

Impact of Certification on Trades Skills in British Columbia

Report of Findings from Commissioned Research

The British Columbia Institute of Technology acknowledges that our campuses are located on the unceded traditional territories of the Coast Salish Nations of Sḵw̓x̓w̓ú7mesh (Squamish), sə́ilwətaʔ4 (Tseil-Waututh), and xwməθkwəy̓əm (Musqueam).

Table of Contents

Executive Summary	4
Scope and Objectives	7
Approach	8
Key Insights	11
1. Soft Skills Gap	11
2. Impact of Certification	13
3. Perspectives on Mandatory Certification	18
4. Underrepresented Populations	20
Additional Employer Observations	21
Appendices	22
Appendix A: Research Methodology	22
Appendix B: Apprentice Respondent Profile	25
Appendix C: Trades Employer Respondent Profiles	26
Appendix D: Research Findings	27

Executive Summary

The Government of British Columbia (BC) is committed to creating the workforce needed to support a strong, sustainable, and inclusive economy. To this end, the province is considering the implementation of mandatory certification for certain trades in BC, which would require that trades workers be either a registered apprentice or a certified journey person. The primary task is to determine whether mandatory certification could be an effective lever for building a more highly skilled workforce by raising and standardizing the overall skills level in the trades and by aligning competences with those demanded in the provincial economy — now and in the future.

As part of this work, the British Columbia Institute of Technology (BCIT) was asked by the Ministry of Advanced Education, Skills & Training (the Ministry) to undertake exploratory research to assess skills gaps in the trades, as well as the effectiveness of certification. BCIT appreciates the opportunity to work in partnership with industry and government in this important exercise to strengthen the provincial economy.

Research Questions and Key Insights

The research was framed by three questions, the answers to which are summarized on the next page. In addition to soliciting employer perceptions about certification and mandatory certification, the research was designed to measure two different skills gaps: the gap attributable to certification status and the gap between employer needs and the skills of tradespeople.

The study of skills is relatively new, and the available data are limited. The research approach reflected various complexities, and the results need to be interpreted accordingly. Specifically, it is difficult to assess the skills of uncertified and certified workers across different trades, especially technical skills. Relatedly, it is challenging to measure skills requirements across multiple occupations and to compare these to worker skills levels. The resultant measurement focused on fundamental skills, which are common needs across trades, with employer perception data used to calibrate the gap between skills requirements and skills levels. While it is possible that the focus on “softer” skills may be somewhat narrow, it is also the case that employers themselves rate these types of competence as most — and increasingly — important. Another complexity is that the profile of BC apprentice sponsors means that disproportionately few employer respondents have experience working in a certification environment. Additional analysis was conducted to test the potential impact of this sample structure.

“Certification provides the foundation to progress through the levels of ever more complex work.”

1. Is there a skills gap between certified and uncertified workers?

It is not clear that there is a significant gap in the tested skills of literacy, numeracy, and problem solving in technology-rich environments, based on assessment of apprentices at different levels of certification. These three competences are fundamental for all trades as they are transferable between occupations, requiring a high level of mastery before more advanced technical or soft skills can be learned. Technical “on-the-tool” skills were not evaluated directly given the lack of a reliable measurement system. However, industry perception appears to be more definitive. Almost 70% of the employers surveyed believe that certified workers are more skilled than uncertified ones, with the former perceived to be most advantaged in the soft skill areas of reading comprehension, troubleshooting, complex problem solving, and active learning. Employers believe that certified workers demonstrate a keen attitude of self-development, which confers a resiliency that is critical in the fast-changing trades sector and economy. Certified workers are also regarded as having a better understanding of industry code and regulations, which could be correlated with public and worker safety, as well as with productivity.

2. Is there a gap between the skills that apprentices have versus the skills that employers need, both now and over the next ten years?

There is a persistent perceived gap between the competences prized by employers and those possessed by apprentices. The key deficiencies are in soft skills, notably communication, problem solving, and project management. This is a finding that is generalizable well beyond the trades. It is notable that, while employers believe that workers are not fully competent in many of these areas, they do believe that certified workers are relatively more skilled in the same areas.

3. Is mandatory certification an effective mechanism to close the gap?

Industry perceptions of certification are generally positive, but views on mandatory certification are mixed. Employers largely believe that mandatory certification could yield benefits in terms of enhanced professionalization of the trades, notably in attracting and retaining talent, and improved readiness of new workers. Validation of the trades as a career for young people is an important provincial objective. However, employers are not confident in the capacity of trades training — as currently configured in BC — to address the soft skills gap. Some also note that on-the-job experience may well be the more appropriate mechanism for development of these competences. Other significant concerns include inequities in access to training and consequent labour shortages, cost, business interruption, and government intervention. Just over half of employers believe that mandatory certification would have a positive impact on the skills levels of trades workers [54%] and completion rates of apprenticeship [53%]. It is notable that more than a quarter of employer respondents are neutral or undecided regarding the impact of mandatory certification on skills or completion; less than a quarter actively disagree. While the research findings are not conclusive in respect of mandatory certification, the data do provide meaningful input to ongoing provincial efforts to raise the level of skills in the trades. Trades training system changes that help address key employer concerns may need to be an integral part of any program to introduce mandatory certification. Communication and a thoughtful approach to implementation would also likely be critical components to help assure the success of any such decision.

“I would like to think that this additional certification would produce a higher quality and more uniform performance expectation trades person.”

“More impactful and purposeful are joint government and business efforts to get the word out about trades as a worthy career choice.”

While the question was not posed directly, it is important to highlight that female apprentices score higher than their male counterparts across the fundamental skills and that there is no noticeable disadvantage for Indigenous apprentices. The positive results are encouraging for business and society. Programs that remove barriers and address worksite discrimination, including Women in Trades, could help ensure that underrepresented groups stay and reap the benefit of longer trades careers. It may be important to consider a broader set of soft skills including, for example, social awareness and emotional intelligence, as part of systemic efforts to improve workplace inclusion and safety. These are increasingly crucial skills for tradespeople.

Current Context

The research was conducted prior to the onset of the pandemic, but it is important to acknowledge the conceivable impact of the crisis on perception and experience. The trades training system has been heavily disrupted by physical distancing requirements, even though training providers have responded well. And demand for trades is likely to continue to increase with the anticipated investment in infrastructure post-COVID. Decisions regarding mandatory certification or trades training system enhancements should accordingly be approached with heightened sensitivity to any impact on the supply of skilled labour in the province.

Scope and Objectives

The Government of British Columbia (BC) is committed to creating the workforce needed to support a strong, sustainable, and inclusive economy.

To this end, the province is considering the implementation of mandatory certification for certain trades in BC, which would require that trades workers be either a registered apprentice or a certified journey person. The overriding question is whether mandatory certification could be an effective lever for building a more highly skilled workforce by raising and standardizing the overall skills level of trades workers and by aligning skills with those demanded in the provincial economy – both now and in the future. BC is currently the only province in Canada to use the market-based regulatory model, with skilled trades deregulated in 2003.

The study of skills is relatively new and there are limited data available. Accordingly, the Ministry of Advanced Education, Skills & Training (the Ministry) commissioned the British Columbia Institute of Technology (BCIT) to conduct some proprietary research to explore three questions.

1. Is there a skills gap between certified and uncertified workers?

2. Is there a gap between the skills that apprentices have versus the skills that employers need, both now and over the next ten years?

3. Is mandatory certification an effective mechanism to close the gap?

The research was administered by BCIT Institutional Research, working in partnership with the Ministry. This report summarizes upfront the research approach, highlights the insights arising from this work in connection with the above questions, and outlines additional observations that may be relevant in the context of trades skills enhancement. The methodology and findings from each of the research phases are outlined in greater detail in the appendices.

None of the research was intended, nor designed, as a means of evaluating the effectiveness of training delivered by any trades training provider in the province, including BCIT. This document should be considered together with the conclusions from other workstreams initiated to assess the value of certification and mandatory certification.

Approach

The research was conducted in three phases, all during the first quarter of 2020, with BCIT Institutional Research working closely with the Ministry to determine the methodology and review the findings. These phases align with the three questions framing the scope of this exercise. The approach is described in greater detail in Appendix A.

In addition to soliciting employer perceptions about certification and mandatory certification, the research was designed to measure two different skills gaps: the gap attributable to certification status and the gap between employer needs and the skills of tradespeople. The certification gap (Phase 1) was assessed through a standardized competency-based tool that represents the potential to be adept in the trades. These are termed “fundamental skills.” This tool was administered with BCIT apprentices at different levels of program completion, with the gap between first year and fourth year apprentice results ascribed to certification. The trades skills gap (Phase 2) is challenging to measure due to the lack of direct information about workers’ skills and job demands, especially when trying to evaluate the same skills across different occupations. This mismatch was calibrated by comparing skills requirements of employers with their assessment of worker competency in these same skills, the result being an industry-perceived gap (rather than an objectively evaluated gap).

The approaches are complementary, but not directly comparable. However, the correlation between the fundamental skills measured in the apprentice assessment and the soft skills deemed most critical — and most lacking — by employers connects these two methodologies and enables us to draw some directional conclusions about the merits of certification. The additional industry research (Phase 3) provides complementary input on employer perceptions, notably in respect of mandatory certification, and experience with apprentices.

Phase 1. Skills of trades apprentices and connection with certification

The skills assessed in the apprentice research were literacy, numeracy, and problem solving in technology-rich environments, as defined by the Program for the International Assessment of Adult Competencies (PIAAC). The PIAAC is a globally recognized tool, developed by the Organization for Economic Cooperation and Development (OECD), to measure cognitive skills used in the workplace and in daily adult life.

OECD Definitions

Literacy: understanding, evaluating, using and engaging with written texts to participate in society, achieve one’s own goals, and to develop one’s knowledge and potential; **numeracy:** the ability to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of range of situations in adult life; **problem solving:** the ability to use technology to solve problems and accomplish tasks, to operate within a digital environment to solve the types of problems faced by adults in their everyday life as users of digital technologies

321 BCIT apprentices completed the fundamental skills evaluation, with the dimensions of the apprentice sample outlined in Appendix B. As the largest trades training provider in the province, BCIT's apprentices provide a reasonable population for testing, especially as apprentices can complete different levels of the program with different providers. The first year and fourth year apprentices acted as proxies for uncertified and certified trades workers, respectively. This methodology was recommended by the Ministry, consistent with an approach taken in related research in Ontario.¹ The cohort included apprentices from the top ten trades offered at BCIT.² It is possible that there is some sampling error created by the voluntary nature of the assessment, with more adept apprentices self-selecting to take the test. But this should not disproportionately influence the results at different years in the apprentice program, meaning that it should not inflate or deflate any skills gap. It is also possible that the urban context of training at BCIT might have an impact on the readiness of apprentices relative to those elsewhere in the province but, again, this should not distort any skills gap.

Phase 2. Trades employer skills priorities and assessment of gaps in apprentices

The skills assessed in this phase of the industry research were drawn from the top projected in-demand skills as published in the BC Labour Market Outlook. This framework utilizes the US-based O*Net Skills Taxonomy³ to map competencies to occupations, translating occupations from the American to the Canadian jobs classification systems. While work to connect skills to occupations is still an emerging area of inquiry, this process enables the creation of a set of skills that is relevant for the trades in BC. Given the evolving nature of trades employment, this set was then augmented with digital and service competences to ensure sufficient focus on these areas.

A list of employer sponsors associated with the ten trades involved in the Phase 1 apprentice skills assessment was compiled. The 258 industry participants in Phase 2 were solicited from this list, with the support of the Industry Training Authority [ITA]. The result was a representative industry sample in terms of geography and company size. Union sponsors represent multiple employers, meaning that the number of unionized survey respondents is less than proportionate with the number of unionized employers hiring and training apprentices in the ten trades. It is not possible to gauge whether this sample composition influenced the employer ratings of skills needs and apprentice gaps as there were insufficient union responses to the full set of Phase 2 questions. It is also relevant to note that BCIT does not offer training in the hospitality trades, meaning that this sector is missing from the employer sample. This may have had a modest effect on industry results. The dimensions of the sample are provided in Appendix C.

Skills Assessed in Employer Survey

Active learning, active listening, complex problem solving, co-ordination, critical thinking, digital literacy, digital proficiency, digital communication, judgement and decision making, monitoring, operation and control, operation monitoring, repairing, service orientation, social perceptiveness, speaking, time management, troubleshooting, reading comprehension, writing

¹ Similar approach (and findings) to those from the Higher Education Quality Council of Ontario (HEQCO) in 2016-17 in respect of first and last term college students

² Automotive technician, carpenter, electrician, heavy mechanical tradesperson, joiner [cabinetmaker], machinist, metal fabricator, millwright, plumber, welder

³ One of the world's largest, most comprehensive, widely used public repositories of job worker characteristics, including measures of importance and complexity for 35 skills across 968 occupations

Phase 3. Trades employer perceptions of skills requirements and certification

This supplementary research consisted of three segments to probe industry views on the key skills gaps identified in Phase 2, as well as solicit perspectives on certification and mandatory certification. The employers in each case were drawn from the sample of Phase 2 respondents. 156 of them completed a quantitative assessment of the impact of mandatory certification on several dimensions affecting their work, including trades skill level and business productivity. 29 employers engaged in a qualitative exploration of skills requirements and their relationship to mandatory certification. And 71 participated in the quantitative survey of skills differences between certified and uncertified workers.

The data suggest that employers with experience working in an environment that includes certification requirements (most often unionized employers) may have more positive views on mandatory certification than those employers who operate within an open labour market. Because the survey reflects the inputs of a limited number of unionized organizations, this means that the employer population perceptions may be moderately more favourable than indicated by the sample average. The analysis and findings have been adjusted accordingly. The sub-sample dimensions are listed in Appendix C.

Key Insights

The research findings can be summarized into four themes. Appendix D provides more details.

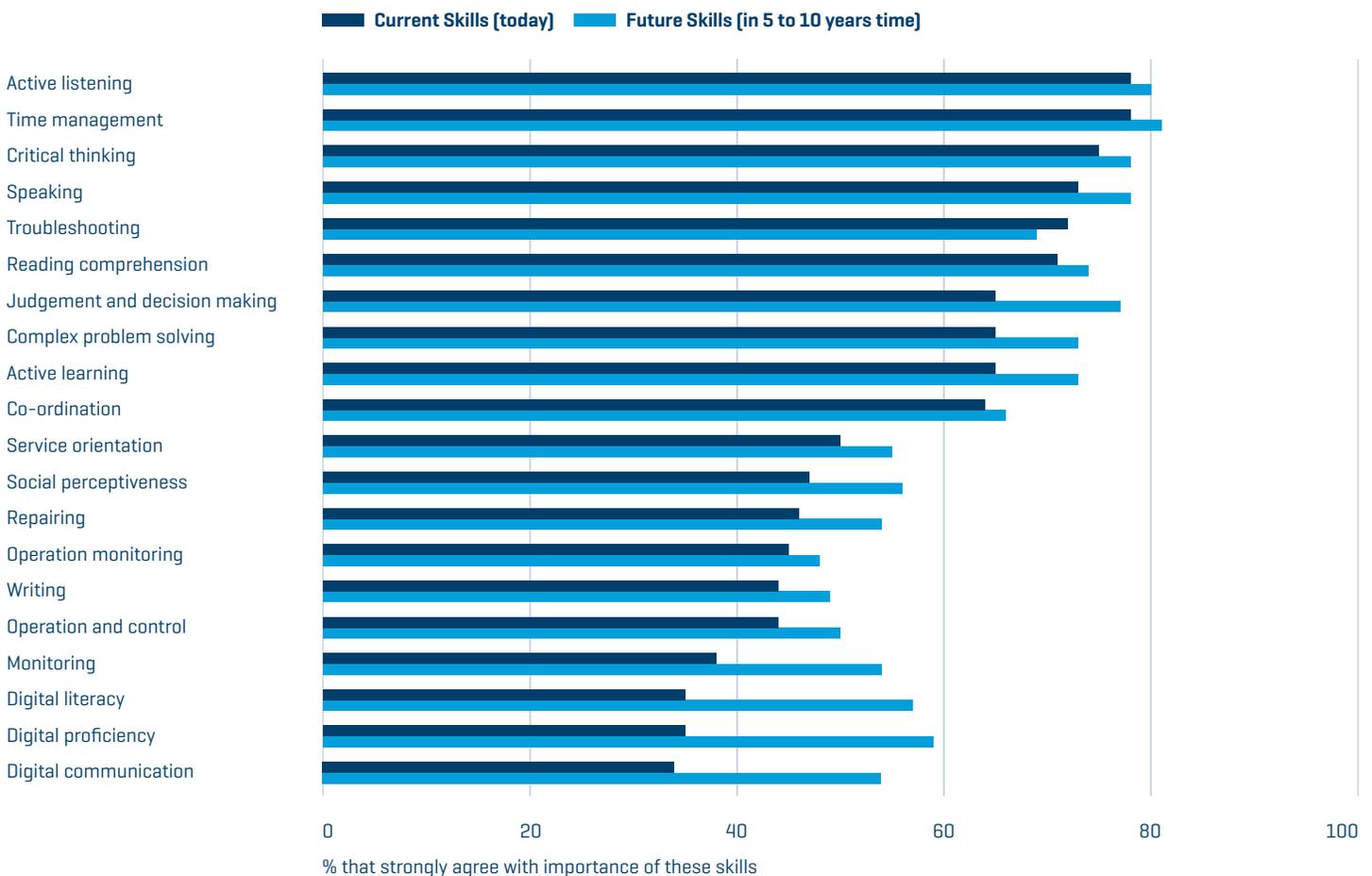
1. Soft Skills Gap

Soft skills are the most valuable — and the most lacking — from the industry perspective.

“In today’s world of smart phones and information management, even the most hands-on trades need to be able to communicate, articulate, and coordinate.”

Employers perceive that apprentices are lacking many of the soft skills that they believe matter most. This is one of the clearest findings from the research. The areas of communication, problem solving, and project management are the most notable gaps. Associated competences, including time management, active listening, and decision making, are rated as most important by employers, both currently and over the next decade [Figure 1]. They are deemed critical for customer service, efficient and safe operation, and team effectiveness, as well as for enabling agility in response to the rapidly changing context.

Figure 1: Comparison of Employer Assessment of Trades Skills Needed over Time



Source: Quantitative research of 258 trades employers in BC, Q1 2020 [Phase 2]

“The importance of problem-solving skills will always increase exponentially with technological advancement.”

These same skills are the ones that industry rates as most lacking in tradespeople [Figure 2]. Digital skills are also viewed as increasingly important by employers, but the perception is that workers are significantly less deficient in these areas. Soft and digital competences are increasingly regarded as critical by industry — and not only in the trades sector.⁴ This evolution reflects the changing nature of work and the labour market.

Figure 2: Comparison of Industry-Perceived Skills Priorities and Gaps



⁴ “Humans wanted. How Canadian youth can thrive in the age of disruption,” RBC 2018

2. Impact of Certification

There are some perceived benefits of certification, but the actual impact on skills is less clear.

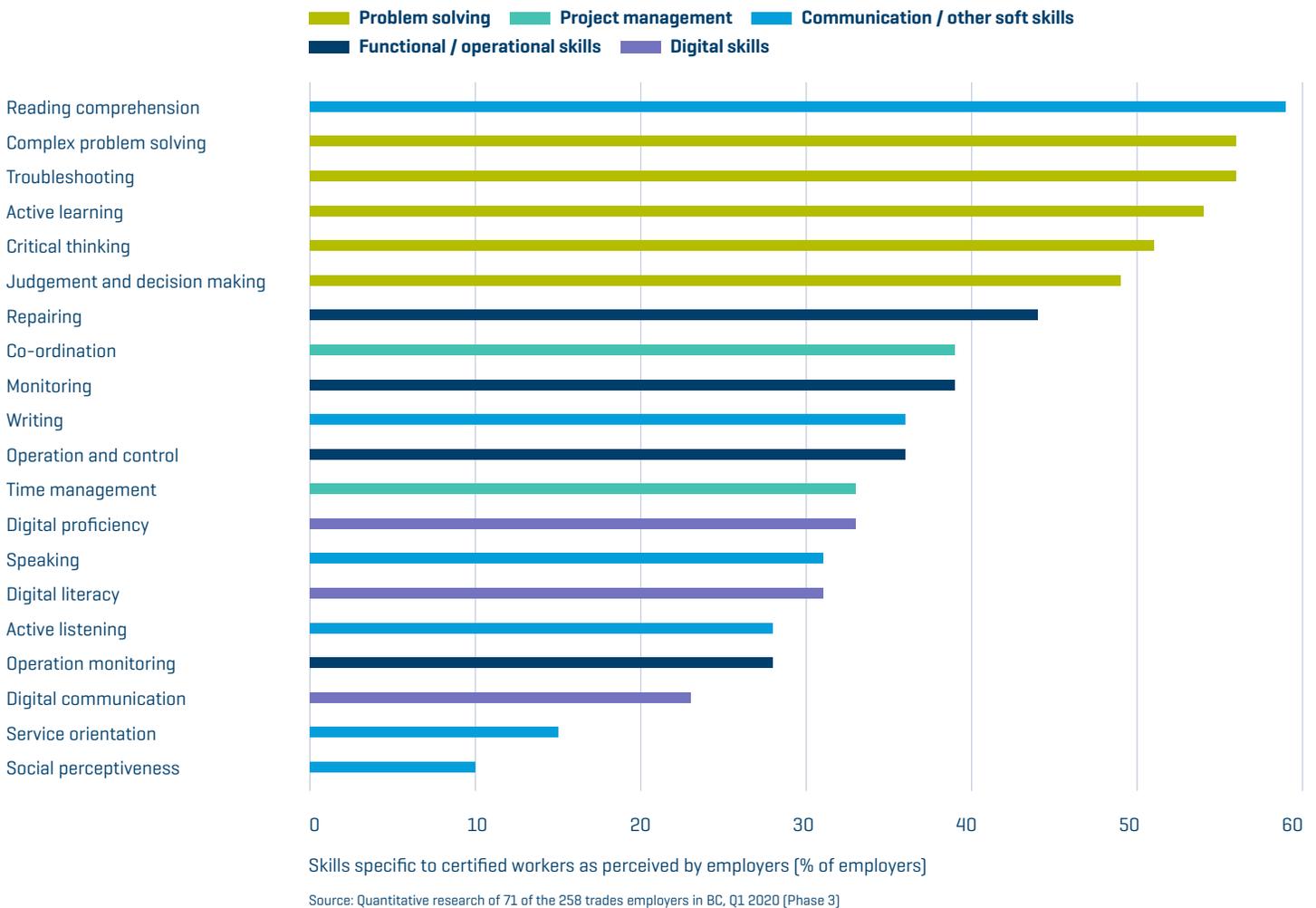
Based on the research, almost 70% of employers believe that there is a skills difference between certified and uncertified workers [Figure 3].

Figure 3: Employer Perceptions of Skills of Certified and Uncertified Workers



The general industry perception is that certified tradespeople are more skilled than their uncertified peers, with certified workers regarded as most advantaged in the areas of reading comprehension, troubleshooting, complex problem solving, and active learning [Figure 4, over].

Figure 4: Employer Perceptions of Advantages of Certified Workers

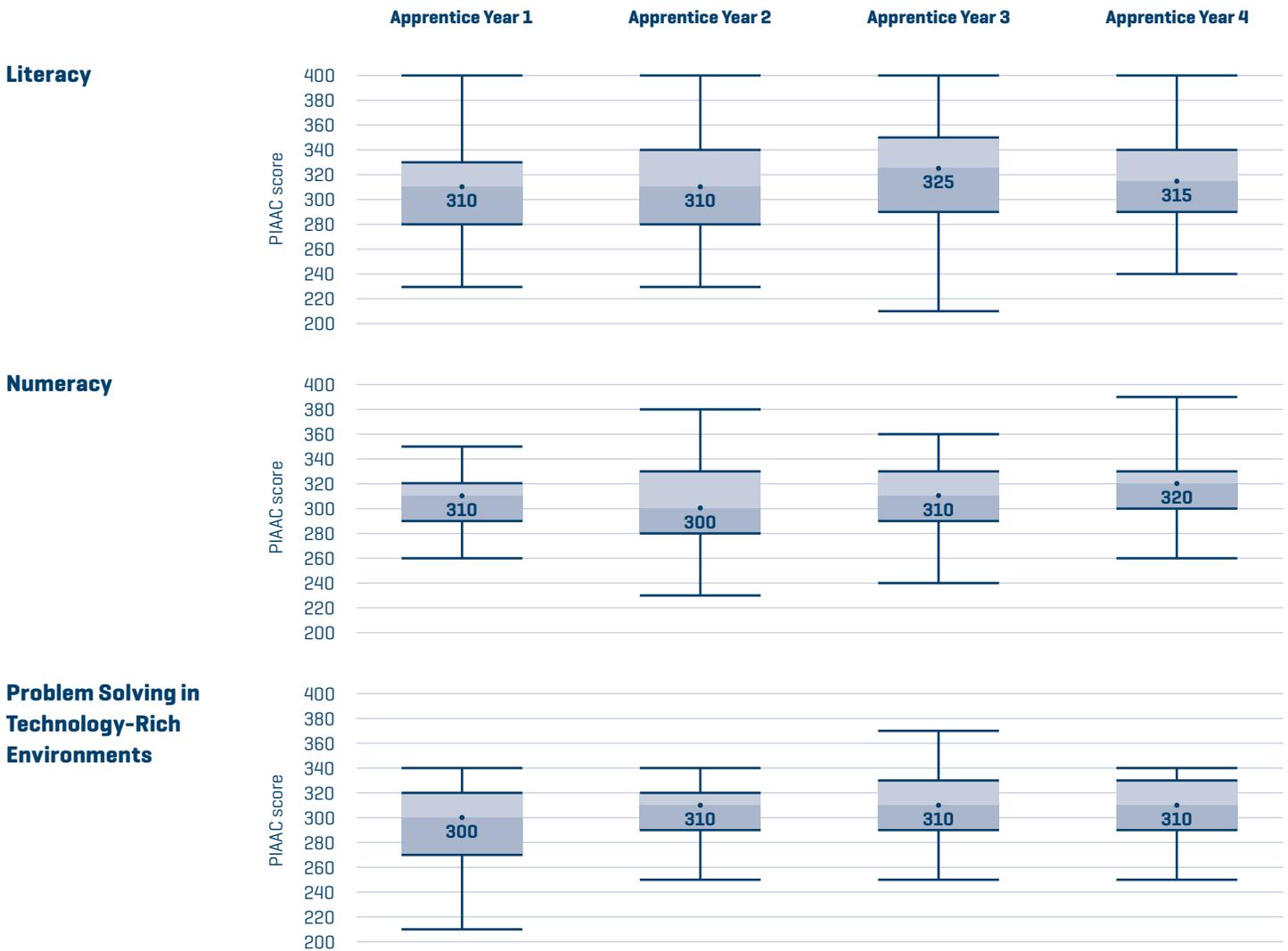


“Workers that commit the time and effort to complete certification generally are more motivated to enhance their skills sets and quality of workmanship.”

Employers also believe that certified workers demonstrate a keen attitude of self-development and have higher fundamental knowledge, both of which are advantageous when approaching new challenges. Such resiliency was not explicitly tested as a skill in the quantitative research, but the qualitative input is compelling. Certified workers are also regarded by some employers as having a better understanding of industry code and regulations than uncertified workers, which could be correlated with public and worker safety, as well as with productivity.

The research on the actual impact of certification is more nuanced, at least as measured through the fundamental skills of first year and fourth year apprentices. There is a small positive, but not statistically significant, difference in the tested competences of literacy, numeracy, and problem solving in technology-rich environments (PSTRE) between the two groups [Figure 5, over].

Figure 5: Impact of Certification on Fundamental Skills in Apprentices



Note 1: The box in the middle of the chart representative of 50% of the respondents, with the lines indicating the top and bottom 25% of respondents. The median denoted by the dot and value within the box. Outliers excluded. Full range of possible scores 0 to 400

Note 2: Two sample t-tests conducted to assess significance of score differences between Year 1 and 4 apprentices. No significant difference in any of the skills, with p-values of 0.3033, 0.24, and 0.0616 respectively in literacy, numeracy, and PSTRE

Source: Quantitative research of 321 trades apprentices from BCIT, Q1 2020 (Phase 1)

The relationship between age and education level and command of these skills is more pronounced [Figure 6]. Certification could accordingly have a greater impact on outcomes and opportunities for both younger tradespeople or workers with high school or lower levels of education, given their relatively lower starting point in terms of fundamental skills. It is also notable that the apprentices perform at a markedly higher level in literacy and numeracy than the average Canadian or British Columbian. Using these population averages as an alternate proxy for uncertified workers, the impact of certification may indeed be greater than suggested by the methodology.

Figure 6: Correlation Between Fundamental Skills by Age and Educational Level in Apprentices



Note 1: Linear regression used to assess significance of score differences by age. Significant positive correlation in literacy and numeracy, with p-values of 0.002985 and 0.002958, respectively. No significant relationship in PSTRE

Note 2: Two sample t-tests conducted to assess significance of score differences by education level. Significant positive correlation in literacy, numeracy, and PSTRE, with p-values of 0.0002, 0.0006, and 0.0011, respectively

Source: Quantitative research of 321 trades apprentices from BCIT, Q1 2020 (Phase 1)

Based on the PIAAC taxonomy, workers operating at the highest level of mastery in the fundamental skills demonstrate reasonable aptitude in the areas of communication, critical thinking, and problem solving [Figure 7, over]. This is an important connection. It means that the fundamental skills are a relevant basis for worker assessment as they are a proxy for some of the soft skills that employers need most.

Figure 7: Description of PIAAC Skill Levels

PIAAC Skills Level	Literacy	Numeracy	Problem Solving in Technology Rich Environments
Highest level	Tasks at this level may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence based arguments. They often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.	Tasks at this level may require the respondent to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and critically reflect on solutions or choices.	At this level, tasks typically require the use of both generic and more specific technology applications. Some navigation across pages and applications is required to solve the problem. The task may involve multiple steps and operators. The goal of the problem may have to be defined by the respondent, and the criteria to be met may or may not be explicit. Integration and inferential reasoning may be needed to a large extent.
Lowest level	Tasks at this level require the respondent to read relatively short digital or print texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Knowledge and skill in recognizing basic vocabulary, determining the meaning of sentences, and reading paragraphs of text is expected.	Tasks at this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit. Tasks usually require one-step or simple processes involving counting; sorting; performing basic arithmetic operations; and identifying elements of simple or common graphical or spatial representations.	At this level, tasks typically require the use of widely available and familiar technology applications, such as e-mail software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. The tasks involve few steps and a minimal number of operators. Only simple forms of reasoning, such as assigning items to categories, are required; there is no need to contrast or integrate information.

Source: www.oecd.org/skills/piaac/Key%20facts%20about%20the%20Survey%20of%20Adult%20Skills.pdf

The research did not evaluate the more complex technical [on-the-tool] skills of the two apprentice groups, in which certification may have a more marked effect. However, the qualitative research yielded employer perspectives around the current focus of trades training programs on technical skills development, suggesting that the technical skills gap may be more pronounced.

3. Perspectives on Mandatory Certification

Employers have mixed views on mandatory certification, with the concerns providing valuable input.

“Mandatory certification is mostly a tool for motivation and supporting employees to continue in our trade.”

There are mixed industry thoughts on mandatory certification, with the perceived benefits of enhanced professionalization of the trades and improved readiness of new workers offset by the disadvantages. At the most basic level, these include wage pressure, costs of apprentices attending training, and/or business disruption for employers. These concerns are especially germane for small businesses. Just over half of employers believe that mandatory certification would have a positive impact on the skills levels of trades workers (54%) and on completion rates of apprenticeship (53%). A similar proportion of employers (48%) are of the view that it would provide significant advantages to their business.

Employers are concerned that there is insufficient infrastructure (primarily trades training seats) for mandatory certification to be implemented successfully as apprentices are already having difficulties registering for classes. Some employers not accustomed to operating in a certified environment worry that mandatory certification may erect obstacles to entry for immigrants and experienced (but uncertified) tradespeople, who may be impeded by language or who may not excel in a classroom setting.

“Mandatory certification... will create another barrier to bringing new workers into the industry.”

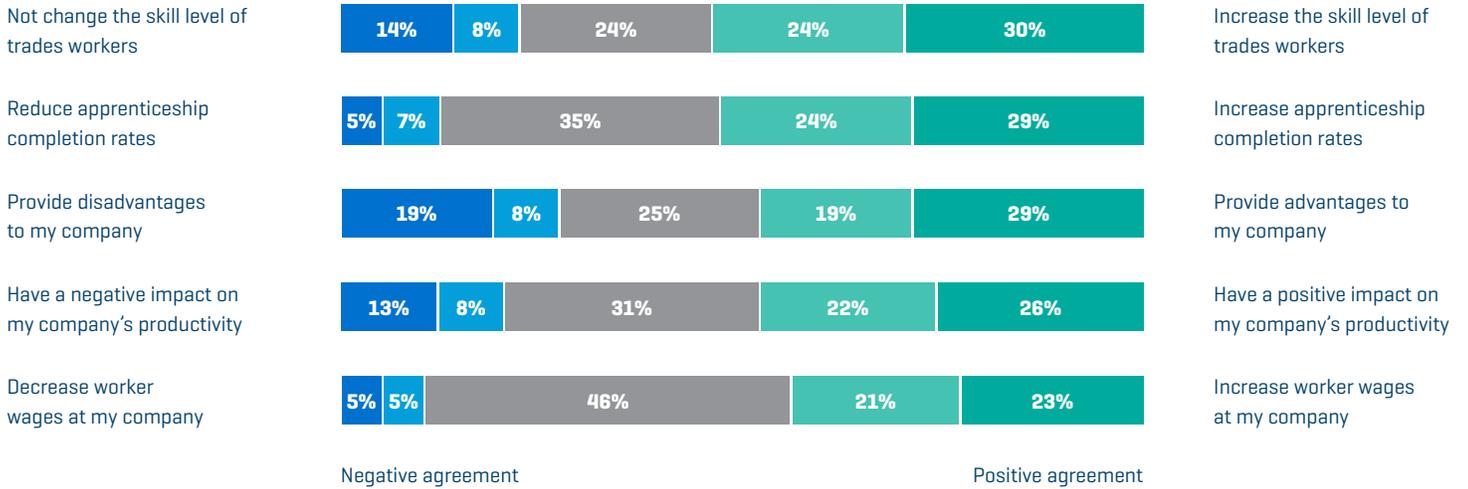
Employers are also not confident that trades training, at least as currently configured in BC, is able to help close the gaps that they perceive in soft skills. They observe that training providers are currently focused on technical (on-the-tool) skills and that tradespeople inherently lack soft skills — either because of generational deficits and expectations or self-selection. Reliance on technology and contemporary parenting approaches are constraining the early development of soft skills such as communication and problem solving, as well as making younger workers more difficult to teach. Deficiencies in the “K-12” education system may also play a part; it will take time for recent curriculum changes to have an effect. Some employers perceive that many who pursue a trades career do so because they lack the soft skills required to progress in the traditional educational system. And some note that on-the-job experience may well be the more appropriate mechanism for development of these competences.

“Skill levels and the ability to be productive, accurate, and diligent are more tied to the trades worker’s aptitude, intelligence, and experience.”

Not all employer experiences are the same, as evidenced by the spread of responses to questions around the impact of mandatory certification (Figure 8, over). Over a quarter of employer responses are neutral or undecided with respect to mandatory certification. This may reflect the fact that many of BC’s employers do not have experience working in an environment that requires certification.

Figure 8: Employer Perceived Impact of Mandatory Certification

Mandatory certification will...



Respondents asked to rate agreement at one of five points on the spectrum between the two assessments of impact

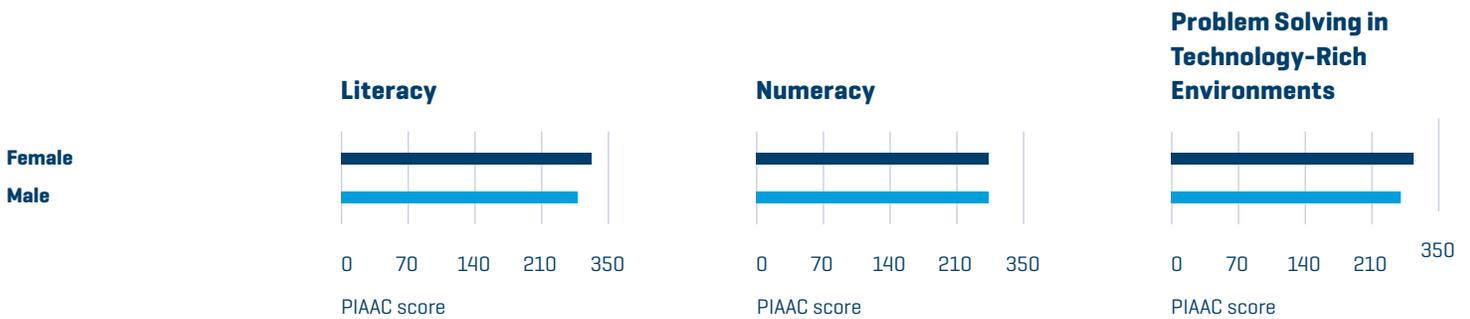
Source: Quantitative research of 156 trades employers in BC, Q1 2020 (Phase 3)

4. Underrepresented Populations

Populations historically underrepresented in the trades are at least as skilled as their peers.

Female apprentices score higher than their male counterparts in the fundamental skills, reinforcing the importance of programs that promote women in the trades [Figure 9], although the advantage in numeracy is not statistically significant. It is interesting that women account for 12% of the research sample, compared to 4 to 5% of the apprentice population, suggesting that they might also feel more confident in their skills. But to the extent that there is any sampling error because more adept apprentices are likely to self-select to take the assessment, any bias would be greater for the male respondents given that proportionately fewer of them volunteer. And while the number of self-identified Indigenous apprentices surveyed is relatively low, they do not rank appreciably differently on any of the fundamental skills. Both findings confirm the societal and economic value of diversity and inclusion programs that help attract and retain traditionally underrepresented populations in the trades.

Figure 9: Correlation Between Fundamental Skills and Gender in Apprentices



Note: Two sample t-tests conducted to assess significance of score differences by gender. Significant difference in literacy and PSTRE, with p-values of 0.022 and 0.0042, respectively. No significant difference in numeracy, with p-value of 0.8735

Source: Quantitative research of 321 trades apprentices from BCIT, Q1 2020 (Phase 1)

Additional Employer Observations

Although beyond the immediate scope, the research yielded employer findings that may provide valuable input to ongoing efforts to strengthen trades training in BC. Five themes were especially prevalent across the qualitative industry comments.

Trades training curriculum

Employers are not confident that the trades training system is configured to promote and support the advancement of the soft competences that they need most.

Technical skill gaps

While employer feedback reinforces the value of soft skills, there is nothing in the research to suggest that on-the-tool skills are not also important. But these were not directly assessed in the research.

Supply of trades training

Access to apprenticeship programs appears to be a bottleneck, at least in certain occupations.

Pathways for experienced tradespeople

Some employers observe that the trades training system does not enable uncertified (but experienced) workers to quickly secure certification.

Opportunities to update skills

Employers believe that hands-on training in the real world is key to success in the trades. But they also note the lack of mechanisms for formal re-tooling in the context of rapidly evolving technologies and demands.

“Currently in BC we do not have adequate education facilities or trainers to support more programs. If you sign up today for level 3 carpentry, you will likely wait 1 to 2 years for a slot.”

Appendices

Appendix A: Research Methodology

Phase 1. Skills of trades apprentices and connection with certification

The sample for the skills assessment was a volunteer cohort of apprentices studying at BCIT between 1 January and 15 February 2020, which included apprentices in each of the four years from the top ten BCIT trades programs⁵ First year students acted as a proxy for uncertified workers and fourth year students as a proxy for certified workers, with the gap ascribed to certification. There were 321 voluntarily completed tests. The assessment was based on the fundamental skills defined by the PIAAC (literacy, numeracy, and problem solving in technology-rich environments). These skills are deemed fundamental as they are transferable between occupations, requiring a high level of mastery before more advanced technical or soft skills can be learned. There is close alignment between these competencies and the nine essential skills common across all trades (Figure 10). Before sending the PIAAC to students, BCIT Institutional Research collaborated with assessment professionals at Educational Testing Services (ETS) and the Ministry to ensure the test was administered correctly.

Figure 10: Mapping of Essential Trades Skills to PIAAC Skills

Essential Trades Skills	PIAAC Skills
1. Reading	Literacy
2. Document use	Literacy
3. Writing	Literacy
4. Numeracy	Numeracy
5. Working with others	Problem solving
6. Thinking	Problem solving
7. Computer use	Problem solving
8. Continuous learning	Problem solving
9. Oral communication	N/A

Sources: Essential Trades Skills www.canada.ca/en/employment-social-development/programs/essential-skills/tools/wp-167-workbook.html;
PIAAC Skills www.oecd.org/skills/piaac/piaacdesign/

⁵ Automotive technician, carpenter, electrician, heavy mechanical tradesperson, joiner (cabinetmaker), machinist, metal fabricator, millwright, plumber, welder

A limitation of this approach is the sample bias that may have resulted from surveying only apprentices that self-selected to the skills assessment. But this should not disproportionately influence the results at different years in the apprentice program, meaning that it should not inflate or deflate any skills gap. The continuous nature of enrolment in trades training means that these cohorts each comprised apprentices from different points in their year, so some of the Year 1 students were already well immersed in the program. It is possible that this had the effect of reducing the apparent impact of certification. It is also the case that the sample size of some of the sub-populations [i.e., demographic profile of apprentice] is small, limiting the confidence of the comparative analyses. There is no tool for direct measurement of more complex technical skills, in which the skills gap may be more pronounced, so the apprentice skills analysis should be regarded as indicative rather than comprehensive.

Phase 2. Trades employer skills priorities and assessment of gaps in apprentices

This quantitative online survey collated responses from 258 trades employers across BC involved in the recruitment, training, and/or supervision of trades apprentices across a range of trades. The participants were solicited, with the support of the Industry Training Authority (ITA), from a list of employer sponsors associated with the ten trades involved in the apprentice skills assessment [Phase 1]. It is a representative provincial sample across two key dimensions: region [Lower Mainland / Greater Vancouver 80%, Interior / Okanagan 17%, Vancouver Island 9%, and Northern BC 7%] and company size [up to 50 employees 72%, more than 50 employees 27%]. Employers were asked to rate a set of skills based on their importance, both now and in the next ten years, and to rate apprentice command of these same skills. The twenty skills assessed in the quantitative phase of the industry research were drawn from the top projected in-demand skills as published in the BC Labour Market Outlook. This framework utilizes the US-based O*Net Skills Taxonomy⁶ to map competencies to occupations, translating occupations from the American to the Canadian jobs classification systems. These were augmented with digital skills to acknowledge the increasing integration of technology in the trades. “Service orientation” was added to test the increasing role of social skills, such as customer service. The skills gap is represented by the resultant difference between those strongly agreeing that a skill is important and those strongly agreeing that apprentices have this skill.

Like the apprentice skills analysis, the sample size of some sub-populations [i.e., company type] is small, again limiting the confidence of comparative analyses.

⁶ One of the world’s largest, most comprehensive, widely used public repositories of job worker characteristics, including measures of importance and complexity for 35 skills across 968 occupations

Phase 3. Trades employer perceptions of skills requirements and certification

Three pieces of research were conducted to probe the views and experience of industry. The first was a quantitative assessment of employer perspectives on the impact of mandatory certification on trades skills, apprentice completion, and various aspects of their businesses. 156 of the employers surveyed in Phase 2 participated. The second was a moderated online discussion forum around industry skills requirements and the relative merits of mandatory certification, engaging 29 of the employers surveyed in Phase 2. The sub-sample size is relatively limited, but the methodology allowed for in-depth dialogue and solicitation of multiple perspectives. The third was a follow-up online survey to test perceived skills differences between certified and uncertified workers. Responses to five questions were received from 71 of the employers involved in Phase 2, none of whom also participated in the discussion forum.

A possible limitation of the Phase 2 sample and Phase 3 sub-samples is that most of the employers are private and non-unionized. Union sponsors represent multiple employers, meaning that the number of unionized respondents is less than proportionate with the extent of unionization in BC. This composition suggests the need for thoughtful interpretation of the data, as outlined in the summary of insights, and possibly for further consideration.

Appendix B: Apprentice Respondent Profile

Apprentice Program	Apprentice Year	Female	Male
Automotive technician apprentice	1	-	1
	2	-	9
	3	2	-
	4	-	7
Carpentry apprentice	1	4	10
	2	3	17
	3	1	11
	4	-	16
Electrical apprentice	1	-	9
	2	4	39
	3	9	31
	4	2	24
Heavy mechanical trades grouping	2	-	9
	3	1	1
	4	-	4
Joinery [cabinetmaker] apprentice	1	1	4
	2	1	6
	3	4	2
	4	1	1
Machinist apprentice	1	-	5
	2	-	4
	3	1	5
	4	-	3
Metal fabricator apprentice	2	-	2
	3	-	1
	4	-	3
Millwright apprentice	1	-	9
	2	-	4
	3	2	4
	4	-	4
Plumber apprentice	1	-	2
	2	-	8
	3	1	11
	4	1	10
Welding	Upgrader	2	5
Grand Total		40	281

Appendix C: Trades Employer Respondent Profiles

	Future Skills and Apprentice Gaps Survey [Phase 2] n=258	Future Skills Survey on Mandatory Certification [Phase 3] n=156	Future Skills Enrichment Discussion Forum [Phase 3] n=29	Future Skills Follow-up Survey on Certification [Phase 3] n=71
Occupation				
Automotive service technician	41	25	3	9
Cabinetmaker [joiner]	31	20	2	11
Carpenter	68	46	8	22
Construction electrician	70	41	9	18
Heavy mechanical trades	36	20	4	8
Industrial mechanic [millwright]	41	24	7	10
Machinist	38	26	5	10
Metal fabricator [fitter]	31	21	2	7
Plumber	48	29	8	13
Welder	50	35	4	13
Other trade occupation	55	31	-	17
Region				
Lower Mainland / Greater Vancouver	205	127	22	51
Interior / Okanagan	46	25	2	9
Vancouver Island	25	13	3	11
Northern BC	19	13	5	3
Company Size				
Up to 10 employees	88	51	10	20
Up to 50 employees	93	59	15	23
Up to 500 employees	52	31	4	13
More than 500 employees	18	12	-	8

Appendix D: Research Findings

The findings from the three phases of research are detailed below, many of which have been represented in the insights and suggestions outlined in the body of the report.

Phase 1. Skills of trades apprentices and connection with certification

- The BCIT apprentices score slightly higher in literacy and numeracy than the Canadian average, suggesting either that apprentices are more skilled than the general population or that the volunteer sampling methodology contributed to a sample bias.
- There are very slight positive skills differences in literacy, numeracy, and problem solving in technology-rich environment (PSTRE) between first and fourth year BCIT apprentices, but the differences are not statistically significant.
- There are small positive skills differences in literacy, numeracy, and PSTRE as the age of the respondents increases. Only the literacy and numeracy differences are statistically significant.
- There are small, statistically significant, positive skills differences in literacy, numeracy, and PSTRE in respondents with higher levels of secondary and post-secondary education.
- Female apprentice scores higher than their male counterparts in literacy, numeracy, and PSTRE; the differences are statistically significant in literacy and PSTRE.
- There are no significant differences between the skills of Indigenous and non-Indigenous apprentices in literacy, numeracy, or PSTRE, but the number of self-identified Indigenous apprentices is low (13 of 321).

Phase 2. Trades employer skills priorities and assessment of gaps in apprentices

- Active listening, time management, and critical thinking are identified by employers as the most important skills when hiring an apprentice.
- The top priorities are generalized as communication, problem solving, and project management by employers.
- Many of the same competences are expected to remain important in the next decade, with an increase in the need for judgment, decision making, and technology skills.
- The largest perceived gaps are in the skills that trades employers viewed as most important: critical thinking, troubleshooting, and active listening. These skills gaps are expected to persist given the perceived relative stability in the demand and supply of these skills.
- There are no meaningful differences across the perceptions of different sized employers.

Phase 3. Trades employer perceptions of skills requirements and certification

- Almost 70% of respondents are of the view that certified workers are more skilled than uncertified ones, with the largest advantage in the areas of reading comprehension, troubleshooting, complex problem solving, and active learning.
- There is an industry perception that certified workers demonstrate a keen attitude of self-development and have higher fundamental knowledge, both of which are advantageous when approaching new challenges.
- But trades employers have mixed views towards mandatory certification, with 48% believing that it would provide significant advantages to their business, 25% neutral, and 27% believing that it would detract from their business.
- Relatedly, about half of employers are of the opinion that mandatory certification would have a positive impact on the skills levels of trades workers [54%], completion rates of apprenticeship [53%], and on business productivity [48%].
- 24% of employer respondents are neutral or undecided regarding the impact of mandatory certification on skills in the trades; only 22% actively disagree.
- The respective numbers for the perceived impact of mandatory certification on apprentice completion rates are 35% and 12% and on productivity, 31% and 21%.
- Employers that have experience working in an environment with certification requirements seem to have more positive views on mandatory certification, but the sample size is limited. If these responses are representative, the perceived impact on skills tends towards 60% and on completion rates and productivity, towards 65%, when these employers' responses are weighted to reflect more closely the balance in the researched trades.
- Other benefits ascribed to mandatory certification by employers include enhanced professionalization of the trades, as well as improved work "readiness" and understanding of code and regulations [and so safety] — both of which are correlated with apprenticeship experience.
- There are, however, several concerns noted by employers in respect of mandatory certification. These include: lack of confidence in the efficacy of current trades training given its focus on technical skills and the inherent soft skill deficiencies of many trades workers; inequities in access to training; labour shortages given deficiencies in trades training supply and disinclination of some workers to seek certification; rise in worker wages; cost and business interruption for employee training; government intervention; and a greater need for just-in-time rather than one-off training given the pace of technological change.

