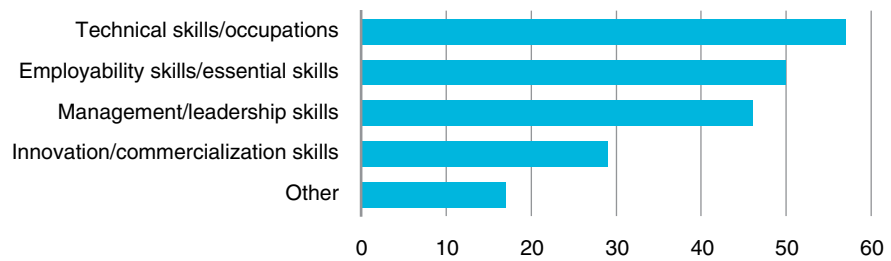
27 Business Council of British Columbia, *Key Issues*.

Identifying the right skills and experience levels needed to support the level of growth and prosperity that B.C.'s businesses and economy have the potential to achieve, however, remains one of the province's most pressing issues.

#### Chart 4

### Top Skills Challenges B.C. Employers Face Over the Next Three to Five Years

(per cent of respondents, n = 329)



Source: The Conference Board of Canada.

## Project Objectives

Our 2013–14 study *Skills for Success: Developing Skills for a Prosperous B.C.* helped to focus discussion on the education and skills requirement needs of B.C.'s economy and employers, and the negative impact that skills gaps would have on the economy.<sup>28</sup> Our expanded report is intended to further galvanize B.C.'s skills stakeholders—in particular, employers, educators, governments, and individuals—in their efforts to build a robust, accessible, and well-calibrated education and skills development system that is proactive and responsive to the province's current and future skills needs.

28 This report builds upon our 2013–14 Skills for Success research project. The *Skills for Success* report, published in 2015, is available for free download from the Conference Board's eLibrary at [www.conferenceboard.ca/e-library/abstract.aspx?did=6686](http://www.conferenceboard.ca/e-library/abstract.aspx?did=6686).

---

Identifying the right skills and experience levels remains one of the province's most pressing issues.

In early 2016, the Conference Board undertook a survey of B.C. employers, interviews with key informants, and other research activities. (See “About the Conference Board’s 2016 B.C. Employer Skills Survey.”) This report presents the results and provides a clear foundation for discussion and action on B.C.’s skills needs and issues. The project objectives remain the same as our 2013–14 study.<sup>29</sup> This report will:

- discuss the key factors shaping B.C.’s skills needs and issues;
- estimate the economic impacts and issues related to the province’s current and future skills gaps;
- identify the occupations, post-secondary credentials, and essential skills that B.C. employers need to contribute to growth and economic competitiveness;
- explore strategies that employers can adopt to attract and develop the workers they need;
- articulate actions that can be taken to address skills gaps and mismatches.

---

## About the Conference Board’s 2016 B.C. Employer Skills Survey

In spring 2016, the Conference Board conducted an online survey of B.C. employers, both public and private sector, as well as several B.C. industry associations and chambers of commerce. We combined our online survey methods with Forum Research’s telephone survey in four sectors:

- technology (60 responses)
- natural resources and LNG (54 responses)
- finance, insurance, and real estate (52 responses)
- transportation and warehousing (51 responses)

In total, 330 people provided input regarding the skills needs and issues their organizations face, including how skills needs have changed; the impacts of skills shortages; the occupations, credentials, and skills needed in the years

<sup>29</sup> Stuckey and Munro, *Skills for Success*, 7.

ahead; strategies they undertake to address their workforce needs; and how effectively they are able to communicate their skills and training needs to PSE institutions.

The Conference Board estimates that the organizations surveyed employ a minimum of 47,000 British Columbians.

## **Cross Section of Industry Sectors**

Employer respondents represent a wide cross-section of B.C.'s economy. The 10 industry sectors with the largest numbers of responses are:

1. technology
2. natural resources and LNG
3. finance, insurance, and real estate
4. transportation and warehousing
5. professional, scientific, and technical services
6. health care and social assistance
7. educational services
8. public administration
9. accommodation and food services
10. management of companies and enterprises

## **Regional Representation Across B.C.**

Respondents were asked to indicate the region in which the majority of their workforce is located, and employers from 26 districts across the province are represented in the survey findings. The majority of employer respondents (52 per cent) are from the Lower Mainland; followed by Okanagan Boundary, Kootenay, and Southern Interior (20 per cent); Vancouver Island and Central Coast (17 per cent); and B.C. North and Central Interior (11 per cent).

## **Age and Size of Businesses**

Most of the survey respondents come from established firms: 82 per cent said their companies have been in business in B.C. for 10 or more years; 12 per cent have been in business between 4 and 10 years; and 5 per cent have been in business for 1 to 3 years. Just 1 per cent of survey respondents indicated that their companies had been in business for less than 1 year.

Survey respondents come from a mix of small, medium, and large firms: 10 per cent said they are self-employed; 31 per cent said they have between 1 and 19 employees; 26 per cent have between 20 and 99 employees; 19 per cent have between 100 and 499 employees; and 13 per cent of respondents come from companies with over 500 employees.

---

## Report Methodology and Structure

To achieve the project's objectives, the Conference Board undertook a multi-faceted research methodology, including:

- a data and literature review;
- a survey of 330 B.C. employers to understand their skills needs and issues;
- an analysis of the economic impacts of B.C.'s skills gaps;
- interviews with 27 B.C. employers, educators, and labour market experts to obtain a more in-depth picture of the skills issues facing the province.

## CHAPTER 2

# The Impact of Skills Gaps in B.C.

### Chapter Summary

- The Conference Board of Canada estimates that skills gaps associated with low educational attainment among some B.C. residents cost the provincial economy up to \$7.9 billion annually in foregone GDP—as well as \$1.8 billion in provincial and federal tax revenues.



## **Concerns about the impacts of skills shortages in B.C. can be mitigated if the post-secondary sector, along with government, industry, and businesses, had the information they need to address current and future labour demands.**

How do rising post-secondary graduation levels affect the B.C. economy? This chapter answers this question by addressing the economic impact of increasing the number of people who access PSE education leading to a credential.

### **Economic Impacts**

Over the past 50 years, economists have developed an intricate understanding of the relationship between education and economic performance. Nobel Laureate Gary Becker was an early pioneer in the field of human capital theory, which holds that people invest in skills and education with an eye to increasing lifetime earnings.<sup>1</sup> The idea of human capital is now central to most economic models of growth and productivity.

The theoretical relationships between human capital and lifetime earnings have been corroborated through numerous empirical studies. For instance, Psacharopoulos and Patrinos reviewed evidence for 42 countries.<sup>2</sup> They found that every additional year of education produces a 10 per cent return on investments in formal education.

International empirical studies have been substantiated by Canadian studies. For instance, Bourbeau, Lefebvre, and Merrigan looked at returns from 1991 to 2006 based on Canadian census data.<sup>3</sup> They

1 See Becker, *Human Capital*.

2 Psacharopoulos and Patrinos, "Returns to Investment."

3 Bourbeau, Lefebvre, and Merrigan, "The Evolution of the Returns to Education."

---

People with higher learning credentials are more likely to earn more when they work.

discovered that after 1995, youth workers with higher education credentials had better labour market outcomes than experienced workers who lack these credentials.

Moreover, their analysis indicated that returns to education vary by province and territory, which suggests that the actual return is partly about the education and partly a function of the health of the labour market that accepts graduates. Returns to education have increased in Western Canada, as more of Canada's economic activity has moved to the Western provinces.

Ferrer and Riddell found that a community college or trade diploma generates an 8 per cent annual return when compared with high school.<sup>4</sup> Meanwhile, university degree holders generate a 36 to 46 per cent return over high school graduates. Returns to education are behind Canada's high rate of post-secondary enrolment and graduation—among the highest for advanced countries. Emery suggested that increasing enrolments are in response to employer demands for more skill.<sup>5</sup> He found that rising enrolments reflect the change from blue collar to white-collar jobs. The earnings data clearly show that the labour market demanded higher skills and the post-secondary system expanded to fill this need.

Given the structure of employer demand, the evidence suggests that people with higher learning credentials are more likely to participate in the labour force, to work while in the labour force, and to earn more when they work.

4 Ferrer and Riddell, "The Role of Credentials."

5 Emery, "Total and Private Returns."

## The Economics of PSE and Work

In this chapter, we are interested in establishing an empirical link between post-secondary enrolment and the macroeconomic performance of the B.C. economy. Before presenting our estimates, it is helpful to lay out the theoretical relationships between PSE, the labour market, provincial GDP, and governments' fiscal positions.

In macroeconomics, provincial GDP represents the total value-added of all economic activities within the province. Value-added is produced through provincial factors of production that include labour, capital, and land. Labour is the most important factor of production, as indicated by its share of factor payments. For instance, in 2014, compensation of employees accounted for over half of Canadian GDP at market prices, about twice as much as payments to capital.<sup>6</sup>

A key concept in macroeconomics is potential output. Potential output measures the capacity of an economy to produce GDP. As labour, capital, and land are made available for use, the potential output of the economy increases. Yet, actual value-added depends on the employment of factors and their productivity when employed. Although factors may be available for employment, they may not be effectively employed if these factors do not correspond to economic demands or if there is insufficient demand in the economy, as occurred after the credit crisis.

The quality of factors of production is as important as the quantity. This is especially true when it comes to labour. An economy may add people, but if the people do not have the right mix of education and skills, then potential output will not be as high as when people are suitably educated and skilled. This speaks directly to the challenge of aligning provincial education and skill development to employers' needs.

Consider, for example, the differences in B.C.'s adult (15+) employment rates by educational attainment. (See Chart 5.) Those with PSE credentials are over 40 per cent more likely to be working than those

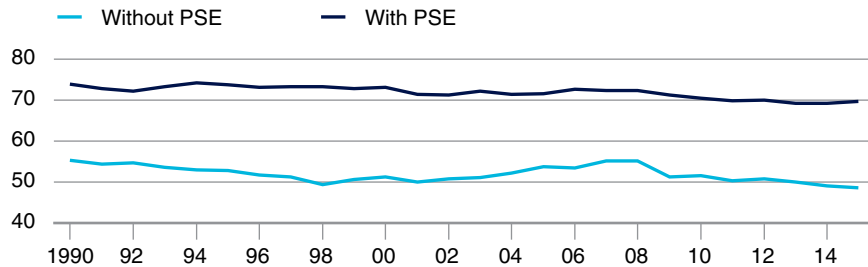
6 Computed from CANSIM table 380-0063.

without PSE credentials. This means that they are more willing to work (i.e., are in the labour force) and are more likely to be working when they enter the labour force. Therefore, the probability of a person contributing to provincial GDP increases if he or she graduates with PSE credentials.

### Chart 5

#### Employment Rate by Educational Attainment, B.C., 1990–2015

(per cent of employed population aged 15 and over)



Sources: Statistics Canada; The Conference Board of Canada.

The education system contributes to potential output by preparing people to meet employer demands. On average, post-secondary graduates meet these demands better than people who lack post-secondary credentials because their employment rate and wages are higher as a group. (See discussion below.) Nevertheless, there is considerable variability in employment and earnings by post-secondary field of study.<sup>7</sup> From an economic perspective, it is key for the PSE system to produce graduates with the right mix of subject matter expertise and employability skills to ensure that B.C. is getting the most out of its education and training systems.

Through the economic cycle, economies with higher levels of potential output can be expected to produce more value-added than those with lower potential output. As governments generate the vast majority of their revenue through taxation (as opposed to direct payments for services),

<sup>7</sup> See Grant, *Aligning Skills Development*.

It is key for the PSE system to produce graduates with the right mix of subject matter expertise and employability skills.

their financial position relies on potential output and the employment of factors of production. Governments raise revenue through direct taxes on factors of production (corporate and personal income taxes) and indirect taxes on expenditures (e.g., goods and services tax and B.C.'s provincial sales tax) that are effectively derived from factor payments.

## Scenarios

We illustrate these economic forces through scenarios that consider how rising levels of post-secondary graduation may affect the B.C. economy through the employment of labour. We consider two scenarios:

1. **Employment gap:** This considers how much provincial GDP would increase if the employment rate for the 15+ population in 2015 was as high as in 2008, before the credit crisis and associated economic downturn. The employment gap is a medium-term cyclical measure of labour market slackness.
2. **Access gap:** The access gap considers how much provincial GDP would increase if more people gained post-secondary credentials by accessing PSE in the province. It looks specifically at the labour market performance of those people who lack PSE credentials since 1990. The access gap is a long-term structural measure of the labour markets' relative demand for PSE credentials and associated education and skills. These gaps were explored in our report *Skills for Success: Developing Skills for a Prosperous British Columbia*.<sup>8</sup> We update and contrast our findings from that report.

We use Statistics Canada and the Conference Board's labour force and earnings data and the Conference Board's proprietary macroeconomic model of the B.C. economy to determine how improvements in the employment rate under these two scenarios would be expected to increase provincial GDP. As the provincial and federal governments' fiscal position is directly related to GDP, we use a government revenue sub-model to estimate how increases in provincial GDP under these

8 See Stuckey and Munro, *Skills for Success*.

---

Increasing labour compensation has a direct impact on GDP through factor payments.

scenarios would translate into increases in governments' revenues. We take a factor payment approach to GDP (GDP can also be measured through industry value-added and expenditures, which work out to the same number).

## Analysis

In 2015, the employment rate (the percentage of the population in employment) for B.C.'s 15+ population fell from to 59.5 per cent from its 2008 level of 63.2 per cent.<sup>9</sup> Our earlier *Skills for Success* report was based on 2013 data, at which time the employment rate was 59.8 per cent. So there has been a further decline since that report.

In 1990, the employment rate for those lacking PSE credentials was 55.3 per cent. By 2015, the employment rate had fallen to 48.5 per cent. Again, this is a further decline from the 2013 level in *Skills for Success*, which was 49.9 per cent.

In the first scenario, we were interested in the economic impact of increasing the employment rate to its 2008 level. Under that scenario, the employment rate for the adult population would increase by 3.7 percentage points.

Note, as B.C.'s 15+ population is 329,000 more than in 2008, this increase in percentage is being applied to a higher base population. Consequently, if the 15+ employment rate was the same as in 2008, 143,453 British Columbians would now be working—that is 18,793 more than our 2013 estimate.

How does this increasing employment affect provincial GDP? The main mechanism is through labour compensation. Increasing labour compensation has a direct impact on GDP through factor payments. Labour compensation then translates into greater demand for goods and services and so feeds through to payments to capital (profits

9 Data from The Conference Board of Canada, e-data.

and interest payments). Governments benefit from the bump in GDP through their direct and indirect tax systems, which results in growing government revenues.

For simplicity, we assume that the additional workers earn average labour compensation. In 2015, the average labour compensation in B.C. was \$49,240. In the first instance, the 143,453 British Columbians will increase provincial factor payments (and hence provincial GDP) by \$7.064 billion.

We use our proprietary macroeconomic model of the B.C. economy to determine how this change affects payments to capital, GDP, and governments' tax receipts. Our model estimates that payments to capital would increase by \$826.44 million. Hence, GDP calculated through factor payments would increase by over \$7.9 billion. (See Table 1.) As governments' tax receipts are sensitive to changes in GDP, we estimate that total (provincial and federal) government receipts would increase by over \$1.8 billion split roughly equally between the federal and provincial levels of government. Table 2 provides the breakdown of tax receipts by type and government.

**Table 1**  
**Changes in GDP From Closing the Employment and Access Gaps, 2015**

	<b>Employment gap</b>	<b>Access gap</b>
Average compensation 2015 (\$ 000s)	49,240	49,240
Change in labour employment (number)	143,453	121,224
Change in labour compensation (\$ millions)	7,064	5,969
Change in payments to capital (\$ millions)	826	698
Change in GDP (\$ millions)	7,890	6,667

Source: The Conference Board of Canada.

**Table 2**  
**Changes in Government Revenues From Closing Employment  
and Access Gaps, 2015**

(\$ millions)

<b>Direct taxes</b>	<b>Employment</b>	<b>Access</b>
<b>Personal income taxes</b>		
Change in federal personal income taxes	702	553
Change in provincial personal income taxes	413	336
<b>Corporate taxes</b>		
Change in federal corporate taxes	93	78
Change in provincial corporate income taxes	58	49
<b>Indirect taxes</b>		
Change in federal indirect taxes minus subsidies	225	190
Change in provincial indirect taxes minus subsidies	351	297
Total change in federal revenues	1,019	821
Total change in provincial revenues	823	682
<b>Total</b>	<b>1,842</b>	<b>1,503</b>

Source: The Conference Board of Canada.

In the second scenario, we are interested in the impact of increasing the number of people who access PSE education leading to a credential. We determine the number of people who would be working if the employment rate for those without PSE credentials was the same as in 1990. Specifically, we are interested in how the worsening conditions for those with less than PSE have affected employment and provincial GDP.

The employment rate for those without PSE credentials has fallen by 6.8 percentage points since 1990. Applying that to the B.C. 15+ population suggests that, in 2015, 121,224 British Columbians were not working because they did not access the PSE system. (This is somewhat higher than the 95,500 that we computed in our earlier study.)

Using the same methodology as for the employment gap, we estimate that closing the access gap would generate \$5.969 billion in additional compensation. Running this increase in compensation through our model



---

Government actions need to be mindful of the return of investment in PSE access.

generates additional payments to capital of over \$698 million. Hence, closing the access gap would generate over \$6.6 billion in provincial GDP. (Our earlier report estimated the access gap as \$4.7 billion in 2007 dollars, or \$5.1 billion in current dollars.) In turn, this would increase government revenues by over \$600 million.

## Closing the Gap Through Actions

Note that the two gaps are different in kind. The employment gap is a medium-term measure, which is likely to improve through demand side factors when the B.C. economy fully recovers from the 2008 recession. The access gap is a long-term structural factor that reflects employers' demand for higher-skilled workers. The current outlook for B.C.'s economy suggests that demand may take longer to recover than previously believed. This explains why governments at the federal and provincial levels are in the process of loosening fiscal policy to support medium-term demand.

Closing the access gap will involve expanding post-secondary enrolments and graduations, especially in fields of study in high demand from employers. We discuss these employer demands in Chapter 4 and in appendices A to D.

It is also important to note that government actions need to be mindful of the return of investment in PSE access. On the cost side, this return takes into consideration government subsidies for post-secondary teaching, which may take place over two to four years in most cases. On the benefit side, it recognizes that provincial revenue returns are generated year after year during the working lives of those British Columbians who have gained a PSE credential.

## CHAPTER 3

# The Shape of B.C.'s Skills Situation

### Chapter Summary

- B.C.'s labour force is heavily reliant upon PSE-educated workers. As of March 2016, 70 per cent of jobs in BC were filled by workers with PSE and the remaining 30 per cent by low-skilled individuals; in late 1991, the share was evenly split 50/50.
- Over this same period, BC employers have been “up-skilling” occupations, converting them to be filled with PSE-educated workers, at an average annual rate of 1.75 per cent. This “conversion rate” has outpaced the growth of jobs, which was 0.98 per cent annually over the same period, which also saw negative annual growth among low-skilled positions at a rate of -0.6 per cent per annum.
- Despite the substantial growth in the relative supply of PSE-educated individuals in the labour market, the price of PSE-educated labour—paid as wages and salaries—also continues to grow: over the period of 2000–15, real wages for this group grew by 10.4 per cent.
- Employers are willing to pay a substantial premium for PSE-educated labour: in 2015, the average wage for PSE-educated workers in their first five years in the labour market was 65 per cent higher than their low-skilled, lower-educated counterparts.

## **Employer Demand for PSE-Educated Workers**

**The education profile of the B.C. labour market has undergone a profound transformation in the last three decades. About 25 years ago, in 1992, there was an even split between jobs filled by low-skilled workers and jobs held by workers with PSE. In each year since then, employers in the province have become increasingly reliant upon PSE-educated workers, shifting away from low-skilled labour.**

This trend shows no sign of reversing as demand among B.C. employers for PSE-educated workers continues to grow. Despite the increasing availability of individuals with higher education and skills acquired beyond high school, prices for this skilled labour—what is paid out to workers as wages and salaries—have been rising in the province. And, even as the relative supply of PSE-educated workers continues to increase, B.C. employers pay a considerable premium for the labour of recent PSE graduates over workers with high school or less education.

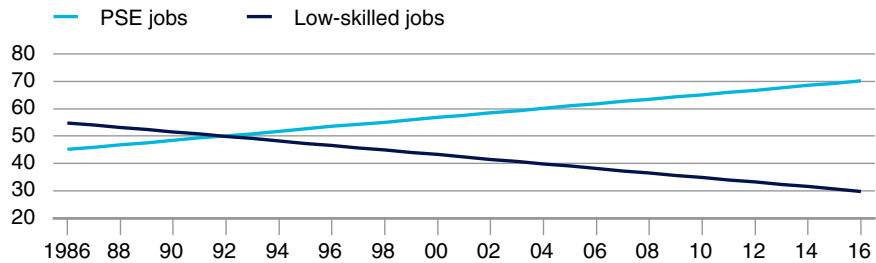
## **The Educational Profile of the B.C. Labour Force—Past and Present**

Today, employers in B.C. fill the vast majority of jobs with PSE-educated individuals. This was not always the case in B.C. where employers, until the early 1990s, hired more workers with high school or less than workers with PSE. Thirty years ago, in 1986, low-skilled workers filled about 55 per cent of B.C. jobs, leaving 45 per cent for PSE-educated people. By 1991–92, this division was equally split, 50/50. (See Chart 6.)

The shift did not end at the equalization of high-skilled and low-skilled jobs in the B.C. labour market. In fact, the upward trend toward greater proportions of jobs filled by PSE-educated workers has not stopped. Since equalization—about 25 years ago in 1992—the majority share of

Chart 6

**Share of PSE-Educated and Low-Skilled Jobs in B.C., 1986–2016**  
(per cent)



Source: Calculations by The Conference Board of Canada using the 1986 Census Public Use Microdata File and the March 2016 Labour Force Survey.

jobs in B.C. has swung to PSE-educated individuals, having climbed a further 20 percentage points to slightly above 70 per cent, leaving low-skilled jobs with slightly less than 30 per cent of jobs. (See Chart 6.)

The widening gap between jobs filled by PSE-educated individuals and low-skilled, lower-educated workers is depicted in Chart 7. The chart shows that the shift toward high-skilled jobs was initiated long before the equalization of skilled and low-skilled workers in 1992. Since 1992, the gap has enlarged to more than 40 per cent in favour of PSE-educated individuals. At an annualized rate, this gap is expanding by 1.7 percentage points per year, on average. Put another way, B.C. employers are converting from low-skilled labour to a higher-skilled, PSE-educated workforce at a rate of 1.7 per cent each year. (See Chart 7.) As a result—and in step with population growth—the number of employed workers in B.C. holding a PSE credential has almost tripled since 1985, increasing from about 564,000 to more than 1.6 million in 2015.<sup>1</sup>

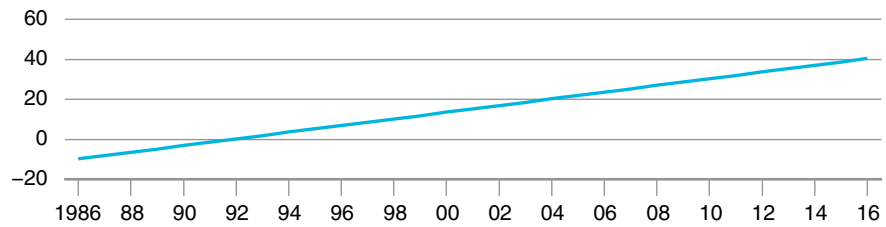
Beneath the aggregate trend of the overall B.C. labour market, various industries are also undertaking a shift toward higher-skilled, PSE-educated workers. While not surprising for industries that have always

<sup>1</sup> Calculations based on estimates developed in Chapter 3 and seasonally adjusted data from the July 1985 and July 2015 Labour Force Survey.

Chart 7

**PSE-Educated and Skilled Job Gap, 1986–2016**

(per cent)



Source: Calculations by The Conference Board of Canada using the 1986 Census Public Use Microdata File and the March 2016 Labour Force Survey.

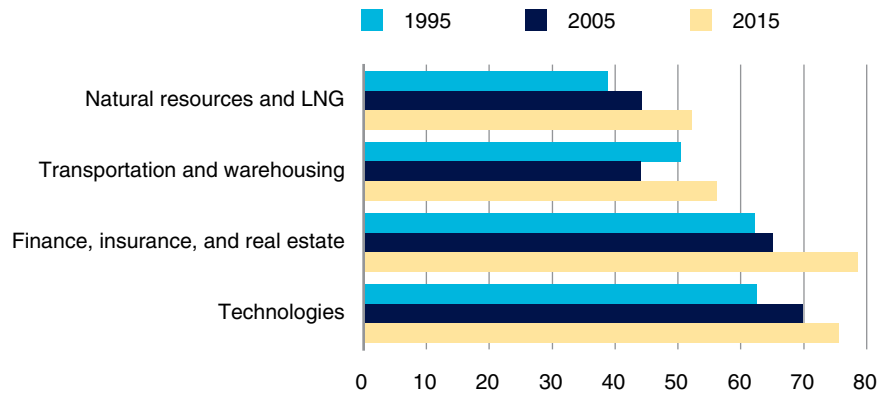
been associated with advanced skills, it is noteworthy that industries that are traditionally viewed as less skilled are also undergoing the same transformation. The majority of occupations in the technology and finance sectors, for instance, have been filled by workers with a PSE background for the past couple of decades. In 1995, over 62 per cent of jobs in each of these sectors were filled by someone with PSE; 20 years later, this figure has risen to 79 and 76 per cent for the finance and technology sectors, respectively. In the natural resources sector, including oil and gas, the share of jobs occupied by a PSE-educated individual rose from 40 per cent in 1995 to about 52 per cent in 2015. The same has occurred in the transportation and warehousing industry, where the proportion rose from 51 to 56 per cent. (See Chart 8.)

## Job Growth in the Last 10 Years

Over the course of the last 10 years—from March 2006 to March 2016—B.C. employers created 217,000 new jobs, raising the total number of jobs from about 2.1 million to over 2.3 million.<sup>2</sup> This gain of 217,000 jobs, however, disguises a substantial shift toward PSE-educated workers. During this 10-year period, PSE-educated workers accounted for 100 per

<sup>2</sup> Figures presented here and used in our analysis are raw job counts from the March 2006 through 2016 Labour Force Survey.

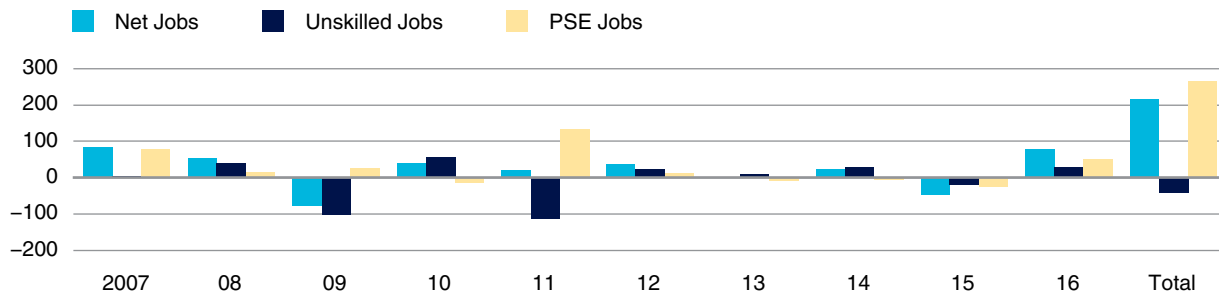
**Chart 8**  
**Skilled/PSE-Educated Share of Labour Force by Select Industry**  
(per cent)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

cent of the net gain of 217,000 jobs. In fact, from March 2006 to March 2016, B.C. employers added approximately 266,350 jobs that were filled by PSE-educated workers, but shed about 41,750 jobs that were previously occupied by workers with high school education or less. (See Chart 9.)

**Chart 9**  
**Year-Over-Year Net Up-Skilling in B.C. Workforce, 2006–16**  
(number of jobs, 000s)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of March in each of the years 2006 through 2016.

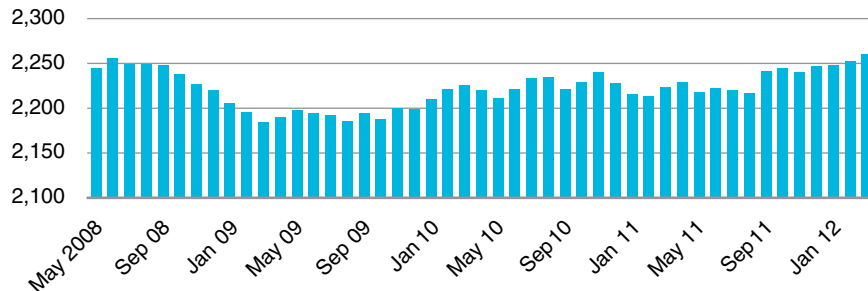
## Up-Skilling and the “Great Recession”

The last decade bore witness to the Great Recession, a period of steep economic downturn in global economies. The extraordinary economic events that began in the last half of 2008 put an end to over 20 years of nearly uninterrupted job growth in British Columbia. At its pre-recession peak at the end of June 2008, the B.C. labour market had filled approximately 2,255,800 jobs. In less than a year—by the end of March 2009—the workforce had contracted to 2,183,800 jobs. The net loss during the contraction, from peak to trough, amounted to a loss of 72,000 jobs. Recovery in the job market was much slower than the rapid nine-month contraction: regaining lost jobs took three years, from the trough in March 2009 to 2,259,800 jobs in March 2012. (See Chart 10.)

Chart 10

### B.C. Jobs Before and After the Great Recession

(number of jobs, 000s)



Source: Statistics Canada, CANSIM table 282-0088.

The devastating economic effects of the Great Recession, however, were not felt uniformly throughout the B.C. labour market. Indeed, the up-skilling trend of the workforce in B.C. continued as B.C. employers accelerated their shift toward PSE-educated employees over low-skilled labour. During the labour market contraction when the net job loss totalled 72,000, employers in B.C. added 20,500 jobs that were filled with

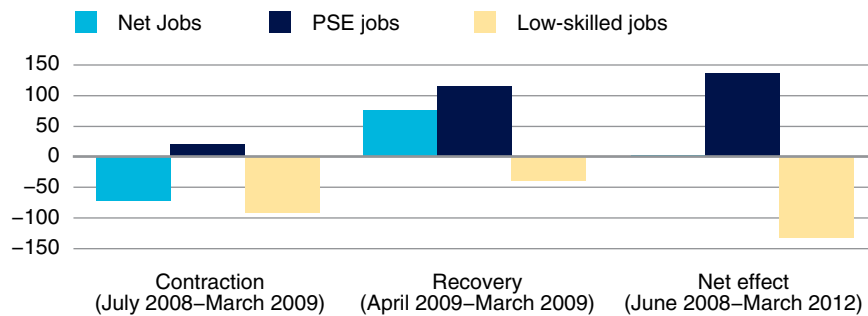
Participation in the B.C. labour market has seen significant growth in the absolute number of people with PSE.

PSE-educated workers; at the same time, employers shed 92,500 jobs filled by low-skilled workers with high school education or less. (See Chart 11.)

The up-skilling pattern in the B.C. labour market continued unabated during the recovery period. In fact, PSE-educated workers filled 100 per cent of the net gain of 76,000 jobs, and thousands more, as the B.C. labour market rose to its pre-recession level. From March 2009 to March 2012, the number of jobs held by PSE-educated workers rose by 115,400, but the number held by lower-educated and low-skilled workers fell by 39,400. All told, approximately 132,000 jobs that were previously held by those with high school or less were replaced by jobs filled by PSE-educated workers. (See Chart 11.)

**Chart 11**  
**Net Effect of Great Recession on Skilled Jobs and B.C. Labour Force**

(number of jobs, 000s)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the months of June 2008, March 2009, and March 2012.

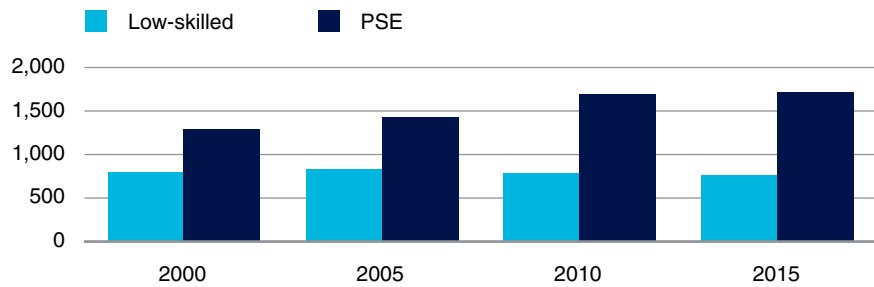
## Supply of PSE-Educated Workers in the B.C. Labour Market

Participation in the B.C. labour market—which includes both employed and unemployed people—has seen significant growth in the absolute number of people with PSE. Between 2000 and 2015, the number of



labour market participants with PSE increased by approximately 423,000, rising from about 1.3 million to over 1.7 million. The number of low-skilled participants in the labour market, on the other hand, decreased by 37,000 over the same period, falling from 799,000 to 762,000 people. (See Chart 12.)

**Chart 12**  
**B.C. Labour Market Supply**  
 (number of participants, 000s)



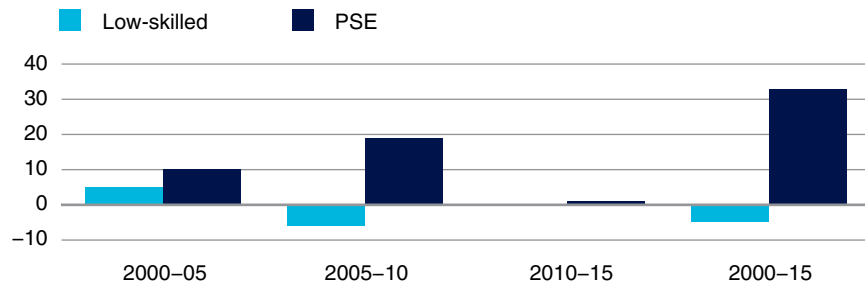
Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

Put another way, the supply of PSE-educated participants in the B.C. labour market rose by 33 per cent, whereas the supply of low-skilled workers fell by 5 per cent. Although the supply of low-skilled workers in the B.C. labour market rose by 5 per cent during the period of 2000–05, it has subsequently fallen by 6 and 3 per cent in the periods 2005–10 and 2010–15, respectively. The supply of PSE-educated workers in the B.C. labour market rose in each of these periods, growing by 10, 19, and 1 per cent for the respective durations of 2000–05, 2005–10, and 2010–15. (See Chart 13.)

**Chart 13**

**Labour Market Supply Growth Rates, 2000–15**

(per cent)



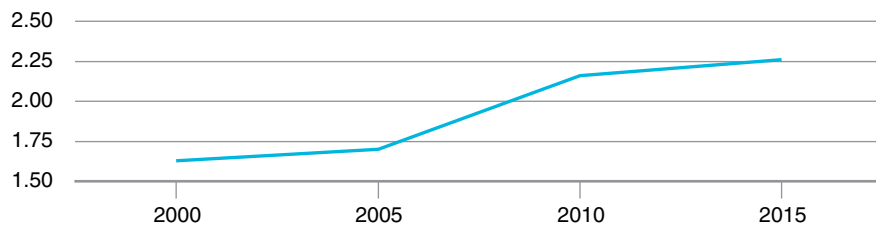
Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

In 2000, the ratio of PSE-educated to low-skilled participants was 1.63:1, respectively; by 2015, this ratio grew to 2.26:1. The steepest rise occurred between 2005 and 2010, increasing from 1.7:1 to 2.16, when growth in the supply of PSE-educated workers rose by 19 per cent and low-skilled workers fell by 6 per cent. All told, the relative supply of PSE-educated to low-skilled individuals in the labour market—from 1.63:1 to 2.26:1—rose by 39 per cent. (See Chart 14.)

**Chart 14**

**Relative Skill Supply in Labour Market**

(ratio of PSE to low-skilled)

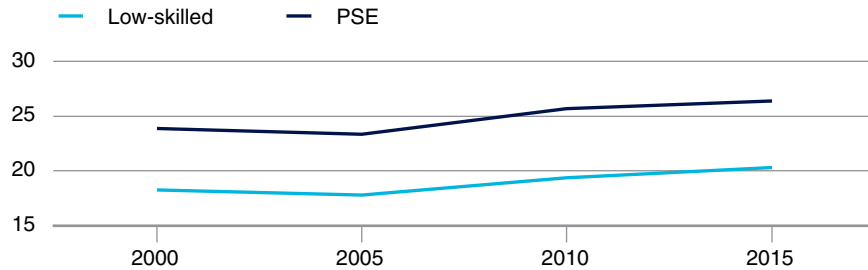


Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

## Wages and the Price of PSE-Educated Labour in B.C.

Employers in B.C. place a considerable premium on PSE-educated labour. On average, B.C. employers pay a 30 per cent premium to PSE-educated workers over their lesser-educated, low-skilled counterparts. Over the 2000–15 period, the skilled, PSE-educated premium in B.C. has remained relatively constant around this mark, rising only slightly to 33 per cent in 2010. In 2015, the average hourly wage for someone with PSE was \$26.38, whereas wages for low-skilled labour paid out only \$20.32 per hour, on average. Back in 2000, average wage rates for PSE-educated and low-skilled labour were \$23.89 and \$18.25, respectively. (See Chart 15.)

**Chart 15**  
**Average Hourly Wages, 2000–15**  
 (constant 2015 dollars)



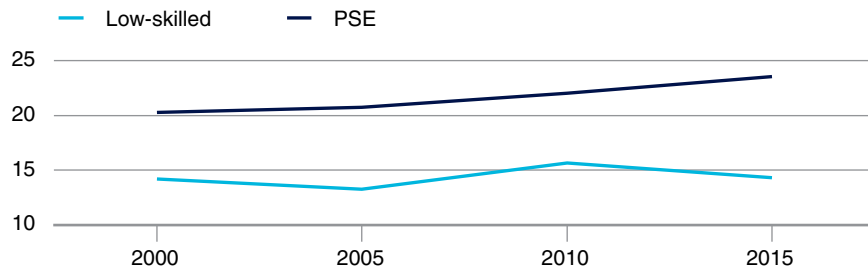
Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

The education/skill premium is particularly evident in the early years of a typical career when experience is low or non-existent. As of 2015, in the first five years after leaving, high school graduates (or those with less education) receive an average wage of approximately \$14.29 per hour. For PSE-educated workers, B.C. employers pay a 65 per cent premium over lesser-educated workers, offering wages of \$23.56 per hour. (See Chart 16). This premium has grown considerably over the past 15 years, rising from 43 per cent in 2000.

**Chart 16**

**Average Hourly Wages in First Five Years of Career, 2000–15**

(constant 2015 dollars)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of July in each of the years depicted above.

## The Demand for PSE-Educated Workers in B.C.

The figures presented above—regarding the supply of workers with PSE or not and the respective wages paid—give us important insight into the B.C. labour market demand for PSE-educated labour. In short, demand for PSE-educated workers in the B.C. labour force is rising, and it is rising quickly and continuously. This is in sharp contrast to low-skilled and lesser-educated labour, especially in the last 15 years. Table 3 summarizes the relevant labour market changes over the period 2000–15.

Demand for PSE-educated labour has been growing.

**Table 3**  
**Growth Rates and Changes in the B.C. Labour Market, 2000–15**

	<b>Low-skilled— high school or less</b>	<b>Skilled—post- secondary education</b>
Occupations	–2 per cent Fell from 717,200 to 701,900	32 per cent Rose from 1,224,900 to 1,616,800
Labour market supply	–5 per cent Fell from 799,200 to 762,400	33 per cent Rose from 1,299,130 to 1,722,127
Real wages (constant 2015 dollars)	11 per cent Rose from \$18.25 to \$20.32	10 per cent Rose from \$23.89 to \$26.38

Source: The Conference Board of Canada.

Over the last 15 years—from 2000–15— the number of jobs filled by low-skilled workers has fallen by 2 per cent, whereas the number of jobs held by PSE-educated individuals rose sharply in comparison, increasing by 32 per cent. This is in step with respective changes in the supply of labour in the B.C. workforce: the supply of low-skilled workers fell by 5 per cent, but PSE-educated workers in the labour market rose by 33 per cent.

The price of labour—the wages paid out by B.C. employers—has risen for both low-skilled and PSE-educated workers, at 11 and 10 per cent, respectively. This is not altogether surprising for low-skilled labour given its falling supply and, therefore, greater scarcity. And, there are many jobs remaining in the B.C. labour force that require low- or low-skilled workers. Thus, it is expected that wages for low-skilled labour will rise under these conditions.

However, there is significantly greater demand for workers with PSE. Despite the considerable expansion of supply of people with PSE in the labour market—an increase of 33 per cent from 2000–15—B.C. employers continue to demonstrate ever-mounting demand for workers with this level of education. Indeed, the price of labour rose 10 per cent over this period of relative abundance of PSE-educated people in the labour market. Typically, greater supply in the face of unchanging demand will put downward pressure on wages. In this case, demand

---

The proportion of jobs in the B.C. labour market filled by a PSE-educated worker will continue to rise.

for PSE-educated labour has been growing as the supply has been increasing. In fact, as the evidence here suggests, the rate of growth in demand for PSE-educated workers is outpacing the growth in its supply, as the increase in real wages indicates. (See Table 3.)

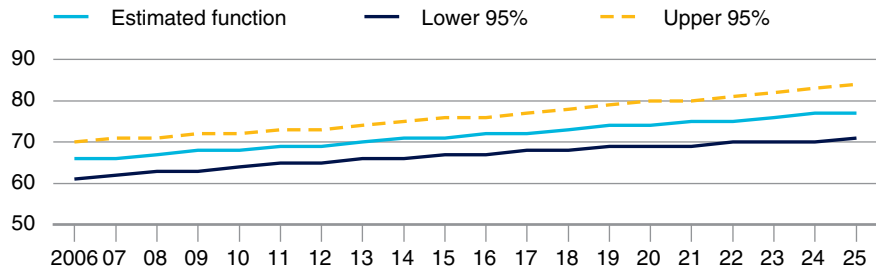
## Forecasting the Educational Profile of B.C.'s Labour Force, 2016–25

The trend toward greater reliance upon PSE-educated workers in the B.C. labour market shows no signs of reversing, let alone slowing. It was only 25 years ago when jobs in B.C. were evenly split 50/50 between low-skilled and PSE-educated workers. Today, a mere 30 per cent of B.C. jobs are held by those with high school or less, leaving the bulk of the workforce—70 per cent—to those with PSE. What's more, B.C. employers have given no indication that demand for PSE-educated workers is cooling and that the underlying trend has slowed or reached an apex.

Looking forward, our projections show that the proportion of jobs in the B.C. labour market that will be filled by a PSE-educated worker will only continue to rise. (See Chart 17.) Over the next 10 years, the current share of 70 per cent will rise to about 77 per cent. Our model, which includes a 95 per cent prediction interval, predicts that, even under adverse conditions, no less than 71 per cent of jobs in B.C. will be filled by PSE-educated workers by 2025. The upper boundary of this interval, however, predicts that the proportion could rise to as high as 84 per cent in 10 years. (See Table 4.)

**Chart 17**

**Projected Share of PSE-Educated/Skilled Occupations, 2006–25**  
(per cent)



Source: Calculations by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of March in each of the years 2006 through 2016.

**Table 4**

**Projected Share of PSE-Educated/Skilled Occupations in B.C. Labour Force, 2016–25**

	Point prediction	Lower	Upper
2016	72	67	76
2017	72	68	77
2018	73	68	78
2019	74	69	79
2020	74	69	80
2021	75	69	80
2022	75	70	81
2023	76	70	82
2024	77	70	83
2025	77	71	84

Source: Prediction interval developed by The Conference Board of Canada using Statistics Canada's *Labour Force Survey Microdata File (71M0001X)* for the month of March in each of the years 2006 through 2016.

## CHAPTER 4

# What B.C. Employers Want

### Chapter Summary

- Employers in B.C. will continue to transition toward higher-skilled workforces. In the next three to five years, 9 out of 10 B.C. employers will undertake up-skilling in their place of business.
- Without undertaking intensified up-skilling efforts, B.C. employers worry that productivity and revenue will fall, costs will rise, and innovation will decrease.
- In order to meet their talent and skills needs, B.C. employers are looking for workers who have acquired PSE credentials, including degrees, diplomas, certificates, and professional designations.
- B.C. employers want to fill the jobs of today and those of the future with PSE graduates from a range of backgrounds. When asked, B.C. employers are looking for workers with PSE backgrounds in areas such as business and management, computer and information services, engineering, communications, and the natural and social sciences.



**Employers in British Columbia are looking for PSE graduates to bring advanced skill sets to the workplace. This has been observed as an overarching trend in the B.C. labour market, and employers have indicated that they will intensify efforts towards up-skilling in the near term. Undermining these plans, however, are concerns and anxieties about the availability of PSE credentialed workers and the consequences that would ensue from a scarcity of skilled workers.**

In what follows, we provide details of what B.C. employers have told us about their recent efforts to increase the number of skilled talent they bring into their workforces, what array of PSE credentials they are looking for, and what they plan to do moving forward.

## **Past and Planned Up-Skilling**

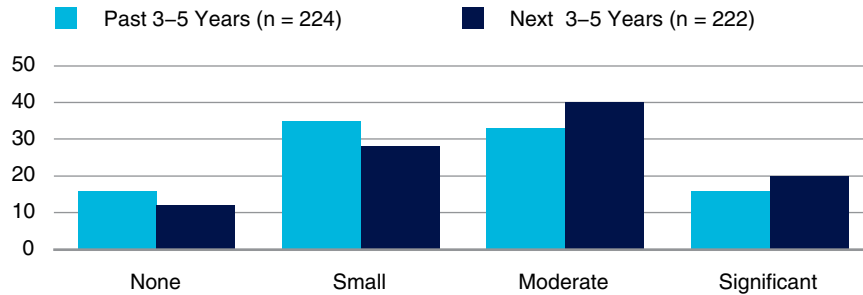
When surveyed, approximately 8 out of 10 B.C. employers noted that their company had, in the past three to five years, undertaken a shift toward higher skills in their workplace. In this same time frame, approximately half of the respondents described the extent of these up-skilling efforts as either moderate or significant. As Chart 18 shows, the proportion of B.C. employers that undertook small, moderate, and significant efforts to increase the skill level in their workplace was 35, 33, and 16 per cent, respectively.

Employers in B.C. have indicated that up-skilling efforts in their workplaces will not only continue for the next three to five years, but that these efforts will actually increase. Responses show that 9 out of 10 B.C. employers are planning to continue along the trend of adding more skilled workers. What's more, these respondents indicated that these efforts will intensify over the coming three to five years: moderate efforts

Chart 18

**Extent of Up-Skilling in Past Three to Five Years and Planned Up-Skilling in Next Three to Five Years**

(per cent of respondents)



Source: The Conference Board of Canada.

are expected to rise from about 33 per cent of B.C. employers to 40 per cent; and the proportion of employers undertaking a significant shift is also expected to rise from 16 to 20 per cent. (See Chart 18.)

The reasons that B.C. employers envision a shift in their organization's needs to a more skilled workforce are varied and numerous. The top reasons include:

- changes to the industry and subsector;
- changes to the business model and structure, with a need for employees to be more cross-disciplinary and responsive to market deliverables;
- upgrading and automation of machinery and equipment, digitization of the work environment, and a high degree of computer automation and technical skills competencies (the new normal);
- constant push (and demand) for next-generation technologies;
- changes in the culture of the organization—shifting from a command-and-control regime to one that allows employees to drive change, accept responsibility, and be accountable;
- rapid growth in our market and increased complexities of the operating environment, and much broader range of issues that need to be understood and addressed in a timely manner;
- jobs becoming more specialized—with a polarization of skill sets;

---

**B.C. employers are worried over the competition among employers for existing skilled labour.**

- greater scope of demands coming from a broader set of stakeholders—requires employees to constantly change and adapt to the new business climate;
- applicants simply coming to the table with more skills and more education;
- always trying to improve.<sup>1</sup>

## Concerns Over Retirement and Competition

The majority of employers surveyed in B.C. express substantial concern over skilled labour shortages. While employers were not asked explicitly about a shortage within the broader B.C. labour market, employers express this anxiety from the viewpoint of their respective organizations and how this figures into their talent management planning in the next three to five years. We found that, when asked about their level of concern over losing skilled workers, more B.C. employers are worried over the competition among employers for existing skilled labour than losing skilled labour through retirement.

When asked about retiring skilled workers, 31 per cent of respondents had no concern; this figure dropped noticeably to 15 per cent when the same respondents were asked about losing skilled workers to other employers. As Chart 19 illustrates, B.C. employers view competition with other employers as a greater source of unease in terms of the security of their skilled HR.

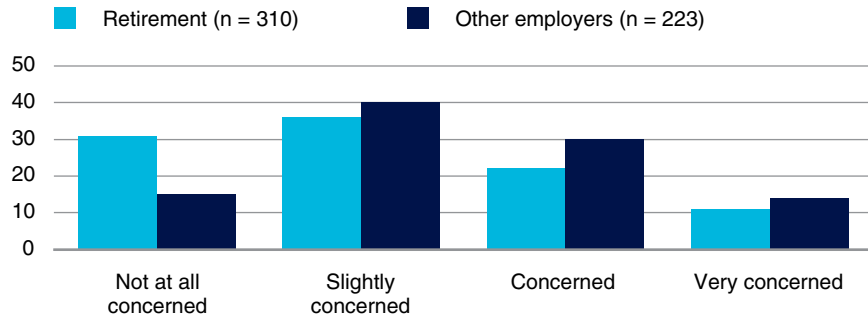
Some 45 per cent of B.C. employers indicate that they are either concerned or very concerned about losing skilled workers to other employers and, at the same time, about 33 per cent of these same respondents express the same level of concern for retirement as a draw on skilled talent. The proportion of B.C. employers that indicate slight concern for losing skilled workers by means of retirement and competition is 36 and 40 per cent, respectively. (See Chart 19.)

<sup>1</sup> Responses from The Conference Board of Canada's 2016 B.C. Employer Skills Survey.

Chart 19

### B.C. Employers' Concern About Losing Skilled Workers in Next Three to Five Years

(per cent of respondents)



Source: The Conference Board of Canada.

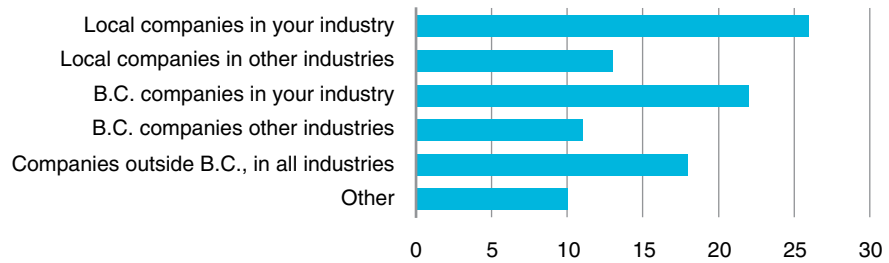
In the very near term, competition for employees is expected to be largely contained within local labour markets and the wider provincial labour market. Over 70 per cent of B.C. employers point out as much, with 39 per cent indicating the main source of competition for labour originating locally and a further 33 per cent pinpointing the source of competition as a province-wide phenomenon.

B.C. employers, however, note that competition for labour—whether stemming from local or provincial labour markets—is chiefly among employers from within the same industry or sector. Almost half of B.C. employers, 46 per cent, implicate their industry counterparts as their principal rivals in the competition for employees, while only 24 per cent view companies in other industries or sectors as contenders for available labour. (See Chart 20.)

**Chart 20**

**Source of Labour Competition in Next Three to Five Years**

(per cent of respondents, n = 223)



Source: The Conference Board of Canada.

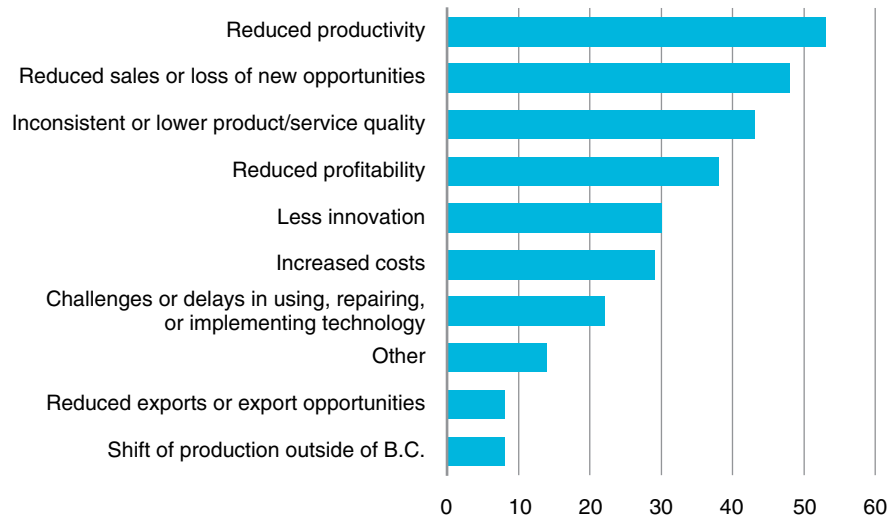
B.C. employers describe a wide range of consequences that would ensue in the case of a skills shortage or if they could not find enough employees with the right skills. (See Chart 21.) Over half of the B.C. employers we surveyed indicate that productivity would decline. Similarly, nearly the same number of employers reveal that sales would diminish or there would be a loss of new opportunities. Respondents suggest several other related outcomes, namely reduced profitability (38 per cent), less innovation (30 per cent), and increased costs (29 per cent).

Consistent with the overarching, long-term shift toward high-skilled, PSE-credentialed workers, B.C. employers have noted that they will continue to rely on PSE institutions to produce the talent needed in the workplace. B.C. employers overwhelmingly identify colleges, polytechnics, and universities as the sources of talent and credentials needed in the jobs comprising much of the B.C. labour force.

Chart 21

**Perceived Impact of Skills Gap on B.C. Employers**

(per cent of respondents, n = 306)



Source: The Conference Board of Canada.

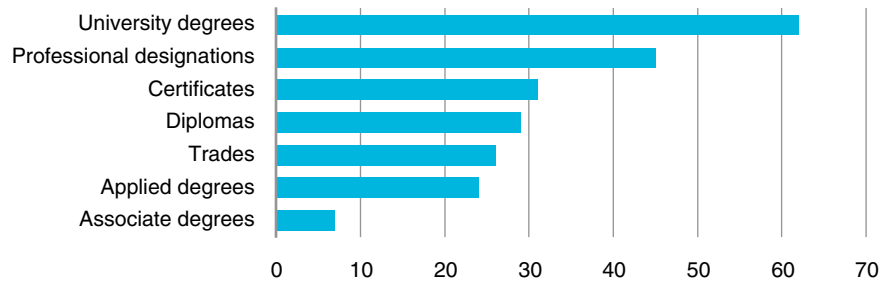
Over 60 per cent of employers we surveyed say that they require workers with university degrees, and approximately one-half of employers note that post-secondary professional designations are also needed to meet their occupational requirements. There is also considerable demand for PSE certificates, diplomas, trades, and applied degrees, with 31, 29, 26, and 24 per cent of B.C. employers acknowledging as much, respectively. Notably few employers—7 per cent—indicated a need for workers with associate degrees. (See Chart 22.)

We asked respondents to identify the occupations or skills that will be most needed in the coming three to five years. Chart 23 illustrates the findings and shows that there is a particular preference—among 30 per cent of B.C. employers surveyed—for occupations/skills in the field of finance, insurance, real estate, or business administration.

Chart 22

**PSE Credentials Needed by B.C. Employers**

(per cent of respondents, n = 295)

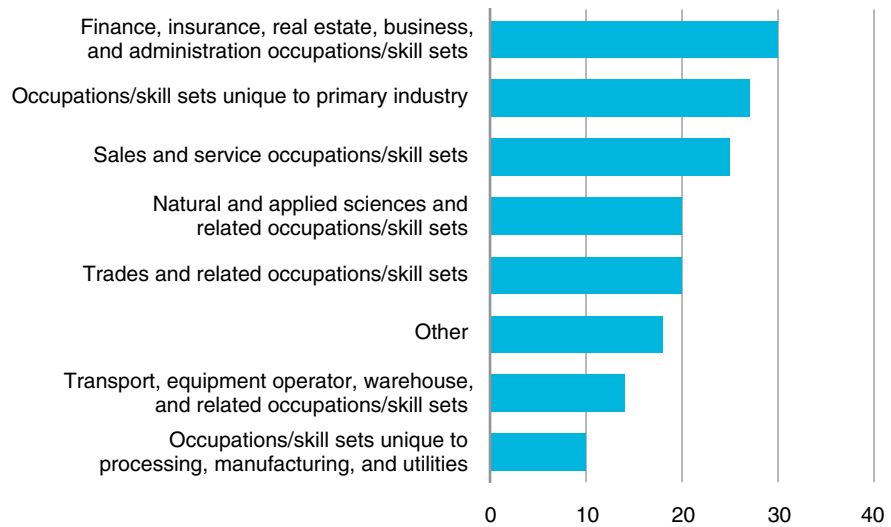


Source: The Conference Board of Canada.

Chart 23

**Expected Skill Set Need in Next Three to Five Years**

(per cent of respondents, n = 300)



Source: The Conference Board of Canada.

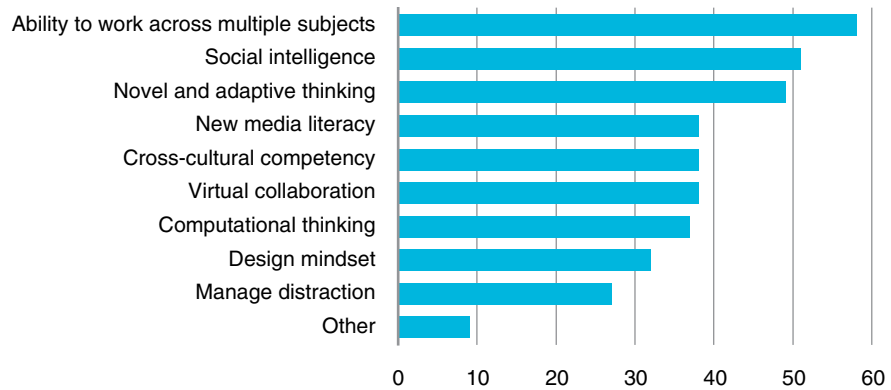
But not far behind in demand, B.C. employers also identify skill sets unique to primary industry (27 per cent) and those skills or occupations in sales and service (25 per cent). About the same proportion—20 per cent—highlight both the natural and applied sciences as well as the trades. Many employers are specific or focused in their responses on one particular occupation or skill set.

Employers are interested in traditional PSE credentials and the skills that are developed in the pursuit and attainment of these credentials. Employers in B.C. indicate that the ambit of skills they will need is evolving. About 6 in 10 believe that a more expansive aptitude is needed among workers, not just a focus or specialization in one subject. Indeed, nearly 60 per cent of B.C. employers surveyed for this project indicated that an emerging need among their workforce is the ability to work across multiple subjects. In addition, approximately 50 per cent of employers also indicated that social intelligence is an emerging skill set that workers will need, in addition to the ability for novel and adaptive thinking. (See Chart 24.)

Chart 24

**Emerging Skills in B.C. Workplace**

(per cent of respondents, n = 237)



Source: The Conference Board of Canada.



**Business and management is the most preferred subject matter by B.C. employers.**

More specific abilities that were highlighted included new media literacy, cross-cultural competency, virtual collaboration, and computational thinking: nearly 40 per cent of respondents affirm each of these will be needed in their workplaces in the near term. (See Chart 24.)

Employers are clear on the need for PSE-credentialed workers, but they are also clear when it comes to particular subject areas of PSE graduates. A heat map of employer subject area preference is presented in Exhibit 1. As the heat map illustrates, business and management is the most preferred subject matter by B.C. employers; this is true of university degrees as well as diplomas, certificates, and professional designations. Although less desired at the associate degree and trades level, business and management is still preferred over nearly every other subject area.

**Exhibit 1**  
**Subject Area and PSE Credential Heat Map**  
(per cent)

Subject Area	Degree (n = 153)	Applied degree (n = 48)	Associate degree (n = 14)	Diploma (n = 57)	Certificate (n = 55)	Trades (n = 34)	Professional designation (16)
Business and management	63	44	29	56	55	26	58
Computer and information services	42	52	43	47	38	26	30
Engineering and electronics	33	54	21	21	18	32	28
Communications	31	35	14	28	31	24	24
Sciences	22	29	29	11	7	12	16
Mechanical and related	7	15	14	11	15	44	11
Social sciences	20	21	14	18	18	6	17
Agriculture, agri-food, and natural resources	7	13	14	7	9	9	4
Construction and precision production	4	8		4	2	29	9
Transportation	3	8		5	15	12	7
Percentage of respondents	50+	40–49	30–39	20–29	10–19	0–9	

Source: The Conference Board of Canada.

The second-most sought-after subject area is computer and information services, which is followed by engineering and electronics, communications, and sciences. These disciplines are closely followed in popularity by mechanical studies and the social sciences. And, as can be seen by the ordering in the heat map, there are a number of disciplines that garner much less demand from B.C. employers regardless of the credential type. (See Exhibit 1.)

For computer and information services, as well as engineering and electronics, B.C. employers have pointed to applied degrees as the favoured PSE credential for these disciplines. Additionally, for computer and information services, B.C. employers noted a strong inclination toward credentials typically offered in colleges, such as a diploma and associate degree, followed by university degrees.

## Conclusion

Employers in B.C. are clear when it comes to their workers and HR. They want and need talented people who have acquired PSE credentials and the skills that PSE has provided them. When asked, about 6 in 10 B.C. employers indicated a desire for employees with a university degree, 5 in 10 noted a preference for a post-secondary professional designation, and there is significant preference for PSE certificates, diplomas, trades, and applied degrees with 31, 29, 26, and 24 per cent of B.C. employers acknowledging as much, respectively.

Without the advanced skills that PSE can provide to workers, B.C. employers anticipate a number of undesirable outcomes to both their businesses and the wider provincial economy. These employers plan to intensify up-skilling efforts in their workplace to sustain current levels of output; failing this, these same employers have indicated that productivity and revenue will fall, costs will rise, and innovation will decrease. To avoid these consequences, B.C. employers are looking to workers with PSE backgrounds in areas such as business and management, computer and information services, engineering, communications, and the natural and social sciences.

## CHAPTER 5

# Conclusion: Addressing Skills Needs in B.C.

### Chapter Summary

- B.C. is well-positioned for economic and social prosperity. It supports technology, knowledge, and culture-based industries, and major infrastructure and natural resource projects.
- Employers in B.C. face a variety of challenges related to technical skills, employability skills, management/leadership skills, and innovation skills.
- The province's PSE institutions, governments, and employers will need to work together to overcome these challenges and to position the province for sustained success.

**B.C. is well-positioned for economic and social prosperity. In addition to supporting a variety of industries that include technology, knowledge, and culture-based activities, it is also home to major infrastructure and natural resource projects. The province's economy is growing: the Ministry of Economic and Skills Development expects that by 2024, B.C. will see up to 1.1 million new jobs.**

The majority of these jobs will require workers to hold PSE credentials. As The Conference Board of Canada's original economic analysis shows, the demand for positions that require PSE credentials is growing, gradually but steadily replacing positions that do not require PSE credentials.

Leveraging B.C.'s economic opportunities will require workers to possess a variety of skills. These include:

- **Management and leadership skills:** As B.C.'s population continues to age, employers across the province face growing retirements of experienced employees, many of whom occupy management and leadership positions.
- **Essential and employability skills:** Employers have difficulty finding new employees with the right combination of essential and employability skills, such as communication, teamwork, problem-solving, personal management, and digital literacy, among others.

By failing to address and overcome their skills shortages, B.C. employers could find themselves without the human capital they need to sustain and build their businesses, let alone contribute to the province's employment tax revenues. Moreover, without sufficient skills training, too many British Columbians could find themselves under-or unemployed.

---

Additional funding and institutional resources would enable PSE institutions to produce more skilled graduates.

For B.C. to stay in front of the issue, it will require up-to-date data on in-demand occupations so that PSE institutions and their students can plan their programs and training. Through program advisory councils, colleges are already working more closely with employers.

## Recommendations

B.C.'s PSE institutions, governments, and employers need to work together to ensure that they can maximize the province's opportunity for economic and social success. The following section provides recommendations for potential action.

### Recommendations for PSE Institutions

1. Improve student access and provide places in PSE programs for under-represented and at-risk populations, including Indigenous students, students with disabilities, and students from low-economic backgrounds, to compensate for a decline in the traditional PSE source population.

PSE institutions have a number of programs and initiatives aimed at increasing PSE accessibility, including accessibility for under-represented and at-risk students. But additional funding and institutional resources directed toward increasing access, student success, student outcomes, retention, and pathways to meaningful work would enable PSE institutions to not only expand their access, retention, and career transition efforts, but also to produce more skilled graduates to help satisfy the province's growing labour market demands.

2. Expand co-op, apprenticeship, internship, and other workplace opportunities for students to acquire practical experience.

Employers in a variety of sectors believe that new employees could benefit from acquiring more practical experience before entering the workforce. To help students acquire this experience, many employers support the expansion of experiential learning opportunities such as apprenticeships, co-op positions, internships, and mentoring

opportunities. Expanding these opportunities would help students improve their oral and written communication skills, information management skills, relationship and teamwork skills, and adaptability, among others. By acquiring and developing these skills before they enter the workforce, students will be better equipped to transition to successful careers and to adapt to changes in skills requirements.

3. Create communication channels for employers to communicate skills needs to students and PSE institutions and commit to being responsive to the needs of employers and future employees seeking PSE credentials.

Our survey and interview results show that employers believe that B.C.'s PSE institutions can play a critical role in addressing their skills needs. A key component of this role is to provide employers with meaningful opportunities to communicate their skills needs directly to PSE institutions. B.C.'s PSE institutions already provide many such opportunities—in fact, colleges are obliged to do it—often through advisory committees and councils for university and college programs, and for apprenticeship training. By expanding such opportunities and communicating their availability to employers, PSE institutions can ensure that their programs and courses continue to be relevant and effective.

## **Recommendations for Governments**

4. Fund additional programs in target disciplines to ensure that PSE institutions have adequate resources and produce enough graduates to meet B.C.'s labour market needs in sectors with rising skill demands.

Many PSE institutions would like to offer additional programs that meet more of employers' skills needs, but have limited resources with which to do so. For example, to address B.C.'s shortage of qualified arborists, Kwantlen Polytechnic University (KPU) delivers an eight-week Arborist Technician Apprenticeship program from its Langley campus. However, the program is not offered every year, and covers only one of

---

Businesses are finding it difficult to offer experiential learning opportunities to PSE students.

three sequential certifications for arborists. A more extensive program that covers all three certifications would help KPU address more of employers' skills needs in the sector.

5. Fund PSE initiatives that target improving access and providing places for under-represented and at-risk populations.

One way to help meet the demand for skilled workers in the province is to increase access to PSE for under-represented and at-risk groups. Funding targeted at, for example, low-income students, students with disabilities, and Indigenous students would not only improve PSE access and attainment for these groups, but would also help to close the gap between supply and demand for PSE-educated workers in the province.

6. Assist businesses with financial and administrative support to increase the number of workplace experiential learning opportunities offered by employers.

Businesses are finding it difficult to offer significantly higher levels of experiential learning opportunities to PSE students. Some employers are concerned about managing additional administrative tasks required by such opportunities; others are concerned about their ability to financially support apprentices, interns, and co-op students. As PSE institutions must contend with increasingly challenging financial and economic environments, it can be difficult for them to find the additional resources required to develop and maintain experiential learning opportunities. More government support—financial or otherwise—could help reduce some of these barriers.

7. Improve labour market information (LMI) for students, PSE institutions, and employers to provide accurate and timely information about current and projected skills and labour force supply and demand.

Labour market data can be incorporated into educational and employment planning for students and graduates who intend to enter the Canadian labour force. Improving LMI systems will help students make informed choices before entering PSE and will help graduates connect

with employers. It will widen the perspective of students and graduates alike about potential career pathways and future areas of growth and/or vacancies. Robust LMI data will also improve productivity and competitiveness by reducing labour and skills shortages.

## **Recommendations for Employers**

8. Make workplace experiential learning a priority by developing an HR strategy for employee renewal and growth that includes PSE students and graduates.

Employers should increase the number and range of experiential learning opportunities available to B.C.'s PSE students. This would improve student readiness to enter and succeed in the workplace and would also provide employers with an important avenue for identifying talented students and graduates who could become their future employees.

9. Provide targeted management training to address increased retirement levels and meet the need for large-scale workforce renewal through employee hiring and development.

Employers should work with business schools and PSE business education programs to develop and deliver targeted management training to enhance their firm-level capacity to manage employee retirements and workforce renewal through hiring and advanced training. This management training should target both new employee professional hires and management entrants in order to build management capacity.

## **Recommendations for Individuals**

10. Seek out workplace experience opportunities, including co-op, internships, mentoring, and volunteering, to gain practical experience and workplace skills.



---

Employers,  
government, and  
PSE institutions  
must work together.

PSE students should strongly consider taking advantage of opportunities to acquire practical experience outside the classroom. Students can do so by registering for apprenticeships, co-op programs, internships, and mentoring opportunities while completing their programs. They can also consider pursuing additional studies (e.g., college or university diplomas and degrees) after graduation. Acquiring this combination of experience can help students better understand what technical, employability, management, and innovation skills are required to be successful in the workplace. Practical experience can also help students better understand their chosen career paths and make adjustments if needed.

## Conclusion

Employers, government, and PSE institutions cannot expect job-ready graduates unless all three coordinate their efforts and resources and work together. PSE institutions must improve their communication and collaboration with B.C. employers, while B.C. employers must increase their investment in PSE by providing more work-integrated/experiential learning opportunities for students.

B.C.'s residents and students alike must also be more alert to labour market trends so that they can pursue PSE programs that will lead to realistic employment goals. Finally, the B.C. government must continue to provide support for the province's students, employers, and PSE institutions to equip them with the resources they need in order to secure their own as well as the province's return on investment.

## APPENDIX A

# About the Finance, Insurance, and Real Estate Industry

The finance, insurance, and real estate (FIRE) industry in B.C. includes two main subsectors. According to the North American Industry Classification System (NAICS), they are:

- finance and insurance (e.g., banks, asset management firms, securities brokerage firms, insurance companies);
- real estate rental and leasing (e.g., real estate brokerage and sales firms, property developers).

WorkBC notes that in 2013, the FIRE sector employed approximately 153,500 people. This represents an increase of approximately 6.8 per cent from 2012, when the sector employed 143,100. In 2013, a significant majority (83 per cent) of these jobs were full-time positions, slightly higher than the provincial average for all sectors (79 per cent).<sup>1</sup>

The FIRE sector is one of the largest in B.C.'s economy and, in 2012, accounted for 23 per cent (\$45 billion) of the province's GDP. Of this:<sup>2</sup>

- 75 per cent, or \$33.75 billion, was generated by the real estate subsector;
- 25 per cent, or \$11.25 billion, was generated by the finance and insurance subsector.

As of April 2016, the average hourly wage in B.C.'s FIRE sector was slightly higher (\$27.10) than the provincial average for all industries (\$25.19). However, wages in B.C.'s FIRE sector are significantly lower than those in sectors such as forestry, fishing, mining, oil and gas (\$35.33); utilities (\$32.36); and professional, scientific, and technical services (\$30.89).<sup>3</sup>

## What Are the Skills Needs?

Careers in finance, insurance, and real estate require a mix of several types of skills. These include, for example, technical skills, such as financial literacy and analysis skills, and a knowledge of economics, mathematics, and statistics. They also include familiarity with digital technologies, which have become increasingly important as workplaces become more digitized.<sup>4</sup>

Our interview results suggest that graduates from B.C.'s universities and colleges have the technical skills they need to succeed in the workplace.<sup>5</sup> However, 30 of 52 (58 per cent) of FIRE sector respondents to our employer survey believe they will face technical skills challenges in the next three to five years. When asked to explain further, 22 of

2 Ibid.

3 Statistics Canada, CANSIM table 282-0071.

4 Manitoba Real Estate Association, *Real Estate Career Guide*, 3; Interview findings.

5 Interview findings.

25 respondents (88 per cent) noted that attracting and hiring new employees with the necessary skills is their biggest challenge to addressing their need for technical skills.

Finding employees with the right employability and essential skills is also a significant challenge for many of B.C.'s FIRE sector employers. For example, several employers we interviewed believe that employees in B.C.'s FIRE sector suffer from a lack of communication skills. These skills help individuals explain complex information to decision-makers that may have limited technical knowledge. A senior executive from a provincial financial association noted that “new employees may be technically skilled, but employers can’t find anybody with good communication skills.”<sup>6</sup> The interviewee added that many new employees have difficulty communicating complex technical information in writing. As a result, many employers need to offer “boot camps” for new employees that focus on improving their basic writing skills.<sup>7</sup>

Like many employers in B.C., employers in the FIRE sector also believe they will have difficulty finding employees with the right management and leadership skills. Several of the employees we interviewed noted that it is difficult to attract high-quality managers and leaders when they receive more lucrative offers from companies outside the province. In addition, a financial executive noted that high housing costs make it difficult to attract top managers from outside British Columbia.<sup>8</sup>

## What Is Being Done to Address the Skills Needs?

Employers in B.C.'s FIRE sector use several strategies to attract and develop workers for hard-to-fill positions. For example, 30 of 36 respondents (83 per cent) use in-house training and development program, and 21 of 36 respondents (58 per cent) increase compensation,

6 Ibid.

7 Ibid.

8 Ibid.

wages, or benefit packages. In addition, 19 of 36 respondents (53 per cent) respond by developing flexible workplaces, and 16 of 36 respondents (44 per cent) hire new employees from out of the province.

A senior executive at a Vancouver-based credit union noted that while his organization offers limited in-house training opportunities, it does operate with a substantial training budget. This budget allows the organization to send its employees to external training courses of up to six weeks, depending on the skill sets required. In some cases, said the same executive, “Employees may be doing a great job, but we want to move them to another area, and they may not have the skills they need for that area.” Examples of preferred training courses include those offered by Cisco in Seattle or short courses at The University of British Columbia and British Columbia Institute of Technology.<sup>9</sup>

We also asked FIRE sector employers about their use of experiential learning strategies, such as co-op positions, internships, and mentoring opportunities. For example, 18 of the 45 FIRE sector employers who responded to this question currently use mentoring to address their skills needs. A further 16 employers noted that they do not currently offer mentoring, but would like to do so in the future. And while a majority (29 of 45) of employers do not currently offer co-op positions, 19 of these employers are interested in doing so in the future. A further 18 of 45 respondents expressed interest in offering paid internships.

### **The Role of B.C.’s PSE Institutions**

Many interview and survey respondents believe that B.C.’s PSE institutions produce high-quality graduates. In some cases, however, these graduates are attracted by lucrative offers elsewhere. As one venture capital executive said, “The issue is not so much that they aren’t producing the right people. It’s that they get lured away to higher-paying positions outside the province.”<sup>10</sup>

9 Ibid.

10 Ibid.

A former executive at a major Canadian bank spoke highly of the value of a combined university-college education. This is particularly relevant for B.C.'s PSE system, which was developed on the assumption of transfer between universities and colleges. The same executive also noted that many successful employees in the industry followed four-year undergraduate degrees at universities with two-year diplomas at public colleges, allowing them to acquire and develop the theoretical and practical skills that help them to succeed in the workplace.<sup>11</sup>

Despite the high quality of PSE graduates in B.C., many employers in the FIRE sector would like to see the province's PSE institutions place more emphasis on work-integrated learning. For example, 21 of 43 survey respondents (49 per cent) would like to see more emphasis on co-op education, while 17 of 43 respondents (40 per cent) would like to see more emphasis on internships. A further 16 respondents would like to see more emphasis on mentoring programs. As a senior banking executive said, "I'm a big fan of experiential learning. If the combination of classroom learning and real world experience becomes a more standard part of PSE, it can have a great payoff."<sup>12</sup>

Consistent, meaningful communication between PSE institutions and industry is crucial to addressing the skills needs of B.C. employers. One interviewee, formerly a senior executive at a major Canadian bank, noted that this communication increases students' awareness and understanding of employers' constantly shifting skills needs.<sup>13</sup> B.C.'s PSE institutions communicate with industry in many ways, but when asked about their opportunities to communicate their skills needs to B.C.'s PSE institutions, 23 of 44 respondents to our online survey of employers responded that these opportunities are limited or non-existent.

11 Ibid.

12 Ibid.

13 Ibid.

## APPENDIX B

# About the Technology Industry

The Technology industry in B.C. encompasses many subsectors. KPMG's Technology Report Card for the province defines the main technology sectors as the following:

- information and communications technology (e.g., telecom, software development, computer services, but not wireless or digital media);
- digital media and wireless (e.g., video gaming, animation, social media, mobile technology);
- life sciences (e.g., biopharmaceuticals, medical devices, and bioenergy);
- clean tech (e.g., energy generation and transmission, energy use and efficiency, and resource management);
- engineering and other services (e.g., services related to design and development of machines, instruments or services; contract research, and consulting services).<sup>1</sup>

In 2012, KPMG noted there were approximately 9,000 companies in the sector employing 84,000 people. Of these, 20,550 are in information and communications technology; 16,500 in digital media and wireless; 8,500 in life sciences; 6,400 in clean tech; and 27,480 in engineering and other services.<sup>2</sup>

1 KPMG, *British Columbia Technology Report Card*, 9.

2 Ibid.

B.C. Stats noted that in 2013, employment in the technology industry climbed further to 86,800 people; however, the employment levels in the sector are still below those of 2008 (88,270).<sup>3</sup> In total, high-technology sectors employed approximately 4.4 per cent of B.C.'s workforce, which is more than the combined industries of mining, oil and gas, and forestry.<sup>4</sup>

The B.C. government, in its BCTECH Strategy, recognizes the importance of the sector in terms of the number of people employed, but also the relatively higher wages earned in the sector (60 per cent higher than average), and its combined revenue of \$23 billion in 2013 (6.5 per cent of the province's GDP).<sup>5</sup> Employment growth in the B.C. high-tech sector has been behind the industrial aggregate, whereas previous to the 2006 economic downturn, employment in the high-tech sector grew faster than the industrial aggregate.<sup>6</sup> B.C. Stats also report that 85 per cent of high-tech workers are in the service industry, an increase from 80 per cent 10 years earlier.<sup>7</sup>

## What Are the Skills Challenges?

KPMG's tech report card notes that B.C. has lower talent availability in terms of granting engineering and science degrees, and it is well below the OECD average in terms of granting doctoral degrees per 1,000 people in the population (1.6 per cent for the OECD average versus 0.6 per cent for B.C. and 1.2 per cent for Canada).<sup>8</sup>

Applied Science Technologists and Technicians of B.C. (ASTTBC) found that globally, the most difficult occupations to fill in the technology labour market in 2012 were skilled trade workers; engineers; sales

3 BC Stats, *Profile of the British Columbia High Technology Sector*, 16.

4 Ibid., 4.

5 Government of British Columbia, *The #BCTECH Strategy 2016*, 7; BC Stats, *Profile of the British Columbia High Technology Sector*, 4.

6 BC Stats, *Profile of the British Columbia High Technology Sector*, 17.

7 Ibid.

8 KPMG, *British Columbia Technology Report Card*, 35.



representatives (technical); technicians; and information technology (IT) staff. In North America, the most difficult positions to fill were engineers; technicians; sales representatives; skilled trades workers; and production operators in the top five (with IT staff coming in ninth place).<sup>9</sup> In Canada, the most difficult positions to fill were skilled trades workers; engineers; sales representatives; technicians; and IT staff. In B.C., the specialty technicians and technologists were the most important position for B.C. technology companies to fill.<sup>10</sup>

The largest occupational categories projected by ASTTBC for absolute employment growth are computer and information systems professionals; medical technologists and technicians; engineers; technical occupations in computer and informational systems; and technical occupations in electronics and electrical engineering. ASTTBC estimates that these positions will contribute to 65 per cent of new employment growth in B.C. leading up to 2020.<sup>11</sup> There is no projection as to whether the provincial supply of labour in these categories will keep up with demand.

Two interviewees for this sector stated that there is still a shortage of software development talent. Survey findings mirrored this result, with 34 per cent of relevant respondents identifying an inability to hire software engineers as a significant challenge, followed closely by an inability to hire computer programmers (28 per cent). In addition, several employers in the sector feel that the skills produced by PSE institutions may not be as up to date as they could be in terms of technology.

Furthermore, another two interviewees specifically mentioned the increasing importance of data analytics. The skill set for data analytics will be related but distinct from general software programmers, but will still also involve programming ability. It will require “those who can take a data set, model it and use algorithms to find nuggets of information.”<sup>12</sup>

9 Applied Science Technologists and Technicians of B.C., *A Strategic Direction*, 6.

10 Ibid., 7.

11 Ibid., 11.

12 Interview findings.

In the area of clean tech, two industry representatives highlight challenges that have arisen from off-shoring of manufacturing from Canada to Asia. In both cases, their products include hardware components, which are being incrementally improved and updated for modern power storage and management needs. Given that many of the power equipment manufacturers are no longer in Canada, experienced engineers with up-to-date skills in the field are scarce in the B.C. labour market. “If we want to be competitive we will need people with the right skills—even to just act as representatives to travel offshore. To enable our companies to be successful in China, Asia, Eastern Europe, we will need industrial engineers.”<sup>13</sup>

Finally, given the increasing need to deal with multidisciplinary challenges in sectors such as clean tech, the demand for people with flexible technical skills is expressed by employers. Engineering physics and systems engineers were specifically mentioned “because you can drop them into any situation.”<sup>14</sup> This aligns with survey results where 50 per cent of respondents in the technology sector identified problem-solving and decision-making skills as a deficit area.

## **Business and Soft Skills**

In addition to technical skill shortages, the B.C. Technology Industry Association (BCTIA) noted in its *Outlook 2020* that B.C. has good tech talent but there are shortages that may prompt hiring “out of jurisdiction.” For example, B.C. is under-weighted in terms of business people in the tech sectors.<sup>15</sup> Similarly, 46 per cent of survey respondents identified a lack of business acumen as a difficult challenge to address.

BCTIA observed several possible weaknesses in the B.C. sector, such as minimal management expertise and how “the majority of technology entrepreneurs have had little exposure to formal management training in finance, sales and marketing, strategic planning and general

13 Ibid.

14 Ibid.

15 BC Technology Industry Association, *Outlook 2020*, 4–7.

management ... growing their businesses, raising money, hiring large numbers of new people, formalizing plans and managing their companies through levels of management will often push them out of their comfort zones.”<sup>16</sup>

According to one interviewee, “We don’t have management who understands the growth phase. We’re really good at earlier-stage companies. We don’t have problems with technically qualified people. The biggest issue is around founders who act as CEOs. They tend to be technical people without a lot of business savvy, and that’s how we help them. Founders are not always suited to be leaders of company in a growth phase. What we really lack are CEOs and VPs who are used to scaling from 100 employees to 1,000.”<sup>17</sup>

Some interviewees cited the issue of Vancouver’s high cost of living, and the relatively lower wages compared with Silicon Valley or Seattle. One interviewee specifically cited three challenges: “We’re competing with Silicon Valley and Seattle, and the earning potential is higher there. The second objection is housing: Why move here and pay so much for a house when I can earn more in Silicon Valley and pay the same amount. The third is a question by the potential hire: How is the [B.C.] company going to outpace the growth potential of American counterparts?”<sup>18</sup>

Survey results painted a more ambiguous picture. When asked which techniques they used to attract workers for hard-to-fill positions, the most commonly used technique was hiring from out of province (66 per cent), followed by in-house training and development programs (54 per cent). Increasing compensation was only the third most employed technique, tied with the development of flexible workplace environments (49 per cent). Somewhat surprisingly, the tech sector was less apt to use flexible workplace environments to attract employees than the finance sector (49 per cent versus 53 per cent), perhaps indicating an area of opportunity.

16 Ibid., 31.

17 Interview findings.

18 Interview findings.

Many of the management skills discussed by our interview respondents reflect soft skills. One interviewee, discussing tech-oriented entrepreneurs and founders, said: “They are great at project-related types of tasks, and at leading a technical team. But they lack the soft skills, managerial skills, dealing with people, dealing with customers, and conveying their value proposition, and turning that into conditional purchase order. These are things they’re not experienced with.”<sup>19</sup>

The combination of technical skills and client-facing communication and business skills is increasingly in demand. While this is expressed as a possible weakness among experienced technicians moving into management, there has been some improvement in the talent pipeline given changes in the PSE curriculum: “10–20 years ago universities didn’t necessarily encourage team work and communication. Today there are more capstone projects and communication that are fundamental [to business].”<sup>20</sup>

## What Is Being Done to Address Them?

Initiatives to address the talent needs of B.C.’s technology sectors are being carried out by government, industry, and the PSE sector.

The #BCTECH Strategy involves initiatives for PSE. For example, the B.C. Innovation Council’s Tech Co-op Grants program provides students with openings at small technology companies, and provides those same companies with access to talent.<sup>21</sup> The B.C. government has also provided \$75,000 to 16 PSE institutions in the province to support outreach to employers and increase employer and student awareness of co-op placements.<sup>22</sup> It also provides information about job openings in the B.C. technology sector through the B.C. Labour Market Outlook.<sup>23</sup>

19 Interview findings.

20 Interview findings.

21 Government of British Columbia, *The #BCTECH Strategy*, 14.

22 Government of British Columbia, *Funding Boost Kicks Off Co-Op Week in B.C.*

23 Government of British Columbia, *The #BCTECH Strategy*, 14.

In addition, research will be better supported in order to increase student exposure to it and build up their R&D skills. The plan involves supporting laboratories through grants, support to researchers, funded research projects, and funding for research infrastructure. Examples of the areas of support include genomics, nuclear physics, nano-materials, and advanced manufacturing.<sup>24</sup>

Survey respondents agree. Respondents in the tech sector are most likely to indicate that their ability to communicate their needs to the post-secondary sector is good or excellent (44 per cent), compared with an average of other sectors of 34 per cent. In addition, the tech sector places greater emphasis on co-ops (49 per cent versus 22 per cent), paid internships (38 per cent versus 26 per cent) and research and development collaborations (47 per cent versus 27 per cent). This suggests that the tech sector is more engaged with post-secondary institutions than other sectors and that this engagement is spurring greater interest in collaboration. (See Chart 1.)

The PWC and Life Sciences sector report noted that while life sciences had the highest rate of university enrolment in the province,<sup>25</sup> engineering and applied sciences was second lowest (next to “other”). More worrisome, according to the report, is that for the disciplines relevant to the tech sector, the growth rate of domestic student enrolment is negative. In contrast there is a positive growth rate in the enrolment of foreign students. It is little surprise, then, that those surveyed from the tech sector were more than twice as likely (49 per cent versus 23 per cent) to recruit internationally.

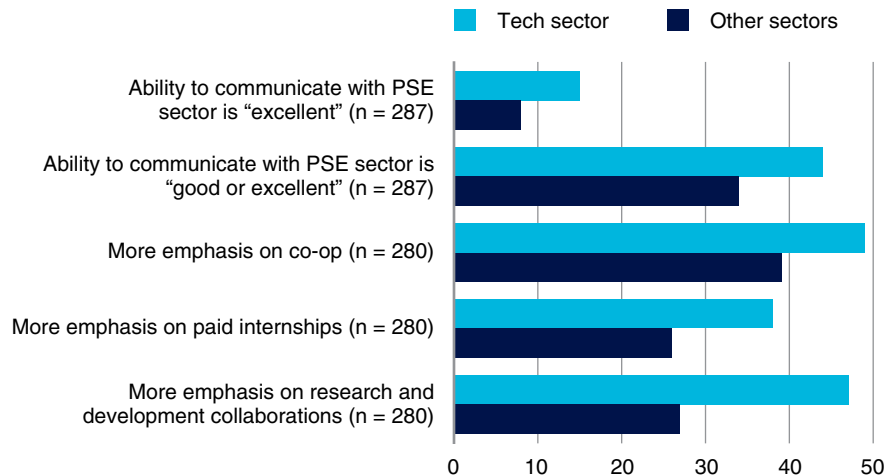
24 Ibid., 14–16.

25 PWC and Life Sciences British Columbia, *The Life Sciences Sector in B.C.*, 22. They specifically state university enrolment; it would appear not to include colleges and polytechnics.

Chart 1

### Interactions With PSE-Tech Sector Versus Other Sectors

(per cent of respondents)



Source: The Conference Board of Canada

Encouraging domestic enrolment is, therefore, a priority, as is retaining foreign talent to supply the demand of the B.C. tech sector. Looking at the 2013 B.C. Labour Force Survey, the 7.3 per cent increase in "professional, scientific and technical service" jobs indicates that local demand for talent in these areas continues to grow.<sup>26</sup>

In its four-point plan for growth, BCTIA recommended the following:<sup>27</sup>

- establish an expert panel to study and make recommendations on increasing graduation rates from post-secondary science/technology programs;
- expand the B.C. Training Tax Credit program to include co-op and Internship placements;
- support industry in the delivery of strategic talent attraction and retention initiatives;
- accelerate foreign worker approvals through the Provincial Nominee Program.

26 WorkBC, *Professional, Scientific, and Technical Services*.

27 BCTIA, *Growing B.C.'s Technology Industry*, 5.

## Corporate Efforts and Support

BCTIA notes that, for education to address the skills gaps in the technology sector, corporations will also need to invest in skills development through cooperative research projects, student co-op programs, providing research funding, and participating in applied curriculum design.<sup>28</sup> Survey results indicate that the tech sector in B.C. is outperforming other industries in terms of engagement with the post-secondary system, but there remains room for improvement.

Co-op positions are spoken about by all interviewees for this sector, who see them as positive training components to PSE programs. Interviewees cited the ability of co-op positions to not only provide the practical technical skills used in industry that may not otherwise be taught in a PSE institution, but offer a way for employers to identify good job candidates currently attending PSE.

As one interviewee said, industry supporting co-op is good for PSE institutions and students, but also good for the employers as it “primes” their pipeline. Furthermore, co-op placements are seen as good mechanisms to provide some of the soft skills that tech graduates may be missing as they experience the reality of working in teams in industry and communicating with clients. To that end, survey respondents in the tech sector (49 per cent) were among the most likely to report using co-ops.

BCTIA, in its 2012 Labour Market Trends report, makes some observations that might impact the efforts that companies can include to ease their talent crunch in the IT sector, but which may resonate across the technology-based industries. It notes that:

- Companies that have built a strong brand in the community are having skilled workers seeking them out—thereby easing their talent crunch.

28 Ibid., 37.

- Companies that have consciously tried to improve their talent retention are seeing pay-offs in their efforts, and therefore also seeing less talent shortage.<sup>29</sup>

In regards to the missing business-related skills, the #BCTECH Strategy mentions the importance of business-related skills for PSE graduates and their development through exposure to industry and co-op placements. However, higher-level management skills (i.e., experienced managers) are not mentioned specifically, an area of weakness noted by BCTIA. BCTIA's recommendations include training small company executives, offering mentoring programs for small company executives, and attracting better management talent through tax incentives.<sup>30</sup>

## What Can the PSE Sector Do?

Results from our literature review and interviews reveal that sector-specific skills called for by B.C. employers include software development, hardware design, and engineering (in power). In particular, people with adaptable technical skill sets will be in higher demand as the technology sectors deal with more interdisciplinary challenges; one interviewee specifically mentioned engineering physics and systems engineering as examples. When asked about future skills needs, 67 per cent of survey respondents in the tech sector identified technical skills and occupations as one of the largest challenges to their company, significantly more than any other skill set.

The importance of soft skills and management skills is also recognized, although to a lesser extent, with 52 per cent of respondents identifying employability skills as a future deficit area and 37 per cent identifying management skills. In addressing this, co-op programs have been cited by interviewees as attractive in providing experience in industry and the workplace, supplementing the technical skills of graduates. It also implies

29 BCTIA, *Labour Trends in the British Columbia Technology Sector*, 6.

30 *Ibid.*, 32.



that other experiential learning methods, such as capstone projects, group work, and PSE-based consultancy, may be helpful in providing and refining the soft skills of technical graduates.

In regards to business skills for the tech sector, our evidence suggests there is an opportunity to provide greater access to business and management courses to students in the science and technology fields, to round out the skills sets they need in B.C.'s tech industry. It also suggests an opportunity for greater cross-faculty collaboration between students on possible projects—exposing science, technology, and business students to working in teams. The tech sector was also most likely to identify innovation and commercialization skills (38 per cent), an important future area of skill needs.

Such initiatives might also provide greater resiliency. As noted by BCTIA, during the downturn many people in the information and communications technology sector become freelance entrepreneurs or consultants; these individuals fill some of the talent gaps for companies in the sector. It also raises the question of whether mandatory entrepreneurial training can be a part of the preparation offered by PSE institutions.<sup>31</sup> These results were mirrored in nationwide focus groups conducted by The Conference Board of Canada on business education in Canada.

Finally, three interviewees specifically mentioned the need for greater contact between PSE institutions and industry. Through industry advisory boards or informal connections, the sentiment was that industry must better understand what are the technical needs of industry and what may now be obsolete or superfluous. For example, one interviewee said:<sup>32</sup>

I think there's a lot of things in the curriculum that students are taught that are not really necessary—and universities are also being disrupted with online courses and fast-track learning facilities that are getting people ready to go into the software industry in

31 Ibid., 7.

32 Interview findings.

eight months ... there's certainly more competition for universities out there. People can learn how to program and get a 100K job at Amazon after eight months.

A second interviewee noted Waterloo as an example: "There's a very tight connection with industry, not just drive-by advisory councils. It starts with resisting the urge to find dollars first. They try to understand where their research interests intersect with the local business environment."<sup>33</sup> This was confirmed in survey results, where 68 per cent of respondents in the tech sector were either actively engaged in R&D collaborations with the PSE sector or had an interest in doing so.

### **Changes Before PSE**

In addition, the Premier's Technology Council (PTC) has a "Vision for Education." While this vision focuses on K–12 rather than PSE, the skills and attributes it does include are key to any tech sector and innovative endeavours. These include:<sup>34</sup>

- functional numeracy and literacy
- critical thinking and problem-solving
- creativity and innovation
- technological literacy
- communications and media literacy
- collaboration and teamwork
- personal organization
- motivation, self-regulation, and adaptability
- ethics, civic responsibility, and cross-cultural awareness

33 Interview findings.

34 Premier's Technology Council, *A Vision for 21st Century Education*, 9.

Based on past Conference Board research, many of the recommended changes made by PTC for the K–12 system are also relevant to discussions about changes in PSE, such as teachers changing from lecturers to guides, open access to information systems, and tailored learning.<sup>35</sup>

35 Ibid., 1–3.

## APPENDIX C

# About B.C.'s Transportation and Warehousing Sector

B.C.'s transportation and warehousing sector plays a critical role in the province's economic performance and prosperity. It ensures that natural resources, raw materials, manufactured products, and value-added goods coming into or leaving the province are properly warehoused and shipped. The sector accounts for approximately 6 per cent of B.C.'s total GDP.<sup>1</sup> And in 2015, B.C. industries exported approximately \$36 billion worth of commodities—wood products, energy products, machinery, mineral products, and pulp and paper products—leveraging the province's air, rail, water, and truck transportation services to get their products to market.<sup>2</sup>

Employment in the sector has grown significantly over the past two years. The sector employed about 127,000 workers in 2013 and grew to approximately 140,000 workers in 2015, accounting for approximately 32 per cent of employment growth in the province. Some 40,000 workers (29 per cent) are employed in truck transportation; 30,000 (21 per cent) in scenic and sightseeing transportation; 19,000 (14 per cent) in transit

1 WorkBC, *Transportation and Warehousing*.

2 BC Stats, *Annual B.C. Origin Exports*.

and ground passenger transportation; and 17,000 (12 per cent) in postal and courier/messenger services. (See Table 1.) Common occupations in the sector include truck drivers, bus drivers, and taxi drivers.<sup>3</sup>

**Table 1**

**B.C.'s Transportation and Warehousing Subsector Is Growing**

(employment, 000s of persons)

Industry subsector	2013	2014	2015
B.C. (all industries)	2,266	2,278	2,306
Truck transportation	36.1	36.9	39.9
Air transportation	11.9	13.2	14.9
Water transportation	7.5	6.1	6.3
Rail transportation	6.8	6.2	6
Warehousing and storage	9.3	8.9	7.1
Scenic and sightseeing transportation and support activities	22.9	24.2	29.5
Transit and ground passenger transportation	18.2	19.6	18.6
Postal and courier/messenger services	14.2	18.6	17.2
Transportation and warehousing total	127.3	133.8	140

Source: The Conference Board of Canada.

## What Are the Skills Needs and Challenges?

Workers in the transportation and warehousing sector need a variety of skills to be successful. These include technical skills such as transporting, loading, warehousing, chemical safety, storage, and logistics. Of the 51 employers in the sector who responded to our online survey, 30 (or 59 per cent) believe they will face technical skills challenges in the next three to five years.

Attracting new workers with the right technical skills is a challenge for many employers in transportation and warehousing. A senior executive from a provincial transportation association noted that because

3 WorkBC, *Transportation and Warehousing*.

fewer young people are familiar with large pieces of equipment (e.g., agricultural machinery) than in the past, they are less likely to be aware of career options related to other large equipment such as commercial transportation vehicles.<sup>4</sup>

Attracting new workers to truck-driving occupations is a particular challenge for the industry. Previous research from Dubé and Pilon, and Chow, notes that long hours, irregular schedules, and comparatively low pay make it difficult to attract young people to the industry.<sup>5</sup> In addition, several survey and interview respondents believe that as more young people move to urban centres, they are less likely to acquire a standard (Class 5) driver's licence because of the availability of public transportation. Since a Class 5 licence is a prerequisite for acquiring a Class 1 (commercial) licence, this also makes young people less likely to consider professional truck-driving as a profession.<sup>6</sup>

Many employers in B.C.'s transportation and warehousing sector also face difficulties finding new employees with the right employability skills. The Calgary Logistics Council notes that the sector is shifting to one that requires a combination of soft skills—working with others, continuous learning, managing information—in addition to the pure physical strength that may have characterized the industry in the past.<sup>7</sup> One interview participant also noted that truck drivers need adequate literacy, numeracy, and communication skills to cope with administrative tasks required by the industry.<sup>8</sup>

Several employers also emphasized the need for safety skills. Many companies in the sector are involved in the transportation of dangerous goods, and their employees need to know how to operate equipment safely and how to properly load, unload, and store such materials.<sup>9</sup>

4 Interview findings.

5 Dubé and Pilon, *On the Road Again*; Chow, *Labour Standard Issues*.

6 Interview findings.

7 Calgary Logistics Council, *The Accelerator Project*, 27.

8 Interview findings.

9 Ibid.

Like many sectors of Canada's economy, the transportation and warehousing sector faces a future shortage of workers with managerial and leadership skills. In its 2012 report on key supply chain occupations, the Calgary Logistics Council notes that markets for several managerial occupations in B.C.'s transportation and warehousing sector will be under-supplied from 2016 through 2020. These occupations include:<sup>10</sup>

- senior managers—goods production, utilities transportation, and construction
- purchasing managers
- computer and information systems managers
- transportation managers
- facility operation and maintenance managers
- supervisors, recording, and distributing and scheduling occupations
- purchasing agents and officers
- customs, ship, and other brokers

Negative perceptions are a common challenge for many employers in the sector. According to an executive from a provincial transportation association, the public perception that transport operators are low-skilled labourers makes it difficult to attract new employees. In addition, there are no minimum training requirements for truck drivers, making it difficult to secure funding for training programs.<sup>11</sup>

## Addressing Skills Challenges

Our survey and interview findings show that employers in B.C.'s transportation and warehousing sector tend to rely on less formal training strategies to address their skills needs. When asked about their use of various experiential learning strategies, 22 of 46 employer respondents (48 per cent) stated that they currently use mentoring programs to address their skill needs. Most survey respondents in the

10 Calgary Logistics Council, *The Accelerator Project*, 20.

11 Interview findings.

sector, however, do not use co-op positions, unpaid internships, or paid internships to address their skill needs, and are not interested in doing so in the future.

Many of these respondents operate in the truck transportation subsector, where PSE involvement has historically been limited.<sup>12</sup> When asked about other types of training and retention strategies, several survey respondents reported that they rely on in-house training and development programs; increasing compensation, wages, and benefits; and hiring from competitors to address their skills challenges.

## **Education and Training**

Employers in B.C.'s transportation and warehousing sector believe that expanding PSE involvement in the sector can help address their skills challenges. For example, some employers believe that creating an academic discipline based on the sector, and promoting this and other related programs through youth engagement in schools, could help attract new workers to the sector. The Calgary Logistics Council also notes that employer support for the expansion of education programs is “nearly universal.”<sup>13</sup> These programs include apprenticeships, co-ops, and internships that employers expect will provide new employees with “more direct work experience ... to better enable the translation of theory into practice.”<sup>14</sup>

Many of our interview and survey respondents believe there is an opportunity to increase communication between B.C.'s PSE institutions and employers in the transportation and warehousing sector. When asked about their opportunities to communicate their skill needs to PSE institutions, 38 of 46 survey respondents reported that such opportunities

12 Interview findings.

13 Calgary Logistics Council, *The Accelerator Project*, 32.

14 *Ibid.*, 25.



are limited or non-existent. Of these, 27 respondents operate in the truck transportation subsector, for which there are few formal requirements beyond acquiring a Class 1 licence.<sup>15</sup>

Several jurisdictions have attempted to formalize requirements for truck-driving occupations. For example, Ontario's Ministry of Transportation hopes to implement new legislation in 2017 that will require commercial truck drivers to complete a mandatory, government-approved training program before applying for a commercial licence.<sup>16</sup> And, in 2013, Manitoba's Apprenticeship and Certification Board agreed to develop formal training requirements for commercial truck drivers.<sup>17</sup>

15 Interview findings.

16 Wallace and Ormsby, "Big-Rig Drivers in Ontario."

17 Cash, "Truck Driver Certification a Go."

## APPENDIX D

# About Natural Resources and LNG in B.C.

Natural Resources and LNG in B.C. are made up of a number of key subsectors:

- forestry and logging
- mining and quarrying
- oil and gas extraction
- agriculture and horticulture
- fishing, trapping, and hunting
- harvesting and landscaping

B.C.'s Labour Market Outlook to 2024 estimates that the natural resources sector employs 74,300 people and accounts for 3.3 per cent of B.C.'s workforce. Despite growth in 2012–13, only nominal growth is anticipated for the mining and oil and gas extraction industry in B.C. as well as for agriculture through 2024. Forestry and logging is not expected to grow, while the fishing, hunting, and trapping sector shrank in 2012–13 and is expected to shed more jobs through 2024.<sup>1</sup>

Of the 23,500 anticipated job openings in the natural resources sector over the next decade, 99 per cent (or 23,300) will be retirement replacements. In other words, only 1 per cent of the jobs (roughly 200)

<sup>1</sup> WorkBC, *British Columbia 2024 Labour Market Outlook*, 32. See also WorkBC's *Industry Profiles*, which are based on 2013 Labour Force Survey data.

will be attributable to growth of the sector. But while growth will be small, the subsector still faces significant turnover. When surveyed, 80 per cent of respondents identified attracting new employees with the necessary skills as one of their biggest challenges. As previous chapters have shown, most of these replacement jobs will require a PSE credential.

The bulk of the new openings will be in the farming and mining sectors, which combined will require 13,400 new workers to replace outgoing ones. Oil and gas, forestry, and logging, and services in support of agriculture and forestry will each need between 3,000 and 3,600 new workers, while fishing, hunting, and trapping as well as services in support of mining and oil and gas extraction will require only an extra 400.<sup>2</sup>

The job creation and economic potential of B.C.'s LNG sector depends very much on investments in the industry and the approval of a number of projects. B.C.'s 2013 Natural Gas Workforce Strategy Committee estimated that an additional 63,000 construction jobs, plus another 64,000 operation and maintenance jobs, would be created if five proposed LNG plants were operational by 2021. However, an updated study by KPMG in 2014—the results of which were incorporated into the *B.C. 2022 Labour Market Outlook*—found that there could be “up to 100,000” additional LNG job openings, with 78 per cent of the jobs (or 763,400) requiring post-secondary training.<sup>3</sup>

A recent Conference Board study on B.C.'s emerging LNG industry also noted that the “labour, skills, and occupations needed to develop B.C.'s LNG potential are significant, though quantifying the exact size and nature of those needs is difficult. Uncertainty remains about how many and what kinds of LNG development projects will be pursued, when construction will begin and end, and when operations will commence.”<sup>4</sup>

2 WorkBC, *British Columbia 2024 Labour Market Outlook*, 32.

3 BC Natural Gas Workforce Strategy Committee, *Natural Gas Workforce Strategy and Action Plan*, 6–7; WorkBC, *British Columbia 2022 Labour Market Outlook*, 19; Burt, *B.C. Must Act Quickly to Profit From LNG Exports*.

4 Robins and others, *A Changing Tide*, 40–42.

The B.C. Natural Gas Workforce Strategy Committee along with the KPMG study suggest that, at peak construction, the most in-demand jobs in the LNG sector would be construction trades and labourers (11,800 jobs), steamfitters and pipefitters (3,800), welders (2,200), concrete finishers (1,500), transport truck drivers (1,500), carpenters (1,400), heavy equipment operators (1,110), gas fitters (1,100), purchase agents and officers (875), and crane operators (800). The exact numbers may be speculative, but what is clear is that the emerging LNG industry could become a significant source of jobs for new entry workers with college and apprenticeship training.<sup>5</sup>

Generally, though, the highest priority areas for hiring in the natural resources sector (excluding anticipated LNG projects) will be in management and senior management positions requiring a combination of education and work experience. After university-educated managers, B.C.'s most recent Labour Market Outlook estimates that the top opportunity jobs require a university degree, followed by jobs that require a college diploma or apprenticeship training.<sup>6</sup>

## What Are the Skills Gaps?

A recent labour market study by the Asia Pacific Gateway Skills Table found that attrition will account for 57 per cent of the job openings over the next 5 to 10 years for B.C.'s engineers, geoscientists, technologists, and technicians, creating considerable demand for new workers with these credentials. The study estimated that the sector will create 11,555 new jobs across 31 different occupations by 2024. Combined with retirement, the sector will have 31,150 job openings in the next 10 years.<sup>7</sup>

5 B.C. Natural Gas Workforce Strategy Committee, *Natural Gas Workforce Strategy and Action Plan*, 6–7; Work BC, *British Columbia 2022 Labour Market Outlook*, 21; Burt, *B.C. Must Act Quickly to Profit From LNG Exports*.

6 WorkBC, *British Columbia 2022 Labour Market Outlook*, 15–16.

7 Asia Pacific Gateway Skills Table, *Labour Market Information (2015–2024)*, 1–5.

There will be an excess demand but limited supply of engineering managers beginning in 2018 through to 2023, though nearly every occupation title under the engineering, technologists, and technicians groups will experience the same demand/supply crunch, according to the *Tightness Rankings for the 31 EGTT Occupations in B.C.* report.<sup>8</sup> Survey results identified “management” as one of the most in-demand skill sets (selected by 17 per cent of respondents). Furthermore, respondents from this sector were most likely to identify the attraction and recruitment of employees with management skills as one of their biggest challenges (71 per cent).

The bulk of the job openings will be for civil engineers (4,060), while geological engineers and architectural technologists and technicians are the fastest-growing occupations. The Asia Pacific study anticipates meeting the demand first and foremost by relying on newly trained workers. The most pressing need will be for new entrants with credentials in software engineering and design. Immigration, interprovincial hiring, and workers changing into these professions are expected to meet the remaining demand.<sup>9</sup>

Although B.C.'s labour supply is expected to grow over the next 10 years, the supply of engineers, geoscientists, technologists, and technicians is not expected to keep pace with job openings, falling short by 10 per cent in the first five years. Survey results confirm these findings, with forestry technicians (17 per cent), “other engineers” (14 per cent), and geologists identified most often as in demand. Extensive shortages in regions in Northern and Southeast B.C. as well as regions outside the Lower Mainland are an opportunity for PSE institutions in these regions to grow their programs in engineering and geosciences as well as related technologists and technicians.<sup>10</sup>

8 Asia Pacific Gateway Skills Table, *Tightness Rankings for the 31 EGTT Occupations*.

9 Asia Pacific Gateway Skills Table, *Labour Market Information (2015–2024)*, 1–5.

10 Ibid.

## What Is Being Done to Address the Skills Gaps?

The Association of Consulting Engineering Companies of British Columbia (ACEC-BC), the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), and the Applied Science Technologists and Technicians of British Columbia (ASTTBC) have tackled the issue of how to fill new entry positions through to management positions, which are usually senior level, by commissioning the Asia Pacific Gateway study. Good data are key and the associations wanted metrics, not anecdotal evidence, to address the issue head-on.

The associations that represent workers in these areas, as well as other natural resource sectors, have begun to raise awareness about the seriousness of the skills gap issue. Some are exploring whether associations should establish human relations committees, which could help to focus human resources people in individual businesses, or possibly go as far as building a strategy—one that includes recruiting more women into industries with small, female workforces.

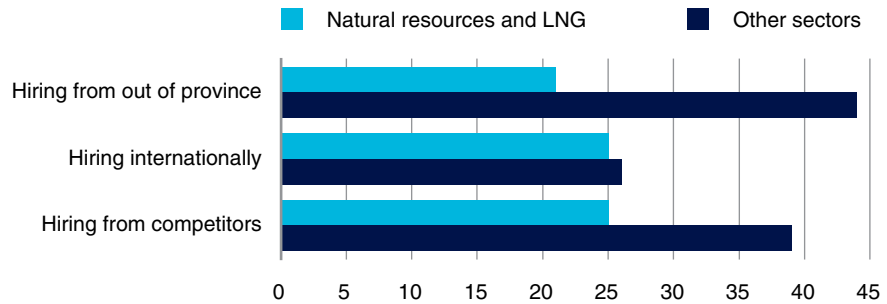
Certain occupations lend themselves to slower winding down or retirement processes than others. Engineering, for example, requires knowledge and abilities, not necessarily physical stamina. So industries like engineering that are already experiencing or expecting shortages in more senior-level positions are increasingly retaining workers past 65 or shifting them into consulting or part-time work arrangements. But increasing the pressure on workers to delay retirement is not a long-term solution.

Owing to a shortage of arborists in B.C., employers in the forestry sector are looking out of province for new recruits. Olds College in Alberta and Fleming College in Ontario both have arboriculture programs that produce students with skills needed in British Columbia. In addition, businesses in need of new recruits are developing relationships with programs outside of B.C. to fill the skills gap within the province.

Generally, however, employers in the natural resources sector were significantly less likely to attract new employees from out of province (21 per cent versus an average 44 per cent for other sectors), out of country (25 per cent versus 26 per cent), or from competing firms (25 per cent versus 39 per cent). This suggests that the sector as a whole, including those in industry and in related PSE programs, could do more to extend the sector’s reach beyond its traditional geographic catchment area, while increased investment in B.C.’s arboriculture programs would create additional pathways in the province for in-demand jobs. (See Chart 1.)

**Chart 1**  
**Non-Local Recruitment—Natural Resources and LNG Versus Other Sectors**

(per cent of respondents, n = 198)



Source: The Conference Board of Canada.

Some forestry businesses are hiring fresh grads who do not necessarily have a background in forestry and then training them in-house, combining internal training with mentorship programming. This kind of arrangement might also include supporting a new entry to up-skill through PSE. But of all the sectors surveyed, it was in natural resources where employers were least likely to be interested in mentoring (39 per cent) as a form of experiential learning. Best practices, though, include the City of Surrey, which works with the British Columbia Institute of

Technology's Forestry program to develop forestry-related programming in order to produce first-rate environmental education and natural area management/forest health students.

## What Can the PSE Sector Do?

The forestry and logging industry, which added 1,000 jobs in 2012–13 and grew its workforce to 18,700, demands a wide range of skill sets, including logging and forestry labourers, timber haulers, and harvesting equipment operators through to technologists and technicians specializing in conservation. The bulk of the largely male workforce is concentrated in the Vancouver Island/Coast region.

A lot of work is becoming more mechanical and for that reason there is a growing demand for university-educated forestry engineers as well as other forestry-related degrees. The University of British Columbia offers a full suite of undergraduate and graduate forestry degrees, ranging from Bachelors of Science in Conservation, Wood Sciences, and Forest Operations through to Forest Sciences, International Forestry, and Urban Forestry.

Urban forestry is an especially interesting and sometimes overlooked field. While the sector as a whole is not expected to grow a great deal through 2024, there are emerging opportunities in urban forestry owing to the growth of municipal planning departments and the demand for urban planners who are tied into green infrastructure initiatives aimed at mitigating climate change and fostering sustainability.

Landscape architecture programs, such as UBC's Master of Landscape Architecture, an "accredited professional program fostering graduates with the environmental knowledge to design and manage the natural and urban terrain," and the Masters of Advanced Studies in Landscape



Architecture, a “post-professional program for individuals interested in further research and investigations of our environment,” lead the pack in preparing students for careers in urban forestry.<sup>11</sup>

But the sector is struggling to find people who can hit the ground running as arborists and who can do the work to maintain urban forests. The only program at the moment is Kwantlen Polytechnic University’s Arborist Technician Apprenticeship program, an eight-week technical training session based out of KPU’s Langley campus.<sup>12</sup> Although it is a certified arborist trade apprenticeship program, it is relatively new, it does not run each year, and it covers only the first of three sequential trades credentials in arboriculture. A more robust program would help to meet the needs of the sector. Where possible, employers working in the sector end up contracting out work in the absence of qualified arborists with specific skill sets. For example, to safely remove a 120-foot Douglas Fir hanging over a house in an urban setting requires a different skill set than a forest industry tree faller might have. Urban arborists might need to climb and remove a tree in increments as well as use a crane to deposit the tree limbs safely three streets away. So a new recruit with both a university credential in arboriculture as well as a crane operation certification from a college—or a new business that could provide both services—would satisfy a growing need in the province.

Summer student and co-op programs—even tree planting—provide opportunities to build a broader awareness of the sector, give new students the chance to learn the ropes, and gain valuable on-the-job training. Distance training could also work and B.C.’s universities and colleges could look at ways to make it easier for people to learn how to do these jobs from afar before making the move to B.C. for work.

The two-year intensive Natural Resources and Environmental Technology program at the College of New Caledonia offers field courses in forest measurements and surveying, forest productivity and

11 UBC School of Architecture and Landscape Architecture, *Master of Landscape Architecture*.

12 Kwantlen Polytechnic University, *Arborist Technician*.

soil properties, forest ecology and health, forest engineering, and fire management. The program combines classroom, laboratory, and field work, with a special emphasis on collaborative and experiential learning as well as career skills development.<sup>13</sup>

Students work with faculty and industry in a research forest, “a foundational land base for conducting applied research”<sup>14</sup> and also have the option of participating in an International Field School.<sup>15</sup> Through entrance requirements, credit transfer agreements, and support from the public and private sector, the program demonstrates a strong commitment to fostering educational and career pathways in natural resources and environmental technology.

Employers in the natural resources sector demonstrated a clear preference for co-op as a form of experiential learning, with 27 per cent indicating an interest in increased emphasis on co-op versus an average of 12 per cent for other methods. It is noteworthy that employers in the natural resources sector were most likely of all sectors surveyed to be using apprenticeships (25 per cent) for training, making the development of apprenticeship pathways in PSE an important priority area.

B.C.’s universities and colleges are clearly on the right track in developing forestry and engineering-related programs and skills training, but the PSE sector could, as more than one interviewee indicated, do more to build awareness of these industries and highlight career opportunities for new recruits or career development opportunities for existing workers. A high number of employers (35 per cent) felt that their chances to communicate their skills and training needs to PSE are “non-existent,” suggesting that there is room to improve.

13 College of New Caledonia, *Natural Resources and Environmental Technology*.

14 *Ibid.*, *Research Forest*.

15 *Ibid.*, *CNC Natural Resources International Field School 2017*.

A number of the industries in natural resources and the emerging LNG industry are inter-related, meaning that there remains a great deal of cross-over. The key to building a sustainable workforce in these sectors will be to build awareness of the career opportunities at the same time as PSE institutions build the programs to supply them.

## APPENDIX E

# Bibliography

ABC Life Literacy Canada. *9 Essential Skills*. <http://abclifeliteracy.ca/nine-essential-skills> (accessed February 15, 2014).

Altonji, Joseph G., Lisa Kahn, and Jamin Speer. "Cashier or Consultant? Entry Labor Market Conditions, Field of Study, and Career Success." *Journal of Labor Economics* 34, no. S1 (January 2016): S362–S401. [www.journals.uchicago.edu/doi/full/10.1086/682938](http://www.journals.uchicago.edu/doi/full/10.1086/682938) (accessed May 13, 2012).

Applied Science Technologists and Technicians of B.C. *A Strategic Direction for Technology Education and Skills in British Columbia*. Surrey: Applied Science Technologists and Technicians of B.C., January 2013. [https://asttbc.org/wp-content/uploads/2015/10/ASTTBC\\_SDR1\\_.13.pdf](https://asttbc.org/wp-content/uploads/2015/10/ASTTBC_SDR1_.13.pdf) (accessed May 13, 2016).

Asia Pacific Gateway Skills Table. *Labour Market Information (2015–2024): Engineers, Geoscientists, Technologists and Technicians in BC*. Executive Summary, Vancouver: Asia Pacific Gateway Skills Table, 2015.

—. *Tightness Rankings for the 31 EGTT Occupations in BC Ranked in the 2015 Report*. Vancouver: Asia Pacific Gateway Skills Table, 2015. [www.lmionline.ca/wp-content/uploads/2016/07/APG-2015\\_EGTT-BC\\_occupations-list-moderate-DEC2015.pdf](http://www.lmionline.ca/wp-content/uploads/2016/07/APG-2015_EGTT-BC_occupations-list-moderate-DEC2015.pdf) (accessed May 13, 2016).

Becker, Gary S. *Human Capital*. Chicago: University of Chicago Press, March 1994.

Bernard, Marie-Christine. *Provincial Outlook Executive Summary Winter 2016: Ontario Is Back Among the Growth Leaders*. Ottawa: The Conference Board of Canada, 2016.

British Columbia Council on Admissions and Transfer (BCCAT). *2015–16 Annual Review: Supporting Post-Secondary Student Journeys*. Vancouver: BC Council on Admissions and Transfer, 2016. [www.bccat.ca/pubs/2015-16\\_Annual\\_Review.pdf](http://www.bccat.ca/pubs/2015-16_Annual_Review.pdf) (accessed June 7, 2016).

—. *What We Do*. [www.bccat.ca/about/work#sthash.SJDRLvd5.dpuf](http://www.bccat.ca/about/work#sthash.SJDRLvd5.dpuf) (accessed June 7, 2016).

BC Ministry of Advanced Education. *Degree Authorization*. [www.aved.gov.bc.ca/degree-authorization/](http://www.aved.gov.bc.ca/degree-authorization/) (accessed May 21, 2016).

BC Ministry of Advanced Education and Labour Market Development. *Ten-Year Employment Outlook for British Columbia: COPS B.C. Unique Scenario, 2007–2017*. Victoria: BC Ministry of Advanced Education and Labour Market Development, n.d. [www.idibc.org/images/uploads/COPS\\_BC\\_Unique\\_Scenario\\_2007-2017\\_.pdf](http://www.idibc.org/images/uploads/COPS_BC_Unique_Scenario_2007-2017_.pdf) (accessed May 21, 2016).

BC Ministry of Jobs, Tourism and Skills Training. *BC Major Projects Inventory*. Victoria: Ministry of Jobs, Tourism and Skills Training, 2013.

BC Ministry of Regional Economic and Skills Development. *Skills for Growth: British Columbia's Labour Market Strategy to 2020*. Victoria: BC Ministry of Regional Economic and Skills Development, n.d.

BC Natural Gas Workforce Strategy Committee. *Natural Gas Workforce Strategy and Action Plan*. July 2013. <http://bcInginfo.com/images/uploads/documents/BC%20Natural%20Gas%20Workforce%20Strategy%20and%20Action%20Plan%20July%202013.pdf> (accessed May 13, 2016).

BC Stats. *Annual B.C. Origin Exports*. May 4, 2016. <http://bcstats.gov.bc.ca/StatisticsBySubject/ExportsImports/Data.aspx> (accessed May 6, 2016).

—. *Profile of the British Columbia High Technology Sector—2014 Edition*. June 2015. [www.bcstats.gov.bc.ca/StatisticsBySubject/BusinessIndustry/HighTechnology.aspx](http://www.bcstats.gov.bc.ca/StatisticsBySubject/BusinessIndustry/HighTechnology.aspx) (accessed May 13, 2016).

BC Technology Industry Association (BCTIA). *Growing BC's Technology Industry: A 4-Point Plan for Growth*. Vancouver: BCTIA, December 2014.

—. *Labour Trends in the British Columbia Technology Sector*. 2012. [www.wearebctech.com/advocacy/publications/publication/techtalentbc/techtalentbc-labour-study-2012](http://www.wearebctech.com/advocacy/publications/publication/techtalentbc/techtalentbc-labour-study-2012) (accessed May 13, 2016).

—. *Outlook 2020 Initiative: BC's Advanced Technology Sector: Reaching for the Next Level*. March 2009. [www.bcbc.com/content/553/2020\\_200910\\_BCTIA.pdf](http://www.bcbc.com/content/553/2020_200910_BCTIA.pdf) (accessed May 13, 2016).

Bourbeau, Emanuelle, Pierre Lefebvre, and Phillip Merrigan. "The Evolution of the Returns to Education for 21- to 35-Year-Olds in Canada and Across Provinces: Results From the 1991–2006 Analytical Census Files." *Canadian Public Policy–Analyse de politiques* 38, no. 4 (2012): 531–49.

Burt, Michael. *B.C. Must Act Quickly to Profit From LNG Exports*. April 24, 2014. <http://blogs.theprovince.com/2014/04/24/michael-burt-b-c-must-act-quickly-to-profit-from-lng-exports/> (accessed May 13, 2016).

Business Council of British Columbia. *Key Issues*. [www.bcbc.com/key-issues](http://www.bcbc.com/key-issues) (accessed April 18, 2016).

Calgary Logistics Council. *The Accelerator Project: A Call to Action*. Calgary: Calgary Logistics Council, 2012.

Business Council of Canada. "Solving Our Skills Gap Challenge: Michael Denham, Accenture." *Address by Michael Denham, Canadian President and Country Managing Director for Accenture*. Held at Toronto Board of Trade, April 11, 2013. [www.ceocouncil.ca/ceo\\_perspectives/solving-our-skills-gap-challenge-michael-denham-accenture](http://www.ceocouncil.ca/ceo_perspectives/solving-our-skills-gap-challenge-michael-denham-accenture) (accessed April 18, 2016).

Cash, Martin. "Truck Driver Certification a Go." *Winnipeg Free Press*, February 23, 2013. [www.winnipegfreepress.com/business/truck-driver-certification-a-go-192667621.html](http://www.winnipegfreepress.com/business/truck-driver-certification-a-go-192667621.html) (accessed May 15, 2016).

Cheung, Calista, Yvan Guillemette, and Shahrzad Mobasher-Fard. *Tertiary Education: Developing Skills for Innovation and Long-Term Growth in Canada*. Paris: OECD, 2012. [www.oecd-ilibrary.org/docserver/download/5k92pghq4247.pdf?expires=1474125002&id=id&accname=guest&checksum=A5ADB8686404C5715547257954029ABF](http://www.oecd-ilibrary.org/docserver/download/5k92pghq4247.pdf?expires=1474125002&id=id&accname=guest&checksum=A5ADB8686404C5715547257954029ABF) (accessed August 31, 2016).

Chow, Garland. *Labour Standard Issues in the Inter-Provincial Canada Trucking Industry*. Ottawa: Commission on the Review of the Federal Labour Standards, 2006.

College of New Caledonia. *CNC Natural Resources International Field School 2017*. [www.cnc.bc.ca/Study\\_Abroad/Study\\_Abroad\\_Opportunities.htm](http://www.cnc.bc.ca/Study_Abroad/Study_Abroad_Opportunities.htm) (accessed August 31, 2016).

—. *Natural Resources and Environmental Technology*. [www.cnc.bc.ca/programs-courses/NRET.htm](http://www.cnc.bc.ca/programs-courses/NRET.htm) (accessed August 31, 2016).

—. *Research Forest*. [www.cnc.bc.ca/research-forest.htm](http://www.cnc.bc.ca/research-forest.htm) (accessed August 31, 2016).

Council of Economic Advisors. *Preparing the Workers of Today for the Jobs of Tomorrow*. Washington, D.C.: Council of Economic Advisors, July 2009.

Council of Ministers of Education, Canada. *Ministers and Key Partners Chart Path Forward for Education and Skills in Canada*. July 10, 2014. [http://cmec.ca/278/Press-Releases/Ministers-and-Key-Partners-Chart-Path-Forward-for-Education-and-Skills-in-Canada.html?id\\_article=831](http://cmec.ca/278/Press-Releases/Ministers-and-Key-Partners-Chart-Path-Forward-for-Education-and-Skills-in-Canada.html?id_article=831) (accessed July 10, 2014).

Dehaas, Josh. “‘Entry-Level’ Jobs Are Getting Harder to Find.” *Maclean’s*, April 5, 2014. [www.macleans.ca/work/jobs/entry-level-jobs-are-getting-harder-to-find/](http://www.macleans.ca/work/jobs/entry-level-jobs-are-getting-harder-to-find/) (accessed August 31, 2016).

Dowdall, Brent, and Daniel Munro. *The Sustainable Approach to Prosperity for B.C. Is Innovation*. April 7, 2016. [www.conferenceboard.ca/commentaries/technologyinnovation/default/16-04-07/the\\_sustainable\\_approach\\_to\\_prosperity\\_for\\_b\\_c\\_is\\_innovation.aspx](http://www.conferenceboard.ca/commentaries/technologyinnovation/default/16-04-07/the_sustainable_approach_to_prosperity_for_b_c_is_innovation.aspx) (accessed April 17, 2016).

Dubé, Vincent, and Denis Pilon. *On the Road Again*. Ottawa: Statistics Canada, 2008, [www.statcan.gc.ca/pub/75-001-x/10106/9061-eng.pdf](http://www.statcan.gc.ca/pub/75-001-x/10106/9061-eng.pdf) (accessed April 17, 2016).

Emery, Herb. "Total and Private Returns to University Education in Canada: 1960–2030 and in Comparison to Other Post-Secondary Training." *Higher Education in Canada*. Held at John Deutsch Institute for the Study of Economic Policy, Kingston, February 13–14, 2004. <http://jdi-legacy.econ.queensu.ca/Files/Conferences/PSEconferencepapers/Emeryconferencepaper.pdf> (accessed May 13, 2016).

Ferrer, Ana M., and W. Craig Riddell. "The Role of Credentials in the Canadian Labour Market." *Canadian Journal of Economics/Revue canadienne d'économique* 35, no. 4 (November 2002): 879–905.

Fields, Daniel. *British Columbia Fiscal Snapshot: Fiscal Situation Remains Solid*. Ottawa: The Conference Board of Canada, 2016.

Government of British Columbia. *Funding Boost Kicks Off Co-Op Week in B.C.* News release, Victoria: Government of British Columbia, March 14, 2016.

—. "Highlights From the Student Transitions Project, Post-Secondary Student Mobility." *Update on Student Mobility in the B.C. Public Post-Secondary System*. Victoria: Government of British Columbia, 2015. [www.aved.gov.bc.ca/student\\_transitions/documents/PSM\\_Highlights\\_2015-02-05.pdf](http://www.aved.gov.bc.ca/student_transitions/documents/PSM_Highlights_2015-02-05.pdf). (accessed June 7, 2016).

—. *The #BCTECH Strategy*. Victoria: Government of B.C., January 2016. [https://bctechstrategy.gov.bc.ca/wp-content/uploads/sites/10/2016/04/BCTech\\_Strategy.pdf](https://bctechstrategy.gov.bc.ca/wp-content/uploads/sites/10/2016/04/BCTech_Strategy.pdf) (accessed May 13, 2016).



Grant, Michael. *Aligning Skills Development With Labour Market Need*. Ottawa: The Conference Board of Canada, 2016.

Fowlie, Jonathan. "Christy Clark Promises Action as Numbers Show a Looming Job Skills Shortage." *The Vancouver Sun*, June 26, 2013. [www.vancouversun.com/business/Christy+Clark+promises+action+numbers+show+looming+skills/8583265/story.html](http://www.vancouversun.com/business/Christy+Clark+promises+action+numbers+show+looming+skills/8583265/story.html) (accessed May 13, 2016).

Hall, Colin. *Learning and Development Outlook 2013*. Ottawa: Conference Board of Canada, 2014.

Immigration, Refugees and Citizenship Canada. *Facts & Figures 2014: Immigration Overview—Temporary Residents*. Ottawa: IRCC, 2015.

—. *Research DataMart*. Ottawa: IRCC, February 2016.

—. *Research DataMart*. Ottawa: IRCC, July 2015. (Custom data request)

Jones, Glen A. "Sectors, Institutional Types, and the Challenges of Shifting Categories: A Canadian Commentary." *Higher Education Quarterly* 63, no. 4 (October 2009): 371–83.

KPMG. *British Columbia Technology Report Card—Bordering on the Big Play: Taking Our Tech Sector to the Next Level*. Vancouver, KPMG, 2014. [www.vancouvereconomic.com/wp-content/uploads/2015/06/KPMG-Tech-Report-Card-20141.pdf](http://www.vancouvereconomic.com/wp-content/uploads/2015/06/KPMG-Tech-Report-Card-20141.pdf) (accessed June 7, 2016).

Kwantlen Polytechnic University. *Arborist Technician: Apprenticeship*. [www.kpu.ca/calendar/2014-15/apprentices/arboristtechnician-apprentice.html](http://www.kpu.ca/calendar/2014-15/apprentices/arboristtechnician-apprentice.html) (accessed May 13, 2016).

Manitoba Real Estate Association. *Real Estate Career Guide*. Winnipeg: The Manitoba Real Estate Association, n.d. [http://realestatemanitoba.com/wp-content/uploads/2014/07/MREA\\_Real\\_Estate\\_Career\\_Guide\\_tk106-DRAFT-4.pdf](http://realestatemanitoba.com/wp-content/uploads/2014/07/MREA_Real_Estate_Career_Guide_tk106-DRAFT-4.pdf) (accessed May 13, 2016).

Munro, Daniel. “Employers Must Start Investing in Skills Training or Risk Having Public Policy Nudge Them Along.” *Financial Post*, May 12, 2014. <http://business.financialpost.com/2014/05/12/employers-must-start-investing-in-skills-training-or-risk-having-public-policy-nudge-them-along> (accessed May 12, 2016).

—. *Skills and Higher Education in Canada: Towards Excellence and Equity*. Ottawa: Canada 2020, 2014.

Munro, Daniel, and Jessica Edge. *Improving Innovation Management Decision-Making: Thinking Like an Innovator*. Ottawa: The Conference Board of Canada, 2014.

Munro, Daniel, James Stuckey, and Cameron MacLaine. *Skills—Where Are We Today? Post-Secondary Education and the State of Skills Production in Canada*. Ottawa: The Conference Board of Canada, 2014.

Ontario Ministry of Training, Colleges, and Universities. *Ontario Labour Market Statistics for January 2013*. Toronto: Ontario Ministry of Training, Colleges, and Universities, 2013.

Oreopoulos, Philip, Till von Wachter, and Andrew Heisz. *The Short- and Long-Term Career Effects of Graduating in a Recession: Hysteresis and Heterogeneity in the Market for College Graduates*. Cambridge, MA: National Bureau of Economic Research, 2006.

Organisation for Economic Co-operation and Development. *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*. Paris: OECD Publishing, 2016. <http://dx.doi.org/10.1787/9789264252073-en> (accessed April 26, 2016).

Premier’s Technology Council. *A Vision for 21st Century Education*. Vancouver: Premier’s Technology Council, 2010. [www.gov.bc.ca/premier/attachments/PTC\\_vision%20for\\_education.pdf](http://www.gov.bc.ca/premier/attachments/PTC_vision%20for_education.pdf) (accessed April 26, 2016).

Psacharopoulos, George, and Harry Anthony. “Returns to Investment in Education: A Further Update.” *Education Economics* 12, no. 2 (August 2004): 111–34.

PWC and Life Sciences British Columbia. *The Life Sciences Sector in B.C.: Economic Impact Now and in the Future*. Vancouver: PWC and Life Sciences British Columbia, 2015. [www.pwc.com/ca/en/healthcare-public-sector/assets/2015-10-LifeSciencesBCSectorReport.pdf](http://www.pwc.com/ca/en/healthcare-public-sector/assets/2015-10-LifeSciencesBCSectorReport.pdf) (accessed May 13, 2016).

Red Seal Program. *Red Seal Trades Designated in British Columbia*. [www.red-seal.ca/others/bc@-eng.jsp](http://www.red-seal.ca/others/bc@-eng.jsp) (accessed July 30, 2016).

Robins, Allison, Prince Owusu, Daniel Munroe and Len Coad. *A Changing Tide: British Columbia's Emerging Liquefied Natural Gas Industry*. Ottawa: The Conference Board of Canada, 2016.

Sonali, Paul. "High-Cost Australia May Miss \$180 Bln LNG Expansion Wave." *Reuters*, April 10, 2014. [www.reuters.com/article/2014/04/10/australia-Ing-idUSL3N0MZ1XB20140410](http://www.reuters.com/article/2014/04/10/australia-Ing-idUSL3N0MZ1XB20140410) (accessed May 13, 2016).

Stanford, Jim. "Canada's Sluggish Labour Market and the Myth of the Skills Shortage." *Academic Matters, The OCUFA's Journal of Higher Education* (November 2013). [www.academicmatters.ca/2013/11/canadas-sluggish-labour-market-and-the-myth-of-the-skills-shortage/](http://www.academicmatters.ca/2013/11/canadas-sluggish-labour-market-and-the-myth-of-the-skills-shortage/) (accessed May 13, 2016).

Statistics Canada. CANSIM table 282-0008. *Labour Force Survey Estimates (LFS), by North American Industry Classification System (NAICS), Sex and Age Group*. [www5.statcan.gc.ca/cansim/a26?lang=eng&id=2820008](http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=2820008) (accessed May 16, 2016).

—. CANSIM table 282-0071. *Labour Force Survey Estimates (LFS), Wages of Employees by Type of Work, North American Industry Classification System (NAICS), Sex and Age Group, Unadjusted for Seasonality*. [www5.statcan.gc.ca/cansim/a26?id=2820071](http://www5.statcan.gc.ca/cansim/a26?id=2820071) (accessed May 13, 2016).

—. CANSIM table 380-0063. *Gross Domestic Product, Income-Based*. [www5.statcan.gc.ca/cansim/a26?lang=eng&id=3800063](http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=3800063) (accessed May 16, 2016).

—. *Education Indicators in Canada: An International Perspective 2013*. Ottawa: Statistics Canada, 2014.

—. *Finance and Insurance*. [www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=118464&CVD=118465&CPV=52&CST=01012012&CLV=1&MLV=5](http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=118464&CVD=118465&CPV=52&CST=01012012&CLV=1&MLV=5) (accessed May 13, 2016).

—. *Labour Force Survey Microdata File (71M0001X)*. [www5.statcan.gc.ca/olc-cel/olc.action?objId=71M0001X&objType=2&lang=en&limit=0](http://www5.statcan.gc.ca/olc-cel/olc.action?objId=71M0001X&objType=2&lang=en&limit=0) (accessed May 13, 2016).

—. *Real Estate and Rental and Leasing*. [www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=118464&CVD=118465&CPV=53&CST=01012012&CLV=1&MLV=5](http://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=118464&CVD=118465&CPV=53&CST=01012012&CLV=1&MLV=5) (accessed May 13, 2016).

Stuckey, James, and Daniel Munro. *Skills for Success: Developing Skills for a Prosperous B.C.* Ottawa: The Conference Board of Canada, 2015. [www.conferenceboard.ca/e-library/abstract.aspx?did=6686](http://www.conferenceboard.ca/e-library/abstract.aspx?did=6686) (accessed May 13, 2016).

—. *The Need to Make Skills Work: The Cost of Ontario's Skills Gap*. Ottawa: The Conference Board of Canada, 2013.

Tal, Benjamin. *The Haves and Have Nots of Canada's Labour Market*. Toronto: CIBC World Markets Inc., 2013.

—. *Degrees of Success: The Payoff to Higher Education in Canada*. Toronto: CIBC World Markets Inc., 2013.

The Conference Board of Canada. *B.C. Provincial Outlook 2014: Long-Term Economic Forecast*. Ottawa: The Conference Board of Canada, 2014.

—. *Canadian Industrial Outlook 2014: Canada's Gas Extraction Industry*. Ottawa: The Conference Board of Canada, 2014.

—. *How Canada Performs: Provincial Economy—Labour Productivity Growth*. [www.conferenceboard.ca/hcp/provincial/economy/labour-productivity.aspx](http://www.conferenceboard.ca/hcp/provincial/economy/labour-productivity.aspx) (accessed April 17, 2016).

—. *Skills for Success: Developing Skills for a Prosperous B.C.* 2015. [www.conferenceboard.ca/e-library/abstract.aspx?did=6686](http://www.conferenceboard.ca/e-library/abstract.aspx?did=6686) (accessed May 13, 2016).

—. *Stellar Outlook for British Columbia's Economy*. Ottawa: The Conference Board of Canada, 2016.

UBC School of Architecture and Landscape Architecture. *Master of Landscape Architecture*. [www.sala.ubc.ca/programs/landscape-architecture](http://www.sala.ubc.ca/programs/landscape-architecture) (accessed May 13, 2016).

Wallace, Kenyon, and Mary Ormsby. "Big-Rig Drivers in Ontario Will Face Mandatory Training." *The Toronto Star*, February 23, 2016. [www.thestar.com/news/queenspark/2016/02/23/mandatory-training-for-big-rig-drivers.html](http://www.thestar.com/news/queenspark/2016/02/23/mandatory-training-for-big-rig-drivers.html) (accessed May 15, 2016).

Watt, Douglas, and Daniel Munro. *Skills for Business Innovation Success: It's People Who Innovate*. Ottawa: The Conference Board of Canada, 2014.

WorkBC. *B.C.'s Skills for Jobs Blueprint: Re-Engineering Education and Training*. Victoria: WorkBC, 2014. [www.workbc.ca/getmedia/4c54646a-93fa-4566-b148-f43a3f27b240/Booklet\\_BCBlueprint\\_web\\_140428.pdf.aspx](http://www.workbc.ca/getmedia/4c54646a-93fa-4566-b148-f43a3f27b240/Booklet_BCBlueprint_web_140428.pdf.aspx) (accessed April 26, 2016).

—. *British Columbia 2022 Labour Market Outlook*. Victoria: WorkBC, n.d. [www.amssa.org/wp-content/uploads/2015/05/BC-Labour-Market-Outlook-2022.pdf](http://www.amssa.org/wp-content/uploads/2015/05/BC-Labour-Market-Outlook-2022.pdf) (accessed May 13, 2016).

—. *British Columbia 2024 Labour Market Outlook*. Victoria: WorkBC, n.d. [www.workbc.ca/getmedia/9e0cadba-16d9-49d5-971b-7e9afd2561d7/BC-LM-Outlook-2014-2024\\_C.pdf.aspx](http://www.workbc.ca/getmedia/9e0cadba-16d9-49d5-971b-7e9afd2561d7/BC-LM-Outlook-2014-2024_C.pdf.aspx) (accessed May 13, 2016).

—. *British Columbia Labour Market Outlook: 2010–2020*. Victoria: WorkBC, n.d. [www.viea.ca/\\_files/Content/Economic%20Library/BC+Labour+Market+Outlook2010-2020.pdf](http://www.viea.ca/_files/Content/Economic%20Library/BC+Labour+Market+Outlook2010-2020.pdf) (accessed May 13, 2016).

—. *Finance, Insurance, Real Estate and Leasing*. Victoria: WorkBC, n.d. [www.workbc.ca/Labour-Market-Information/Industry-Profiles/6](http://www.workbc.ca/Labour-Market-Information/Industry-Profiles/6) (accessed May 13, 2016).

—. *Industry Profiles*. Victoria: WorkBC, n.d. [www.workbc.ca/Labour-Market-Information/Industry-Profiles.aspx](http://www.workbc.ca/Labour-Market-Information/Industry-Profiles.aspx) (accessed May 13, 2016).

—. *Jobs in Demand—B.C.'s Top Occupations*. Victoria: WorkBC, n.d. [www.workbc.ca/Labour-Market-Information/Jobs-in-Demand/Top-Occupations.aspx](http://www.workbc.ca/Labour-Market-Information/Jobs-in-Demand/Top-Occupations.aspx) (accessed May 4, 2016).

—. *Professional, Scientific, and Technical Services*. Victoria: WorkBC, n.d. [www.workbc.ca/Labour-Market-Information/Industry-Profiles/15](http://www.workbc.ca/Labour-Market-Information/Industry-Profiles/15) (accessed May 15, 2016).

—. *Transportation and Warehousing*. Victoria: WorkBC, n.d. [www.workbc.ca/Labour-Market-Information/Industry-Profiles/17#section-employment](http://www.workbc.ca/Labour-Market-Information/Industry-Profiles/17#section-employment) (accessed May 15, 2016).



## About The Conference Board of Canada

We are:

- The foremost independent, not-for-profit, applied research organization in Canada.
- Objective and non-partisan. We do not lobby for specific interests.
- Funded exclusively through the fees we charge for services to the private and public sectors.
- Experts in running conferences but also at conducting, publishing, and disseminating research; helping people network; developing individual leadership skills; and building organizational capacity.
- Specialists in economic trends, as well as organizational performance and public policy issues.
- Not a government department or agency, although we are often hired to provide services for all levels of government.
- Independent from, but affiliated with, The Conference Board, Inc. of New York, which serves nearly 2,000 companies in 60 nations and has offices in Brussels and Hong Kong.

Insights. Understanding. Impact.



255 Smyth Road, Ottawa ON  
K1H 8M7 Canada  
Tel. 613-526-3280  
Fax 613-526-4857  
Inquiries 1-866-711-2262  
[conferenceboard.ca](http://conferenceboard.ca)



PUBLICATION 8343 | 8344  
PRICE: Complimentary