

QUÉBEC'S DIGITAL ECONOMY: OUTLOOK 2030

Research by



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Student Work Placement Program

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PREFACE:

The Information and Communications Technology Council (ICTC) is a neutral, not-for-profit national centre of expertise with the mission of strengthening Canada's digital advantage in the global economy. For over 30 years, ICTC has delivered forward-looking research, practical policy advice, and capacity-building solutions for individuals and businesses. The organization's goal is to ensure that technology is utilized to drive economic growth and innovation and that Canada's workforce remains competitive on a global scale.

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To cite this report:

Allison Clark, Noah Lubendo, and Lisa Wolfgram. Québec's Digital Economy: Outlook 2030. Information and Communications Technology Council (ICTC), April 2025. Ottawa, Canada. Author order is alphabetized.

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The opinions and interpretations in this publication are those of the authors and do not necessarily reflect those of the Government of Canada.

ACKNOWLEDGEMENTS:

The contributions made to this report by our key informant interviewees and subject matter experts are greatly appreciated. We would like to acknowledge all the contributors to this report, along with the following specific individuals:

- › **Marlène Canuel, c.o.** – Membre de l'Ordre des conseillers et conseillères d'orientation du Québec
- › **Philippe Daoust** – Managing Director, NAventures
- › **Ludovic Font** – Chargé de projet – Science des données / Project Manager – Data Science, TechnoCompétences
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GLOSSARY OF KEY TERMS

DIGITAL ECONOMY: A classification that includes both workers employed in largely digital or technical roles across all sectors of the economy (e.g., a data scientist working for an airline), and workers employed in non-technical roles within technology companies (e.g., an accountant working at a software company).

INFORMATION AND COMMUNICATIONS

TECHNOLOGY (ICT) SECTOR: The sector focused on the development, production, and management of technologies and services that facilitate communication, information processing, and data exchange, including hardware, software, telecommunications, and digital services.

INFORMATION AND COMMUNICATIONS

TECHNOLOGY (ICT) WORKERS: Professionals engaged in designing, developing, managing, and supporting ICT systems and infrastructure, including roles such as software developers, network engineers, IT support specialists, and data analysts.

STUDENT WORK PLACEMENT PROGRAM (SWPP):

The SWPP is funded by Employment and Social Development Canada and has been in operation since 2017. This program brings together employers, students, and post-secondary school stakeholders to create quality work-integrated learning opportunities. The program benefits employers by providing a wage subsidy to hire post-secondary students, and students benefit from quality work experience so they can secure employment in their chosen fields of study.¹

WORK-INTEGRATED LEARNING (WIL):

A form of curricular experiential education that formally integrates a student's academic studies with quality experiences within a workplace or practice setting. WIL experiences include an engaged partnership of at least an academic institution, a host organization, and a student. WIL can occur at the course or program level and includes the development of student learning objectives and outcomes related to employability, personal agency, knowledge and skill mobility, and lifelong learning.²

¹ Idil Abdulahi, et al., "Assessing the Value of Canada's Student Work Placement Program for Students, Employers, and the Digital Economy," Information and Communications Technology Council, August 2021, <https://ictc-ctic.ca/reports/assessing-the-value-of-canadas-student-work-placement-program-for-students-employers-and-the-digital-economy>.

² Co-operative Education and Work-Integrated Learning Canada, "What is Work-integrated Learning (WIL)?" CEWIL Canada, November 3, 2021, <https://cewilcanada.ca/CEWIL/CEWIL/About-Us/Work-Integrated-Learning.aspx>.



EXECUTIVE SUMMARY

Québec is a significant player in Canada's digital economy, employing over half a million technology workers, or about one-fifth of the country's total tech workforce. Central to Québec's strengths are Montréal and Québec City, which accounted for 61% and 6% of the province's information and communications technology (ICT) job postings, respectively, from January to December 2024. Québec's digital economy is bolstered by foreign direct investment and its innovation hubs, which serve as the backbones of its interactive digital media sector and artificial intelligence ecosystem.

Despite the province's numerous strengths, it faces a cooling ICT job market marked by declining research and development spending, increasing ICT unemployment rates, and reductions in the number of ICT job postings. While demand for tech talent surged early in the post-pandemic period, recent data indicates that Québec's ICT labour market has transitioned from favouring job seekers to favouring employers.

Due to these challenges, future growth scenarios vary significantly. In an optimistic projection, ICTC forecasts that Québec's digital economy could create up to 196,400 jobs by 2030, whereas a pessimistic projection suggests a potential annual decline of 0.4% in the digital economy. All projections underscore the importance of an increase in research and development investments and technology adoption across sectors.

If Québec is to continue on its growth trajectory, it will be important to strengthen its ICT talent pipeline to ensure businesses have a skilled workforce that can achieve innovation, commercialization, and productivity objectives. Work-integrated learning programs, such as

co-ops and internships, may be the solution: ICTC finds that they provide clear benefits for both students and employers. While students acquire real-world experience, employers gain access to a continuous talent pipeline.

However, more can be done to increase the adoption of work-integrated learning programs to maximize the advantages they provide for students, employers, and Québec's digital economy, including raising awareness of wage subsidies and addressing employer concerns about the supervisory costs associated with WIL initiatives.

Québec's role as a pillar of Canada's digital economy depends on its ability to assess its challenges and leverage its many strengths. Strategic policy actions that encourage increased research and development investments and technology adoption, enhance Québec's talent pipeline, and further establish Québec as a vital player in securing Canada's digital advantage are crucial for fostering a digital economy that addresses the rapidly evolving needs of employers and job seekers alike.

KEY FINDINGS

DIGITAL ECONOMY AND LABOUR MARKET DYNAMICS

Québec accounts for 21% of Canada's tech workforce.

Despite recent economic shifts, lower shares of business sector research and development spending, and an uptick in ICT unemployment rates, Québec's dynamic tech ecosystem remains a significant contributor to overall economic development.

ICTC forecasts that, in an optimistic scenario, Québec's digital economy could grow by an average of 5.6% annually, creating 196,400 new jobs by 2030 and reaching a total employment of 704,020 professionals. In a pessimistic scenario, the digital economy is projected to decline by an average of 0.4% annually.

Despite slowing demand for ICT workers, average ICT annual salaries in Québec are rising.

Québec's digital economy is partly driven by continued international investment and the province's strong post-secondary infrastructure. However, the sector struggles with a prevailing gender gap, with women representing just 32.6% of Québec's digital workers.

QUÉBEC'S DIGITAL ECONOMY

In addition to technical proficiencies like programming languages and cloud infrastructure, cybersecurity, artificial intelligence, and data management capabilities are growing in importance.

Software engineering and programming jobs make up nearly 30% of Québec's digital economy postings.

Soft skills such as critical thinking, bilingual communication, and problem solving are essential parts of the skill sets needed for digital technology roles in Québec.

Despite Québec's strong talent pool, employers face difficulties recruiting individuals with a mix of specialized technical skills, the necessary soft skills, and business acumen.

WORK-INTEGRATED LEARNING

Work-integrated learning (WIL) fosters growth in Québec's digital economy by offering students hands-on experiences that connect academic training with real-world competencies while also giving employers access to a well-prepared and well-rounded talent pool.

WIL placements improve students' technical and soft skills while offering employers a cost-effective means of evaluating and onboarding skilled talent. This reduces the uncertainty typically associated with hiring recent graduates.

Seventy-four percent of surveyed Québec tech sector employers who had hosted WIL students either agreed or strongly agreed that they participated to help develop their industry's workforce.

Employers who hosted WIL students found WIL programs beneficial for workforce development and effective as extended interviews with potential new hires.

Employers are not yet broadly adopting WIL opportunities due to limited awareness of subsidy programs and concerns regarding supervisory costs.

Raising awareness of WIL subsidies and simplifying application processes can enable Québec companies to more easily cultivate the experienced talent necessary for maintaining a competitive digital economy.

INTRODUCTION

Québec is a significant force in Canada’s digital economy, largely thanks to its post-secondary institutions, robust talent pool, and world-class technology hubs like Montréal. As of 2024, the province’s digital economy employed an estimated 510,900 individuals, representing 21% of Canada’s total technology workforce. This report examines Québec’s digital economy in three sections: Section 1 provides an overview of the current state of Québec’s digital economy, including trends and developments. Section 2 explores in-demand skills and roles, while Section 3 outlines the benefits of work-integrated learning programs for both students and employers.

Section 1 illustrates how Québec’s robust post-secondary sector—alongside hubs for foreign direct investment—fosters innovation in fields such as artificial intelligence (AI), gaming, and creative technology. By analyzing labour market trends in the aftermath of the COVID-19 pandemic, the section shows that the demand for ICT talent initially surged but then moderated as hiring cooled and unemployment rates for key technology occupations gradually rose. Additionally, three forecast scenarios presented in Section 1 reveal possible trajectories for Québec’s digital economy leading up to 2030. In the optimistic outlook, over 196,000 new roles could be created by 2030, whereas a pessimistic scenario points to a potential loss of 10,690 positions. The baseline scenario indicates the creation of approximately 92,860 new jobs, underscoring the importance of targeted policy actions and stakeholder collaboration to sustain growth.

Section 2 builds upon the economic backdrop provided in Section 1 and details the specific roles and skill sets most in demand by digital economy employers in Québec. With the increasing interest in emerging technologies across Canada and the global market, software development and cloud computing remain critical, as evidenced by their share of technology job postings in Québec. Employers also reported a growing interest in AI, cybersecurity, and data management to meet the needs of a rapidly evolving market. In addition to technical skills, Section 2 demonstrates that soft

skills and business skills have become increasingly important and sought after. Employers engaged through surveys and interviews indicated that finding qualified candidates with the necessary technical and soft skills, as well as the business acumen required for scaling, has been a challenge.

Section 3 examines the benefits that work-integrated learning (WIL) programs offer both employers and students. By participating in WIL programs, students have the opportunity to apply skills acquired through coursework to real-world scenarios, enhancing their technical and soft skills and facilitating their transition into the workforce. Additionally, WIL programs provide employers with a consistent flow of talent, reducing hiring risks while also delivering economic advantages through the work completed by WIL students. Employers and students expressed overwhelmingly positive views on WIL programs and identified numerous practical benefits, including funding to help with living and schooling costs, increased confidence in their skills, additional value, and access to pre-vetted professionals. Although some barriers persist—specifically, a lack of awareness regarding subsidy programs and their benefits, as well as perceived costs associated with supervising student placements—experts, educators, and employers involved in this study emphasized the significance of improved access to and awareness of WIL programs for the ongoing health of Québec’s digital economy.



SECTION I: UNDERSTANDING THE DIGITAL ECONOMY IN CANADA AND IN QUÉBEC

Key Findings

- › Québec accounts for 21% of Canada's tech workforce.
- › Despite recent economic shifts, lower shares of business sector research and development spending, and an uptick in ICT unemployment rates, Québec's dynamic tech ecosystem remains a significant contributor to overall economic development.
- › ICTC forecasts that, in an optimistic scenario, Québec's digital economy could grow by an average of 5.6% annually, creating 196,400 new jobs by 2030 and reaching a total employment of 704,020 professionals. In a pessimistic scenario, the digital economy is projected to decline by an average of 0.4% annually.
- › Despite slowing demand for ICT workers, average ICT annual salaries in Québec are rising.
- › Québec's digital economy is partly driven by continued international investment and the province's strong post-secondary infrastructure. However, the sector struggles with a prevailing gender gap, with women representing just 32.6% of Québec's digital workers.

ICTC measures the digital economy as the sum of employment across digital industries and digital occupations. In other words, the digital economy encompasses technology workers across all sectors, along with all workers within the technology sector.³ For example, a cybersecurity specialist working in healthcare would belong to the digital economy, as would a sales representative for a software development firm.

This section provides an overview of the digital economy in Canada and Québec. It offers insights

into the demographic and regional breakdowns of the digital technology ecosystem in Québec and details leading subsectors within Québec's digital economy, including AI, creative technology, and research and development (R&D). This section also outlines the dynamics of the labour market in the Canadian and Québec digital economies, highlighting employment and unemployment rates, as well as the socio-economic factors driving shifts in the demand for technology talent in Québec.

³ Tech workers are defined by 30 National Occupational Classification (NOC) codes; the tech sector is defined by 18 North American Industry Classification System (NAICS) codes.

Canada's Digital Economy

For several decades, the number of individuals employed in Canada's digital economy has been steadily increasing. In 2006, the digital economy comprised approximately 8.8% of Canada's total workforce.⁴ By 2019, this figure had risen to approximately 9.7% of the Canadian workforce. In January 2020, prior to the COVID-19 pandemic, the digital economy accounted for over 10.0% of the total Canadian workforce.⁵ As of December 2024, the digital economy includes 2.4 million workers, or 11.6% of total national employment.⁶ From 2023 to 2024, employment in the digital economy grew by 3.2%, while employment across Canada's overall economy increased by 0.8%.⁷

The ICT sector is a significant portion of the digital economy. The ICT sector outperforms the overall Canadian economy in terms of economic output, employment, and innovation.⁸ According to

Innovation, Science and Economic Development Canada, in 2023, the ICT sector's GDP was \$125.5 billion, or 5.7% of the national GDP, and it accounted for 18.7% of national GDP growth between 2018 and 2023.⁹ Across ICT subsectors, software and computer services dominate in Canada, representing 92.5% of total ICT companies nationally. Smaller subsectors include ICT wholesaling (3.4%), communications services (2.5%), and ICT manufacturing (1.7%).¹⁰

In terms of regional distribution, digital economy workers in Canada are predominantly located in Ontario (47.2%), followed by Québec (21.2%), British Columbia (13.6%), and Alberta (9.5%) (Figure 1). A significant portion of this talent is found in urban areas, including Toronto, Mississauga, Montréal, Vancouver, and Calgary.

Canadian Digital Workforce by Province

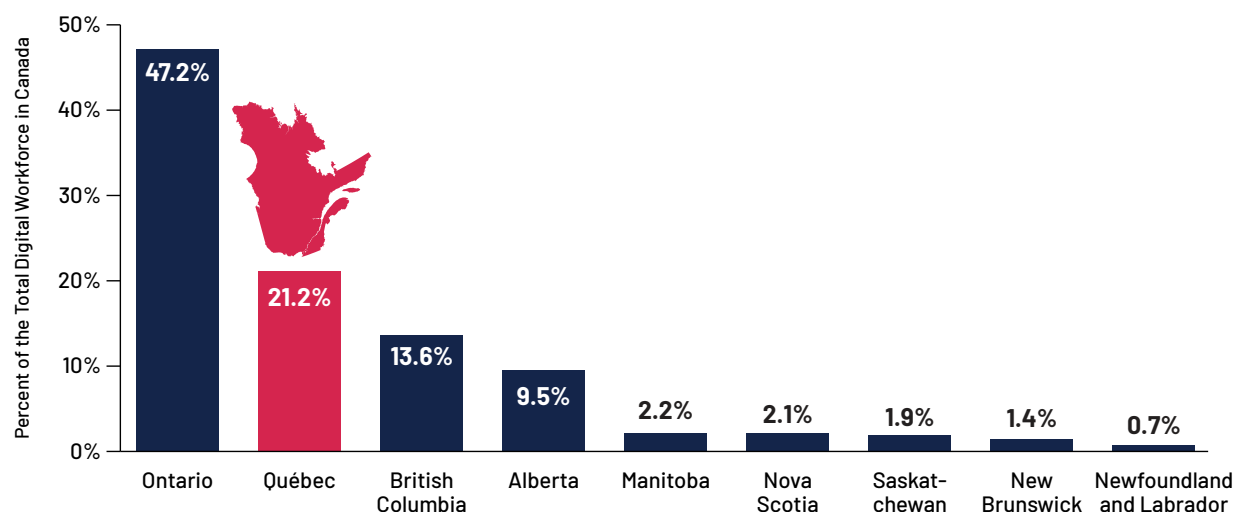


Figure 1. Breakdown of Canada's digital workforce by province. Source: Statistics Canada Labour Force Survey, ICTC analysis.

⁴ "Labour Force Survey (LFS)," Statistics Canada, 2024, <https://www.statcan.gc.ca/en/survey/household/3701>; Statistics Canada Labour Force Survey Data, ICTC analysis, 2024.

⁵ Ibid.

⁶ Ibid.

⁷ Ibid.

⁸ Innovation, Science and Economic Development Canada, Canadian ICT Sector Profile 2023: 2023 ICT Sector Snapshot, last update October 9, 2024, <https://ised-isde.canada.ca/site/digital-technologies-ict/en/canadian-ict-sector-profile>.

⁹ Ibid.

¹⁰ Ibid.



Québec's Digital Economy

The province of Québec is a leader in Canada's digital economy. As of December 2024, the digital economy in Québec employed 510,900 individuals, representing 21% of Canada's total digital economy (see [Figure 1](#)).¹¹ In 2024, the annual employment growth rate in Québec's digital economy aligned with most industries, at 4%. For the ICT sector, employment growth in 2024 was even higher, at 4.9%. The only sectors in Québec with employment growth surpassing that of ICT were utilities (8.3%) and construction (5.1%).¹²

Demographic Composition

In 2024, 67.4% of workers in Québec's digital economy identified as men, while 32.6% identified as women.¹³ This contrasts with gender representation across the entire labour force in Québec, which consists of 53% men and 47% women.¹⁴ The overrepresentation of men in Québec's digital economy reflects a common trend across the Canadian digital economy, with studies highlighting systemic challenges that hinder women's representation in technology.¹⁵ Most workers in Québec's digital economy are mid-

career: only 6% are between the ages of 15 and 24, 26% are between 25 and 34, 53% are between 35 and 54, and 13% are between 55 and 64.¹⁶ The Canadian digital economy exhibits a similar age group representation, with mid-career workers being overrepresented. However, employment across the Canadian economy features higher representation from both older and younger workers, with 21.2% of the workforce aged 55 and over and 13.2% aged 15 to 24.¹⁷

Jobs in Demand

ICTC analyzed job postings for ICT occupations from January 2024 to December 2024 and found 2,814 ICT job postings in Québec during this 12-month period. Of these postings, 1,713 jobs were located in the Montréal region, making up approximately 60% of the total postings ([Figure 2](#)). Québec City and La Conception accounted for a smaller share of the digital economy in Québec, representing 6% and 4% of job postings, respectively. Refer to [Figure 2](#) for a breakdown of job postings by metropolitan region.

¹¹ Statistics Canada Labour Force Survey, ICTC analysis, 2024.

¹² Ibid.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Allison Clark, Justin Ratcliffe, and Mansharn Sangha (Toor), "Empowering Women in the Digital Economy: Addressing Tech's Untapped Potential," Information and Communications Technology Council, June 2023, <https://ictc-ctic.ca/reports/empowering-women-in-the-digital-economy>.

¹⁶ Statistics Canada Labour Force Survey; ICTC analysis, 2024.

¹⁷ Maryna Ivus, et al., "Canada's Digital Economy: Talent Outlook 2030," Information and Communications Technology Council, forthcoming 2025.

For a detailed investigation of the pros and cons of foreign direct investment in the technology sector in Canada, see: Mairead Matthews and Faun Rice, "Context Matters: Strengthening the Impact of Foreign Investment on Domestic Innovation," Information and Communications Technology Council, March 2022, <https://ictc-ctic.ca/reports/context-matters>.

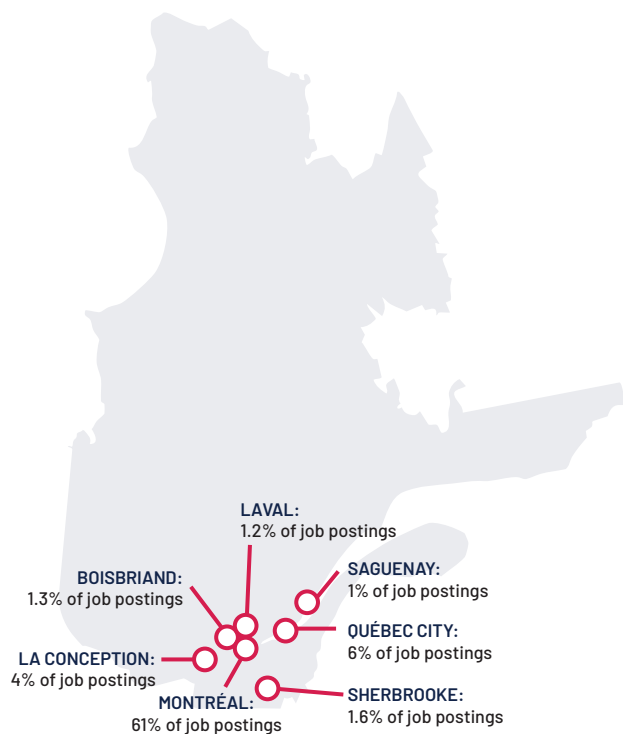


Figure 2. A map of Québec detailing a regional breakdown of ICT job postings, January 2024 to December 2024, in Québec. This map features all regions that represent over 1% of ICT job postings in Québec; all other regions represent less than 1%. Source: Vicinity Jobs Inc.; ICTC analysis.

Foreign Direct Investment

In addition to being a leader in tech sector employment, Québec's digital economy is a hub for international investment. Interviewees and published literature are divided on the effects of international investment: on the one hand, international investment can create jobs and opportunity for knowledge spillovers that boost domestic innovation. On the other hand, international investment can lead to intellectual property attrition and salary competition in Québec-owned companies, complicating efforts for domestic firms to scale.¹⁸

Montréal is a top location for foreign direct investment. In 2021, Montréal received second place on the Global Cities of the Future list, being recognized as one of "the most promising destinations around the world for future inward investment."¹⁹ FDi Magazine ranked Montréal as "the best place in the world to invest in the digital and multimedia sectors."²⁰ Montréal is home to over 5,000 technology companies and 170,000 IT professionals, and it is a growing hub for robotics, AI, and video games.²¹

¹⁸ For a detailed investigation of the pros and cons of foreign direct investment in the technology sector in Canada, see: Mairead Matthews and Faun Rice, "Context Matters: Strengthening the Impact of Foreign Investment on Domestic Innovation," Information and Communications Technology Council, March 2022, <https://ictc-ctic.ca/reports/context-matters>.

¹⁹ "Montréal ranked no. 2 in the world for its foreign direct investment strategy," Montréal International, 2021, <https://www.montrealinternational.com/en/news/montreal-ranked-no-2-in-the-world-for-its-foreign-direct-investment-strategy/>.

²⁰ Ibid.

²¹ "Why should you invest in Greater Montréal?" Montréal International, 2022, <https://www.montrealinternational.com/en/invest/why-invest-in-the-greater-montreal/>.

Innovation Hubs

Growth in the AI sector in Montréal is bolstered by Scale AI, a co-investment and innovation hub where AI research, development, and commercialization receive support from the Government of Canada, the Government of Québec, and the private sector.²² The city's AI sector is further enhanced by a network of notable institutes and AI organizations, including the Mila - Quebec AI Institute. According to Montréal International, the greater Montréal area is home to approximately 30,000 AI professionals.²³ Furthermore, Montréal boasts 300 video game studios and 13,500 video game developers, making it the largest video game hub in Canada and the fifth largest globally.²⁴

Québec City is an emerging hub for R&D in the technology sector, with a focus on life sciences and health technology.²⁵ Québec City is home to more than 500 technology companies, which generate approximately \$2 billion in revenue each year,²⁶ and notable post-secondary institutions such as Université Laval. Additionally, Québec City boasts over 5,500 researchers and hundreds of research laboratories, institutes, and centres.

Québec-led organizations emphasize the significance of building on the province's innovative culture through technology adoption and investment in R&D. One participant in this study noted that the business culture in Québec tends to be slow to respond to evolving trends, stating, "We're late; Canada as a whole, and Québec more specifically, has a problem with adopting new technology and new solutions." A 2024 report by le Conseil de l'innovation du Québec, the province's innovation council,

revealed that over the past 20 years, Québec has faced challenges in productivity and business investments linked to R&D.²⁷

A 2024 report by Québec's Ministry of Finance showed that R&D investments improved economic outcomes for small and medium enterprises (SMEs), such as profitability, revenue, and productivity.²⁸ Specifically, the study revealed that SMEs that invested in R&D (compared to those that didn't) saw a 27.1% increase in profits, 13.2% growth in assets, and 6.2% growth in productivity²⁹—something particularly important considering that 99.8% of businesses in Québec are SMEs.³⁰

Despite these benefits, over the last two decades Québec's business sector R&D spending (business enterprise expenditure on research and development, or BERD)³¹ has decreased as a percentage of overall GDP—falling from 1.74% to 1.30%.³² The authors of the report *Vers un Québec Innovant (Toward an Innovative Québec)* suggest that the impact of this decline has been felt by Québec's GDP growth itself. In fact, Québec's GDP would have risen \$1.93 billion in 2021 if R&D investments had kept up with GDP growth from 2001 to 2021.³³

Meanwhile, the 2022 *Survey of Innovation and Business Strategy* by Statistics Canada revealed that innovation rates declined nationwide from 2020 to 2022 compared to the years 2017 to 2019. It further indicated that Québec's innovation rate (70.0%) ranked second to last among regions in Canada.³⁴ Interestingly, the survey findings demonstrate differences in the perception of

²² "Who we are," ScaleAI, 2025, <https://www.scaleai.ca/about-us/>.

²³ "Why should you invest in Greater Montréal?" Montréal International, 2022, <https://www.montrealinternational.com/en/invest/why-invest-in-the-greater-montreal/>.

²⁴ "Montréal, a major player in video games," Montréal International, 2023, <https://www.montrealinternational.com/en/keysectors/video-games/>.

²⁵ eTalent Canada, "Québec," Information and Communications Technology Council, accessed February 26, 2025, <https://etalentcanada.ca/locations/Quebec>.

²⁶ Ibid.

²⁷ "Vers un Québec Innovant," Conseil de l'innovation du Québec, April 2024, <https://conseilinnovation.quebec/rapport-vers-un-quebec-innovant/>.

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ "Business Enterprise R&D Spending," The Conference Board of Canada, accessed February 26, 2025, <https://www.conferenceboard.ca/hcp/berd.aspx/>.

³² "Vers un Québec Innovant," Conseil de l'innovation du Québec, April 2024, <https://conseilinnovation.quebec/rapport-vers-un-quebec-innovant/>.

³³ Ibid.

³⁴ "Survey of Innovation and Business Strategy, 2020-2022," Statistics Canada, 2024, <https://www150.statcan.gc.ca/n1/daily-quotidien/240220/dq240220b-eng.htm>.



innovation by region. In every region except Québec, the highest proportion of respondents cited COVID-19 disruptions as the primary obstacle to innovation.

In contrast, **respondents from Québec most commonly (28.2%) identified lack of skills as the main barrier to innovation.**³⁵ An interviewee ICTC spoke to during the report's production echoed this sentiment, noting that "many organizations are considering AI implementation but lack the necessary baseline of technical understanding, skills, and infrastructure to implement and support the use of AI tools."

Post-secondary education in Québec is a significant driver of talent in the province.

Furthermore, the R&D capabilities of universities have contributed to the growth and success of technology hubs in Québec. One interviewee based in Montréal remarked, "The education system in Québec does a phenomenal job. If it weren't for them, we would be lagging even more in terms of productivity." At the same time, other interviewees noted that the province's post-secondaries could improve in retaining intellectual property rights for local business use. One analysis indicates that 61% of intellectual property created by Québec's three largest universities engaged in public research is ultimately owned by foreign entities.³⁶

Labour Market Dynamics in Canada

Labour market dynamics are influenced by a number of factors, including economic growth, recessions, population size, demographics, automation, sectoral booms, pandemics, and more.³⁷ Within the past five years, Canada has experienced changes in several of these areas, with the COVID-19 pandemic playing a significant role. Canada's GDP has recovered since the pandemic, but other indicators, such as labour productivity growth (typically measured as growth in GDP per hour worked) have continued to decline.³⁸

Despite the challenges faced by the Canadian economy, the digital economy has continued to grow since the pandemic.³⁹ The COVID-19 pandemic prompted an increase in technology use and adoption, which includes the rise of remote work, e-commerce and intelligent retail, digital health and telemedicine, digital content consumption, and "platformification," a term

that refers to utilizing digital platforms and social media to access and serve customers.⁴⁰ Furthermore, research indicates that the COVID-19 pandemic accelerated the adoption of industry 4.0 technologies, including big data, cloud computing, AI, the Internet of Things, and blockchain across many industries.⁴¹

Digitalization across the Canadian economy during and after the pandemic led to a surge in demand for technology workers.⁴² In the years immediately following the pandemic, Canadian employers struggled to find digital talent to meet growing demand.⁴³ However, after the rapid growth of digital economy hiring during the pandemic, demand has adjusted and cooled slightly. Employers are increasingly seeking experienced personnel with several years in core ICT professions, such as data scientists who can assist in developing AI applications.⁴⁴

³⁵ Ibid.

³⁶ "Vers un Québec Innovant," Conseil de l'innovation du Québec, 2024, <https://conseilinnovation.quebec/rapport-vers-un-quebec-innovant/>.

³⁷ Karen Harris, Austin Kimson, and Andrew Schwedel, "Labour 2030: The Collision of Demographics, Automation and Inequality," Bain and Company, 2018, https://www.bain.com/insights/labor-2030-the-collision-of-demographics-automation-and-inequality/?utm_source=chatgpt.com.

³⁸ Beata Caranci, James Marple, "From Bad to Worse: Canada's Productivity Slowdown is Everyone's Problem," TD Economics, 2024: <https://economics.td.com/ca-productivity-bad-to-worse>.

³⁹ Maryna Ivus, A. Kotak, "Onwards and Upwards – Digital Talent Outlook 2025," Information and Communications Technology Council, 2021: <https://ictc-ctic.ca/reports/onwards-and-upwards>.

⁴⁰ "COVID-19 is Accelerating the Rise of the Digital Economy," BDO USA, 2020, <https://www.bdo.com/insights/advisory/covid-19-is-accelerating-the-rise-of-the-digital-economy>.

⁴¹ Vikram Singh, Homayoun Shirazi, and Jessica Turetken, "The COVID-19 Era-Influencers of Uneven Sector Performance: A Canadian Perspective," *Economies* 10, no 2 (2022), <https://doi.org/10.3390/economies10020040>.

⁴² Maryna Ivus, Akshay Kotak, "Onwards and Upwards – Digital Talent Outlook 2025," Information and Communications Technology Council, 2021: <https://ictc-ctic.ca/reports/onwards-and-upwards>; Alejandra Bellatin, Gabriela Galassi, "What COVID-19 May Leave Behind: Technology-Related Job Postings in Canada," IZA Institute of Labor Economics, 2022: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4114783.

⁴³ Parisa Mahboubi, "The Knowledge Gap: Canada Faces a Shortage in Digital and Stem Skills," C.D. Howe, 2022: https://www.cdhowe.org/wp-content/uploads/2024/06/Commentary_626_0.pdf.

⁴⁴ See ICTC Digital Economy Labour Market Outlook to 2030 (forthcoming, 2025).



Labour Market Dynamics in Québec

Like the rest of Canada, many employers in Québec faced challenges in finding ICT workers after the pandemic. A 2021 report by TechnoCompétences titled *Diagnostic Sectoriel 2021-2024* revealed that midway through 2021, there were 8,290 unfilled ICT job postings in Québec, and this number was projected to reach 11,163 by the end of that year.⁴⁵ Furthermore, a collaborative study by the Institute of Québec, Montréal International, and the Chamber of Commerce of Metropolitan Montréal highlighted a notable labour shortage in the Québec economy. The study stated, “The scarcity of labour has accelerated, even during the COVID-19 pandemic, and the availability of talent remains a central concern for businesses, especially as demographic transitions and population aging increasingly make their impact felt”(my translation).⁴⁶ While some research points to an aging workforce as a cause for concern,⁴⁷ in 2024, more than half (55.3%) of ICT workers were between the ages of 25 and 44,⁴⁸ indicating that the majority of ICT professionals in Québec can remain in the workforce for decades, allowing ample time to train the next generation of ICT workers and address labour market gaps.

While there may have been an ICT labour shortage in Québec in 2021,⁴⁹ data collected throughout 2024 suggests that, similar to the rest of Canada, ICT labour demand has started to cool. One interviewee remarked that **the pendulum of the labour market has swung from an economy favouring employees to one favouring employers**. Although some sources report that Québec employers have concerns about the quality of the local talent pool,⁵⁰ this trend was not confirmed by

employers interviewed for this study, who feel that the province has ample skilled technology talent. One interviewee shared their perspective that “the talent pool in Québec is phenomenal.” Some employers attribute the strength of the talent pool to the excellent post-secondary educational institutions located throughout Québec.

The shift in Québec’s digital economy labour market was echoed by interviewees from post-secondary institutions. One interviewee explained that graduates from their program find it difficult to secure full-time work after graduation. This interviewee estimated that only one-quarter of recent graduates from their program have managed to obtain a job in their field shortly after graduation.

ICTC also analyzed data on ICT unemployment trends across Québec. As detailed in **Figure 3**, unemployment rates for ICT workers were slowly declining in 2019, indicating a tightening labour market prior to the COVID-19 pandemic. Like many industries across Canada, ICT unemployment rates in Québec increased in 2020 following pandemic-related lockdowns, implying that many ICT workers could not find jobs during this period. Workers in the digital economy were quick to recover, however, with unemployment rates reaching as low as 0.6% in November of 2021.

Following the COVID-19 pandemic, unemployment rates for ICT roles in Québec have steadily risen, meaning that there is less demand for these workers and/or it has become more challenging for ICT talent to find jobs in Québec (see **Figure 3**). Importantly, the ICT sector unemployment rate remains lower than the overall unemployment rate in Québec, which averaged 5.4% in 2024.⁵¹

⁴⁵ “Diagnostic Sectoriel,” TechnoCompétences, 2021, https://www.technocompetences.qc.ca/wp-content/uploads/2024/12/TC_Diagnostic-Sectoriel_Page_LowRes_20200802-1.pdf.

⁴⁶ “Comparer Montréal,” Institut du Québec, December 2021, <https://institutduquebec.ca/content/publications/comparer-montreal-les-defis-du-marche-du-travail-pour-les-ti/122021-idq-comparer-montreal.pdf>.

⁴⁷ Ibid.

⁴⁸ Statistics Canada Labour Force Survey, ICTC analysis, 2024.

⁴⁹ “Comparer Montréal,” Institut du Québec, December 2021, <https://institutduquebec.ca/content/publications/comparer-montreal-les-defis-du-marche-du-travail-pour-les-ti/122021-idq-comparer-montreal.pdf>.

⁵⁰ “Survey of Innovation and Business Strategy, 2020-2022,” Statistics Canada, 2024, <https://www150.statcan.gc.ca/n1/daily-quotidien/240220/dq240220b-eng.htm>.

⁵¹ “Monthly indicators: Employment and unemployment rates by administrative region,” Institut de la statistique du Québec, accessed January 29, 2025, <https://statistique.quebec.ca/en/produit/tableau/monthly-indicators-employment-and-unemployment-rates-by-administrative-region>.

Time Trend: ICT Unemployment rate in Québec

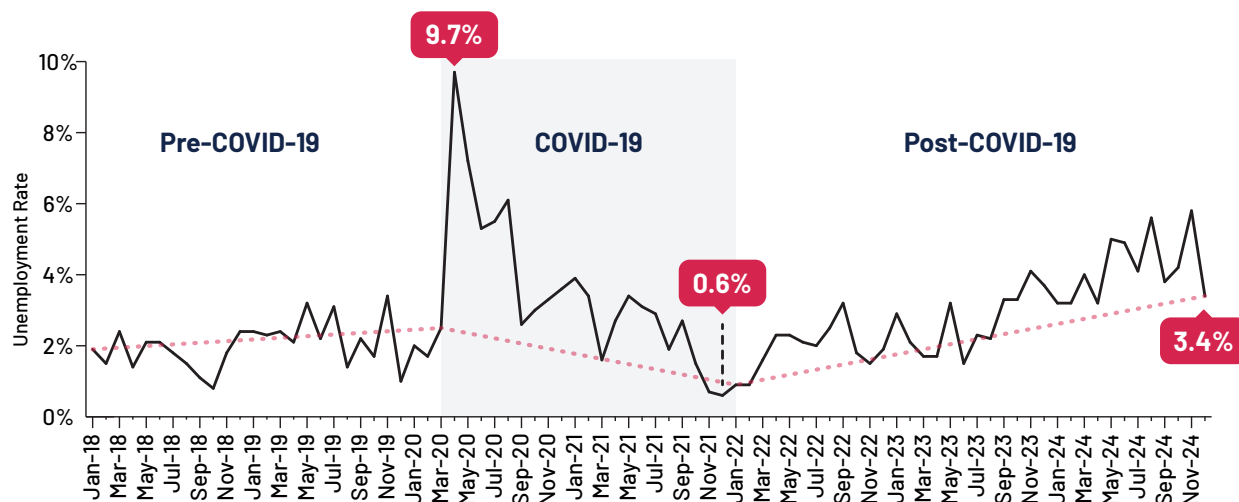


Figure 3. Unemployment rate (%) of core ICT roles across the Québec digital economy from January 2018 to December 2024. Source: Statistics Canada, Labour Force Survey; ICTC analysis

In addition to rising unemployment rates, employers in Québec are posting fewer ICT roles than they were immediately before the pandemic (Figure 4). In 2019, the ICT sector in Québec saw growth, with nearly 10,000 new ICT jobs posted in the province. With the onset of the COVID-19 pandemic, there was a drop in ICT job postings in 2020; however, the digital economy appeared to

bounce back quickly, with almost 8,000 ICT jobs posted in Québec in 2021. Since then, however, the total number of ICT job postings in Québec has continuously dropped. From January to December 2024, there were only 2,814 job postings in Québec, over 900 fewer than in 2020, the year of the pandemic.

Time Trend: Number of ICT Job Postings in Québec

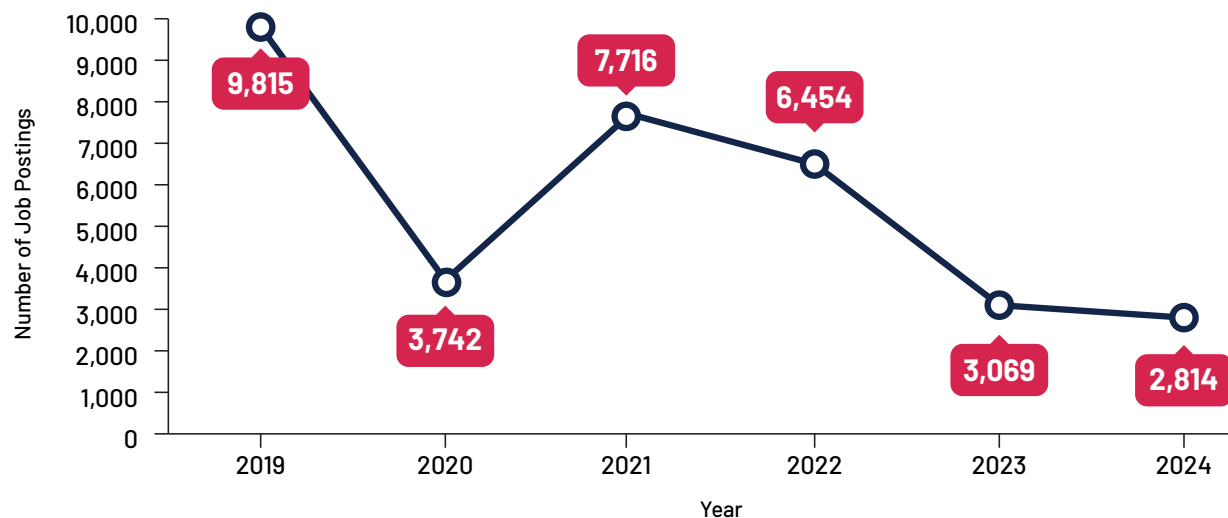


Figure 4. Total number of ICT job postings in Québec from January 1, 2019, to December 31, 2024. Source: Vicinity Jobs; ICTC analysis.



As seen when comparing **Figures 3 and 4**, there is an inverse relationship between job postings and the unemployment rate. Many companies experienced a “boom and bust” period following the pandemic: as the economy reopened, employers increased hiring to recover lost output. Across Canada, as the demand for workers rose in 2021, wage growth accelerated due to worsening labour shortages and inflation rising above 8%.⁵² However, as interest rates climbed in 2022, spending across the economy declined, and companies no longer required the same number of workers, reflecting a cooling labour market.⁵³

Despite the slowing demand for ICT workers, average annual salaries are rising. From 2021 to 2024, the average hourly wage listed in ICT job postings in Québec increased by over \$10, from \$33.40 per hour to \$44.30 per hour (Figure 5). The rise in ICT wages may indicate that employers have adjusted salaries to accommodate the increased cost of living in Canada,⁵⁴ or it could stem from competition among employers for talent, which has led to higher wages to enhance recruitment efforts.⁵⁵ Regardless of the reasons behind

it, wages are climbing in Québec’s ICT sector (Figure 5). However, without corresponding growth in outputs, rising average wages could negatively affect productivity and potentially impede business operations.⁵⁶ Consequently, economic productivity in Québec remains a concern.⁵⁷

ICTC has developed three forecast scenarios for Québec’s digital economy employment growth between 2025 and 2030 (see **Figure 6**).

In the optimistic scenario, Québec’s digital economy is expected to grow by an average of 5.6% annually.

The baseline scenario indicates that the digital economy will experience an average annual growth of 2.8%, with a higher growth rate of 3.3% in 2025.

In the low, or pessimistic scenario, the digital economy is projected to decline by an average of 0.4% annually.

In the baseline scenario, Québec’s digital economy could create 92,860 new jobs by 2030, potentially reaching a total employment of 600,470 by that year.

Time Trend: Average Annual Salary of Québec ICT Job Postings



Figure 5. Average annual salary (\$/hour) for ICT job postings in Québec from January 1, 2019, to December 31, 2024.
Source: Vicinity Jobs; ICTC analysis.

⁵² Tiff Macklem, “Workers, jobs, growth and inflation – Today and tomorrow,” Bank of Canada, June 24, 2024, <https://www.bankofcanada.ca/2024/06/workers-jobs-growth-and-inflation-today-and-tomorrow/>.

⁵³ Ibid.

⁵⁴ “Nearly half of Canadians report that rising prices are greatly impacting their ability to meet day-to-day expenses,” Statistics Canada, August 15, 2024, <https://www150.statcan.gc.ca/n1/daily-quotidien/240815/dq240815b-eng.htm>.

⁵⁵ Danny Leung and Ryan Macdonald, “Real wages and productivity during the COVID-19 pandemic,” Statistics Canada, October 2022, <https://doi.org/10.25318/36280001202201000002-eng>.

⁵⁶ Ibid.

⁵⁷ Carolyn Rogers, “The productivity problem,” Bank of Canada, March 26, 2024, https://www.bankofcanada.ca/2024/03/productivity-problem/?utm_source=td&utm_medium=referral&utm_campaign=productivity-problem; Beata Caranci and James Marple, “From Bad to Worse: Canada’s Productivity Slowdown is Everyone’s Problem,” TD Economics, September 12, 2024, <https://economics.td.com/ca-productivity-bad-to-worse>.

Employment in the Digital Economy of Québec, 2007–2030

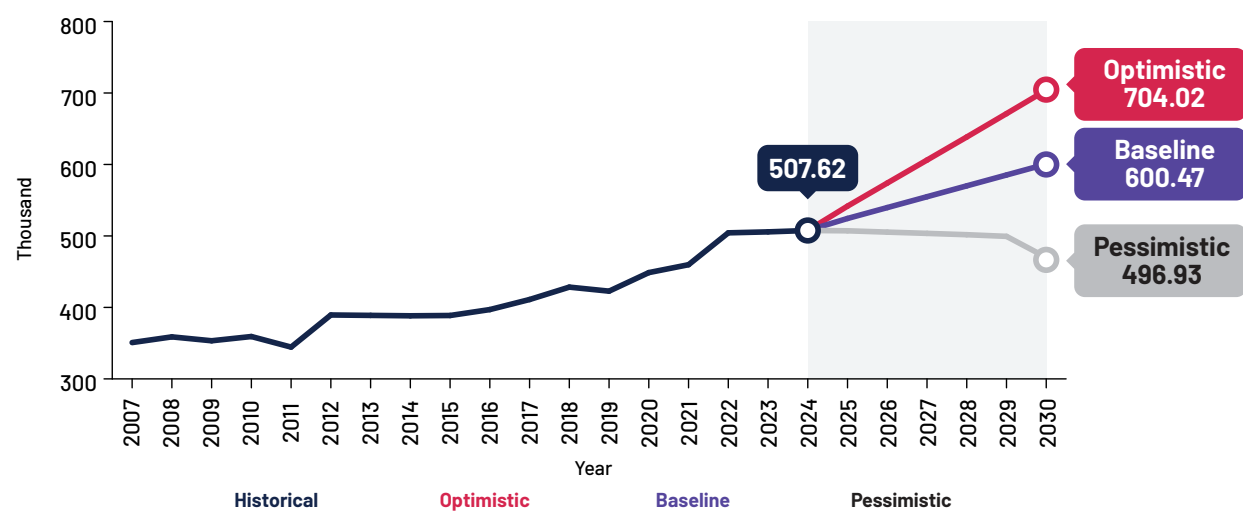


Figure 6. Trend graph showing three different scenarios (optimistic, baseline, and pessimistic) for employment in Québec's digital economy from 2007–2030. Source: Statistics Canada, Labour Force Survey; ICTC analysis.

In the optimistic scenario, **Québec's digital economy could create 196,400 new jobs by 2030, potentially reaching a total employment of 704,020 professionals.** Several factors may contribute to the growth of the digital economy. First, the province's strong post-secondary ecosystem and research infrastructure helps produce a steady stream of graduates. Second, sustained public and private investment in R&D, combined with government programs that incentivize technology adoption, could drive a more widespread application of AI, data analytics, and other advanced digital tools. Third, Québec's role as an attractive destination for foreign direct investment—especially in sectors like gaming, AI, and robotics—may further support business expansion and job creation. Fourth, the increasing

use of work-integrated learning programs can help address skills gaps, enabling employers to hire students with hands-on experience.

In a pessimistic scenario, **Québec's digital economy could lose 10,690 jobs by 2030, potentially dropping to a total of 496,930 digital economy workers.** Challenges faced by the digital economy that could negatively impact its growth include limited adoption of emerging technologies and insufficient R&D investment relative to GDP, which may hinder long-term innovation and slow growth. Moreover, shortages of experienced talent in critical areas might worsen if employers do not actively invest in training or collaborate with academic institutions to create industry-responsive curricula and work-integrated learning opportunities.



Employer Perspectives on Attraction and Retention

Labour market data reveals a cooling demand in Québec, yet employers who engaged with ICTC during this study still reported challenges related to talent attraction and retention. In ICTC’s employer survey, 61% of respondents indicated hiring and recruitment as a concern, while 33% mentioned retention and turnover rates when asked about difficulties they faced regarding their ICT human resources management (Figure 7).

Interviewees described their challenges related to finding personnel with the right mix of skills and experience. Several expressed that strong talent emerged from English-speaking universities but moved to other provinces after graduation. As one employer commented, “You’re not going to learn French while you’re at McGill. It’s just not going to

happen. So if [recent graduates] feel they’re not welcome, [they] just move to Toronto.”

To address this gap, several interviewees recommended integrating more accessible and flexible French language learning programs at Québec universities. “I think the province is losing out on great minds. I think it’s a weakness for Québec, definitely, although I do want to reiterate that I understand where the French requirement is coming from. So I’m not saying that the requirement should not be there, but I think the province should better support people in learning French while they work,” one employer shared. Another interviewee requested greater leniency for new hires, which would allow the hires to “start a job without the [French] proficiency,” but receive “training alongside it. And then the requirement is that after two years you speak French [well enough for professional settings].”

What difficulties, if any, do you experience in terms of ICT workforce management? Please select all that apply.

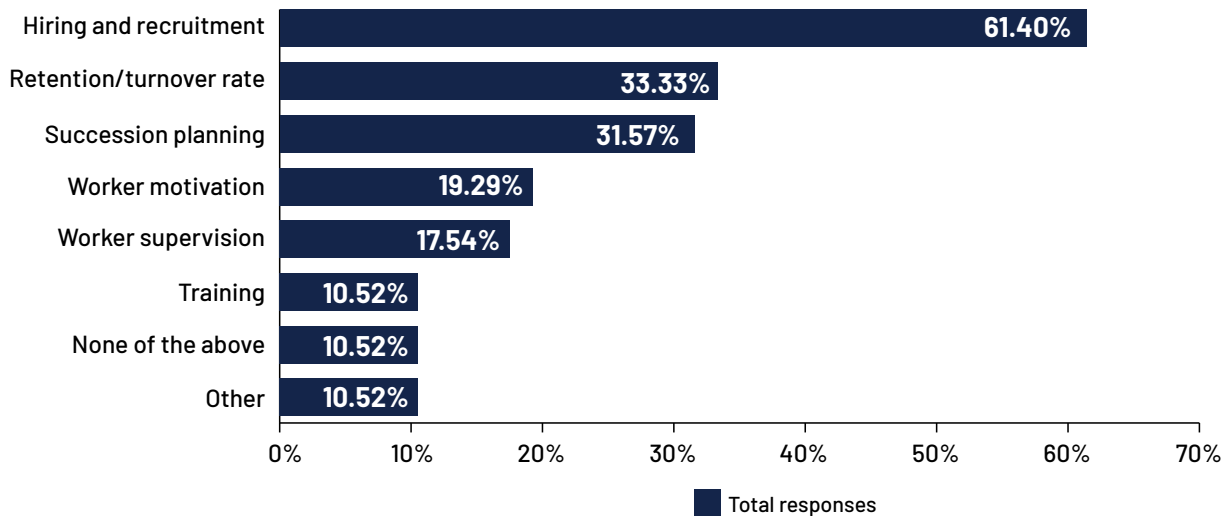


Figure 7. Data reflects answers to the following question: “What difficulties, if any, do you experience in terms of ICT workforce management? Please select all that apply.” Source: ICTC Québec Digital Economy Employer Survey (n=57).

SECTION II:

IN-DEMAND JOBS, SKILLS, AND EXPERIENCE IN THE QUÉBEC DIGITAL ECONOMY

Key Findings

- › In addition to technical proficiencies like programming languages and cloud infrastructure, cybersecurity, artificial intelligence, and data management capabilities are growing in importance.
- › Software engineering and programming jobs make up nearly 30% of Québec's digital economy postings.
- › Soft skills such as critical thinking, bilingual communication, and problem solving are essential parts of the skill sets needed for digital technology roles in Québec.
- › Despite Québec's strong talent pool, employers face difficulties recruiting individuals with a mix of specialized technical skills, the necessary soft skills, and business acumen.

To understand in-demand jobs, skills, and experience in Québec's digital economy, ICTC conducted a survey that explored hiring plans for core digital economy roles in Québec. Québec-based technology employers, including senior executives and HR specialists, responded to the survey, which focused on IT services, cybersecurity, big data and analytics, fintech, and automation and robotics.

Survey data was complemented by a web scraping analysis of Vicinity Jobs, a labour market database that collects data on job postings across Canada and can be analyzed to provide insights into top jobs, skills, and experience required by employers in Québec. To better understand nuances in labour market demand, qualitative insights were gathered from key informant interviews (n=11) with experts, ICT employers, and post-secondary institutions. This data is elaborated upon below to provide robust insights into the demand for digital economy roles, skills, and experience in Québec

In-Demand Jobs

Employers surveyed for this study were asked to describe their hiring plans for key digital economy roles in Québec. This included selecting which roles they planned to hire for, which roles they wouldn't be hiring, which roles they planned to cut, and which roles weren't applicable to their organization ([Figure 8](#)).

The top role that employers planned to hire for in the coming year was software developer (e.g., software developer, full-stack developer, back-end developer, AI developer, DevOps engineer, computer programmer, game developer, mobile developer), with over 60% of surveyed employers reporting that they will be increasing the number of software developers in their companies over the next year.

Following software developers, other roles that were in high demand included sales roles



(product specialist, solutions engineer, sales executive, account manager, sales analyst), design roles (product designer, user experience (UX) designer, user interface (UI) designer), and cybersecurity roles (IT security analyst, network security engineer, information security analyst, information security engineer, cybersecurity specialist, computer forensic investigator)(see Figure 8, below).

Roles in software, sales, and cybersecurity were similarly highlighted by interviewees as being in high demand in Québec's digital economy. As explained by one Québec-based employer, "For us, the most in-demand roles are full-stack developers or DevOps. I would say that, in the past two years, those two positions have had the highest number of job postings and the most in-demand skills for us." Another employer in Montréal pointed out that programmers, in general, were the most in demand for their company.

Besides developer roles, employers identified a significant need for skilled business, sales, and marketing professionals to assist in scaling and growing their operations. Cybersecurity was also noted as an increasingly crucial role, vital for safeguarding IT infrastructure, privacy, and proprietary data at both the business and ecosystem levels.

An analysis of job postings from 2024 reveals that software engineers, designers, software developers, and programmers are the most in-demand roles in the digital economy in Québec. These software-related roles collectively account for over one-quarter (29.60%) of all digital economy job postings advertised in Québec in 2024. Following these software positions, Québec experienced a significant number of job postings for information systems specialists, business systems specialists, and computer network and web technicians in 2024.

Employer Survey: Hiring Plans for Core Digital Economy Roles

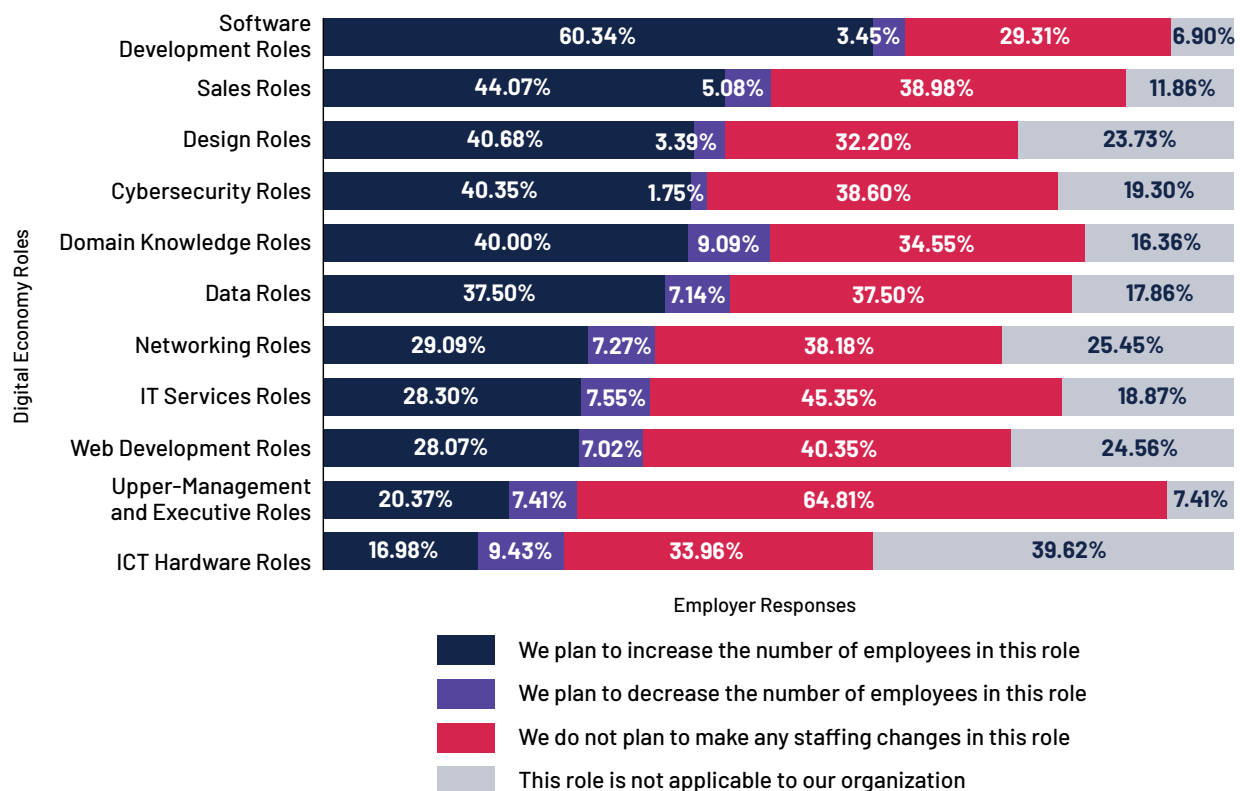


Figure 8. Québec digital economy employer hiring plans for core occupations over the next year. Employers were asked to consider their hiring plans for the next year (2024–2025) and to consider all seniority levels, including entry-level, mid-level, senior-level, and management-level positions. Source: ICTC Québec Digital Economy Employer Survey (n=60).

Top Digital Economy Job Postings in Québec

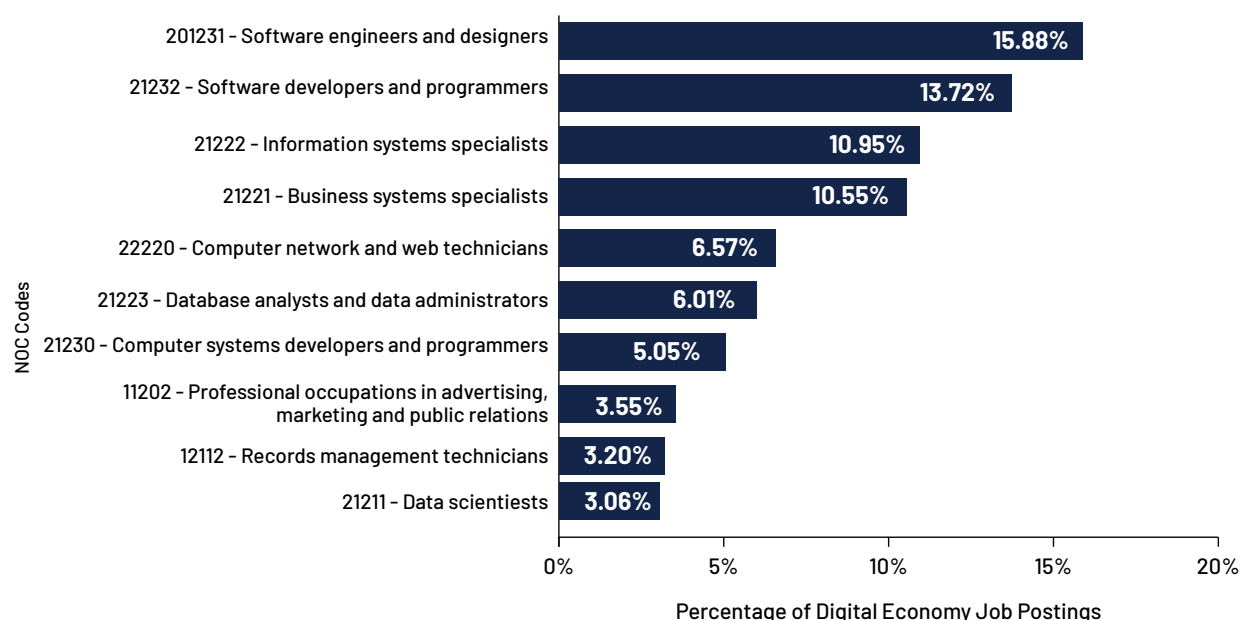


Figure 9. The top 10 technology jobs in Québec from January 1, 2024, to December 31, 2024, according to web scraping analysis of data from Vicinity Jobs. Job postings have been classified into National Occupational Classification (NOC 2021) codes grouped into the digital economy, as per ICTC's definition of digital economy. Source: Vicinity Jobs; ICTC analysis.

Software development roles are evidently in high demand across Québec. Despite this demand, employers do not report significant difficulty in finding skilled software developers in the province. As an employer at a software-as-a-service firm in Montréal detailed, "In general, we have an OK time finding people for developer roles. It's not very easy, but it's not hard either." Similar findings were reflected in ICTC's employer survey, with approximately one-third of employers indicating that it is "neither difficult nor easy," "somewhat easy," or "very easy" to find skilled software developers (see [Figure 10](#)).

Among the core digital economy roles presented to employers, those that were reported to be the most difficult to find include upper management and executive positions, domain knowledge experts, cybersecurity specialists, and design professionals ([Figure 10](#)).

Generally, individuals in these roles possess more experience and knowledge, and are often regarded as seasoned technology experts. Given the extensive experience required for these positions, it is not surprising that they are more challenging to fill.

Surveyed employers considered sales roles to be "somewhat difficult" to find (42%), and interviewees in this study concurred that it is quite difficult to locate individuals who can effectively market, sell, and commercialize technology. Employers highlighted that these roles are especially hard to fill due to their interdisciplinary nature, which demands a blend of technical expertise and business acumen. The need for interdisciplinary skill sets is further examined in the next section.

Employer Survey: Ease and Difficulty of Finding Employees with the Right Mix of Skills

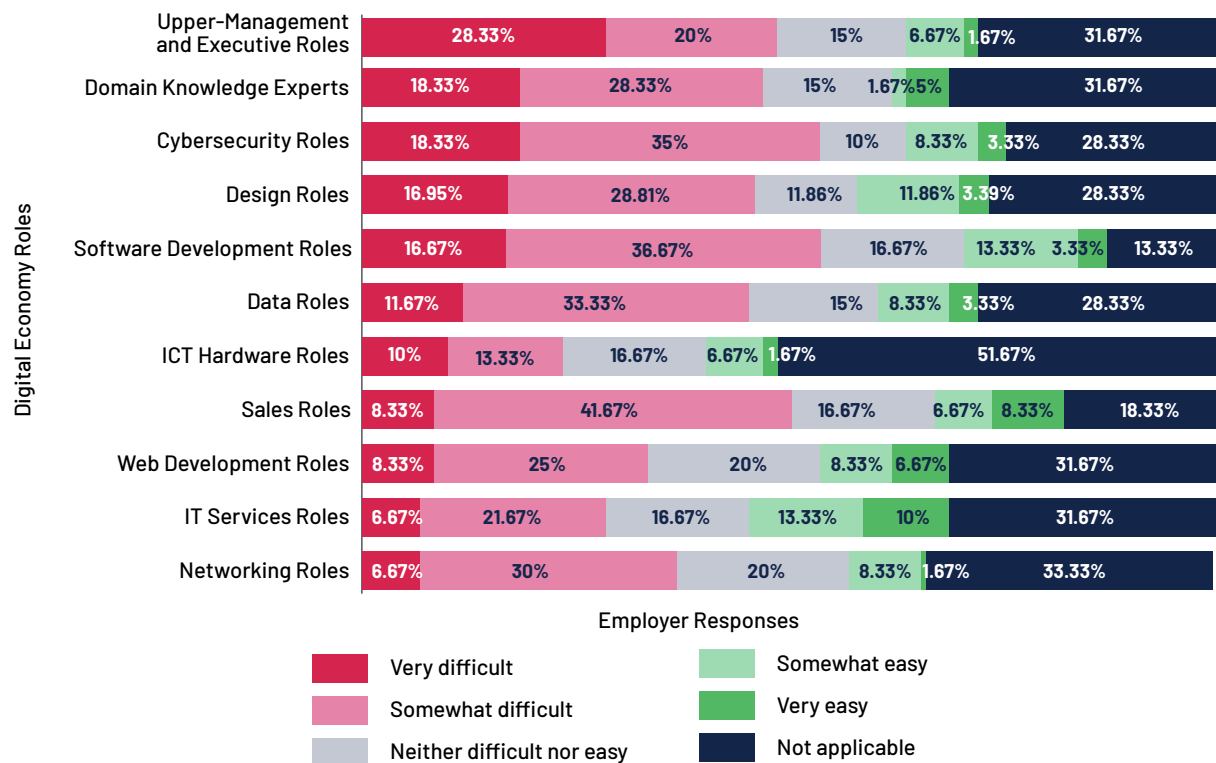


Figure 10. The ease and difficulty Québec employers have finding employees with the right mix of skills for core digital economy roles. Employers were asked to consider all seniority levels, including entry-level, mid-level, senior-level, and management-level positions. Source: ICTC Québec Digital Economy Employer Survey (n=60).

In-Demand Skills

Technical Skills

Technical skill sets are the foundation of the digital economy. Interviewees in this study detailed that general digital literacy—understanding how to build, operate, and manage hardware and software—is important for all digital economy workers. This is true for digital economy workers in technical roles, such as software developers, data scientists, and IT service workers, as well as workers in non-technical roles, such as HR and administration.

Given the increasingly important role of software in the global economy, especially in the digital economy, demand for software skills is growing. Since software developers and programmers are in demand in Québec, it is unsurprising that knowledge of programming languages (e.g., Python, JavaScript, Java, C++, SQL) was ranked by 80% of surveyed employers as the most important skill for entry-level hires (see Figure 11). Cloud/

server infrastructure tools (e.g., AWS, Azure, Kubernetes, Docker, Jenkins) were also ranked as highly important, with 56% of employers indicating that this is an important software skill set for entry-level talent to possess.

According to a recent study by Randstad, the demand for cloud roles in Canada has grown by 215% since 2015, as many organizations and institutions have shifted to a cloud-based environment.⁵⁸ Employers interviewed for this study noted that the demand for cloud roles and cloud computing skills is indeed increasing in Québec. Some employers cited a skills gap in cloud computing and other cloud skill sets.

Other software tools and skills noted by surveyed employers as important included Office software (e.g., Word, PowerPoint, Excel, Outlook, Teams), version control software (e.g., Git, GitHub, GitLab), and large language model software (e.g., ChatGPT, Gemini, Copilot) (see Figure 11 below).

Employer Survey: Software Skills

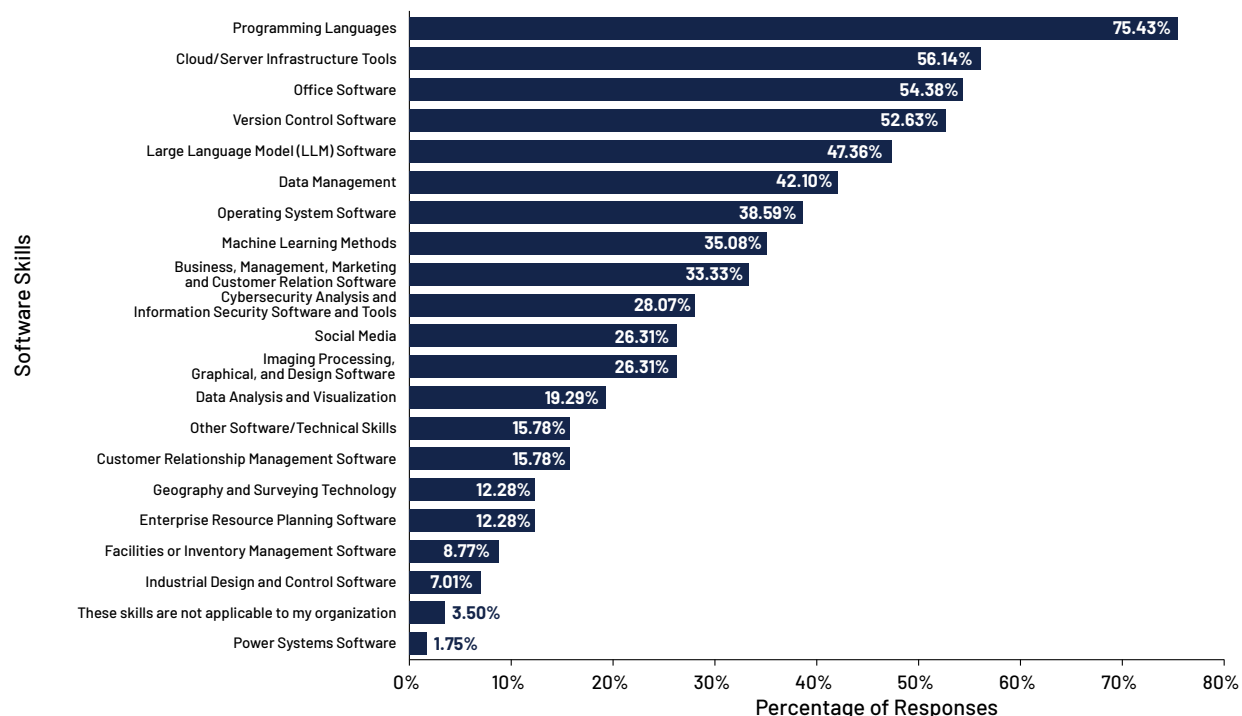


Figure 11. The importance of software skills to Québec digital economy employers. Data reflects answers to the following question: “Reflecting on your organization’s skills needs, which of the following software skills are important for entry-level employees to possess? Please select all that apply.” Source: ICTC Québec Digital Economy Employer Survey (n=60).

⁵⁸ “Training up-and-coming talent: the ideal solution to cloud talent scarcity,” Randstad, March 8, 2021, <https://www.randstad.ca/employers/workplace-insights/corporate-culture/training-talent-to-counter-cloud-talent-scarcity/>.

Findings from ICTC’s employer survey were corroborated by a web scraping analysis of digital economy job postings in Québec (Figure 12). This analysis revealed that knowledge of cloud and server infrastructure tools and programming languages was the most frequently mentioned skill requirement in Québec-based job postings. The demand for specific programming languages

varied by role; however, the most common languages requested in Québec included structured query language (SQL), Python, C#, and Java. For cloud skill sets, the most commonly selected area was an understanding of cloud computing, followed by knowledge of Microsoft Azure and Amazon Web Services (AWS).

Top Software Skills Mentioned in Québec Digital Economy Job Postings

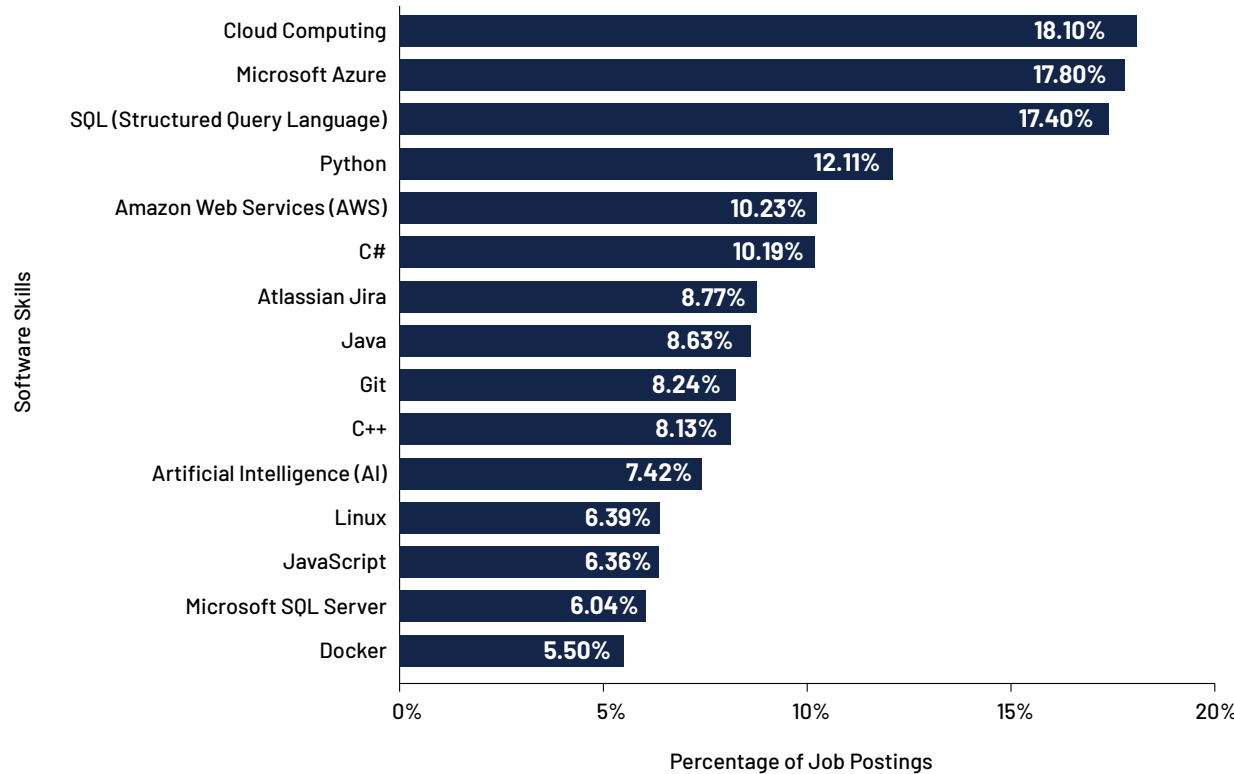


Figure 12. Top software skill sets and knowledge from January 1, 2024, to December 31, 2024, ranked by the percentage of digital economy job postings they are mentioned in. Source: Vicinity Jobs; ICTC analysis.

In addition to software skills, employers interviewed for this study highlighted a growing demand for broader data skills. One employer from Québec City emphasized that data skills are becoming increasingly crucial as industries undergo digitalization. “Customers aren’t just customers anymore; they are now part of a database ... and people think digital marketing is just SEO [search engine optimization], or that sales is still done by phone. But it’s not anymore.” This interviewee further expressed that the tech ecosystem in Québec is “missing data knowledge,” including how to collect, manage, analyze, and interpret data while also ensuring that it is securely stored and protected from breaches.

Similarly, ICTC’s employer survey revealed that 42% of employers in Québec require entry-level hires to have strong knowledge of data management software, such as SQL Server, Oracle, Spark, and Hadoop. Moreover, 19% of these employers noted that entry-level hires should know data analysis and visualization software, such as Matlab, R, Stata, SPSS, and Tableau. These skill sets were also frequently mentioned in digital economy job postings analyzed for this study (see [Figure 12](#), above).

In addition to the common technical skills mentioned above, knowledge of AI is an increasingly important technical skill set in Québec’s digital economy. Furthermore, data from Vicinity Jobs indicates that AI knowledge was mentioned in 7.4% of job postings in Québec’s digital economy in 2024, marking a 2% increase from the previous year (5.3%). AI tools like ChatGPT, Google Gemini, and Copilot experienced greater adoption rates in 2024 and are becoming more influential in the global technology ecosystem. Interviewees involved in this study noted that they anticipate an increase in AI adoption in Québec over the next few years and, consequently, predict that the demand for AI-related skill sets will rise.

Interviewers also asked employers about the demand for hardware skills but discovered that these skills were not applicable to 74% of those surveyed. Among the 25% of employers who indicated a demand for hardware skills in their organizations, the top skill set was “installing or programming computer hardware, machines, or instrumentation software in microprocessor-

based systems.” Additionally, hardware skills were less prevalent in job postings within the digital economy, possibly due to the higher number of software and IT services firms and practitioners in the ICT sector in Québec, which rely more on software skills than hardware skills.

Business Skills

While technical skills are and will continue to be in demand in the digital economy, interviewees engaged in this study felt that the most significant skills gap in the Québec digital economy is in business skills. Essential business skill sets included those related to sales, marketing, and commercialization. Interviewees from various subsectors in the Québec digital economy, including video games, financial technology, and software as a service (SaaS), agreed that these skills are crucial to the growth and success of the digital economy, yet are very challenging to find in the labour market.

“If you go back like two or three years, technology was high on the list. Everybody was searching for coders, developers.... This has died down. I don’t have any of my companies looking for technology or developer-type people. What we see is people looking to build sales teams.... And in Canada, one of the main problems we have in any startup is that commercialization is really, really hard.... That’s why they need salespeople that can sell to big businesses. They need salespeople that can cover a lot of ground.... And we’re having a lot of difficulty finding that talent.”

– Employer

In the digital economy, individuals working in business need to be multidisciplinary. Interviewees explained that those in sales, marketing, and commercialization must possess a deep understanding of technology ecosystems, market trends, and how technology functions, as well as the ability to communicate this information clearly to stakeholders like investors, clients, and customers. According to interviewees, this multidisciplinary skill set is quite difficult to find. As one employer in Montréal detailed, “We have a hard time finding people who understand tech and understand business.” An industry leader in the creative technology sector pointed out that this is especially true for small tech companies, such



as video game studios, where the founder may be technically skilled but is neither “equipped nor interested” in the business or marketing aspects. This interviewee emphasized that training more businesspeople is critical so that the innovative technologies and intellectual property developed in Québec can thrive locally rather than being sold to foreign entities. They noted that **enhancing business skills in Québec is essential for retaining intellectual property, generating financial returns, and supporting a thriving economy.**

Soft Skills and Language Skills

Regardless of how digital workplaces evolve, social-emotional or “soft” skills remain in high demand. Employers interviewed for this study noted that critical thinking and problem-solving skills are increasingly vital. One interviewee from a software development firm emphasized that finding developers who can think critically is more crucial now than ever, partly due to the adoption of generative AI tools. This interviewee explained that while AI tools are advantageous, technology

workers must be able to critically assess AI output and not accept ideas found online or from AI at face value.

The demand for soft skills in Québec’s digital economy is corroborated by job postings analyzed for this study (see Figure 13). Fifty-seven per cent of digital economy jobs posted in 2024 listed “teamwork” as a top social-emotional skill set. Next, one-third of job postings (33.33%) listed communication skills as in-demand, and roughly a quarter of job postings noted “bilingualism” as an important skill set (25.6%).

Effective communication in both French and English is an essential skill in Québec. As French is the province’s official first language, and English is the global language of business, Québec employers desire bilingual talent. Some research suggests that bilingualism is particularly important for client-facing roles in Canada and less so for technology roles.⁵⁹ However, Québec employers interviewed for this study said that bilingualism is important for all roles in the digital economy, client-facing or otherwise.

Top Soft Skills Mentioned in Québec Digital Economy Job Postings

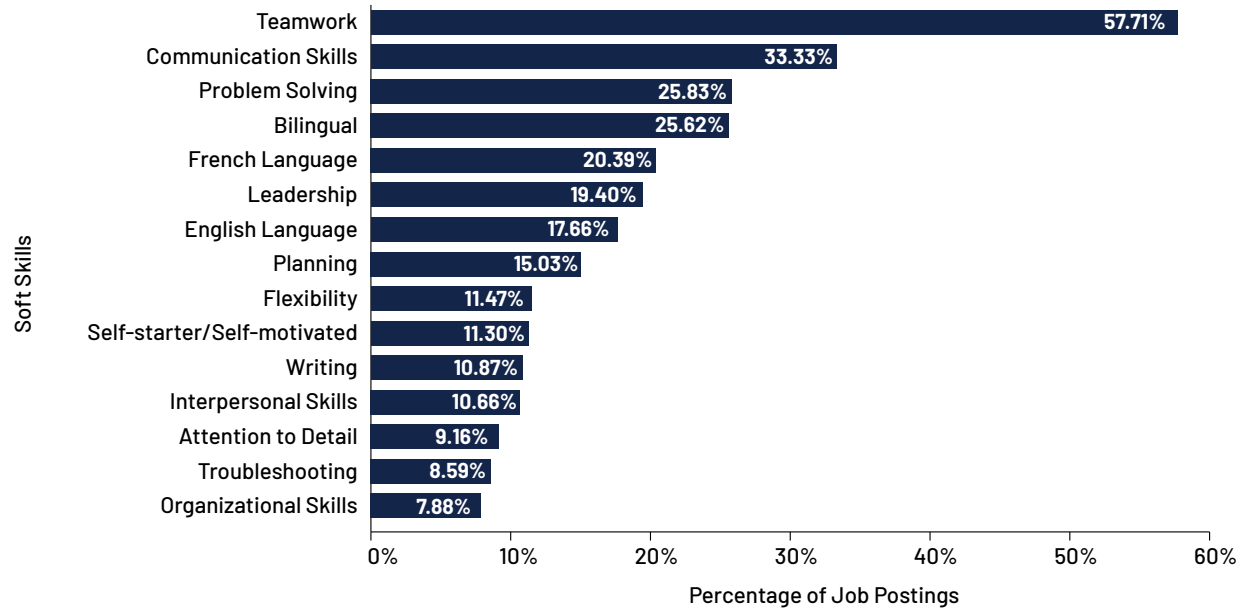


Figure 13. Soft skills, also known as social-emotional skills, ranked by the percentage of digital economy job postings they were mentioned in from January 1, 2024, to December 31, 2024. Source: Vicinity Jobs; ICTC analysis.

⁵⁹ Erik Henningsmoen and Faun Rice, “Mapping Career Pathways for Ontario’s Francophone and Bilingual Workforce Insights for Post-Secondaries, Employers, and Students,” Information and Communications Technology Council, August 2022, <https://ictc-ctic.ca/reports/mapping-career-pathways-for-ontarios-francophone-and-bilingual-workforce>.



In-Demand Experience

Information gathered from interviewees and an analysis of available databases reveals that Québec has an excellent talent pool to draw from.⁶⁰ As detailed in Section 1 of this report, ICT unemployment rates in Québec have been steadily rising, implying that some ICT workers are having difficulties finding work.⁶¹ Interviewees engaged for this study explained that, due to a surplus of skilled ICT talent in Québec, employers can afford to be more selective in their hiring. This ability to choose top talent from the available pool thus raises employer standards for new hires.

Interviewees explained that in a competitive labour market, having relevant experience significantly

contributes to getting noticed and securing a role. Regarding educational qualifications, most employers require some form of post-secondary education, with 30% of job postings asking for an undergraduate degree, 23% requesting a college diploma or certification, and 2% requiring a graduate degree (master's or PhD).⁶²

However, despite the necessity of post-secondary education for new entrants to Québec's ICT workforce, due to a highly competitive job market in which employers are more carefully selecting for multidisciplinary skill sets, students and new entrants must acquire real-world professional experience. As the next section will explore, work-integrated learning is a great way to bridge this gap.

⁶⁰ Vicinity Jobs and Statistics Canada Labour Force Survey

⁶¹ Statistics Canada Labour Force Survey; ICTC analysis, 2024.

⁶² Vicinity Jobs; ICTC analysis, 2024.

SECTION III:

ENHANCING AND SUSTAINING QUÉBEC'S DIGITAL ECONOMY

Key Findings

- › Work-integrated learning (WIL) fosters growth in Québec's digital economy by offering students hands-on experiences that connect academic training with real-world competencies while also giving employers access to a well-prepared and well-rounded talent pool.
- › WIL placements improve students' technical and soft skills while offering employers a cost-effective means of evaluating and onboarding skilled talent. This reduces the uncertainty typically associated with hiring recent graduates.
- › Seventy-four percent of surveyed Québec tech sector employers who had hosted WIL students either agreed or strongly agreed that they participated to help develop their industry's workforce.
- › Employers who hosted WIL students found WIL programs beneficial for workforce development and effective as extended interviews with potential new hires.
- › Employers are not yet broadly adopting WIL opportunities due to limited awareness of subsidy programs and concerns regarding supervisory costs.
- › Raising awareness of WIL subsidies and simplifying application processes can enable Québec companies to more easily cultivate the experienced talent necessary for maintaining a competitive digital economy.

This section examines the impacts of WIL on student and employer outcomes and discusses the importance of WIL programs in strengthening and maintaining Québec's digital economy. It draws on findings from a national survey of alumni from ICTC's WIL program, who received a wage subsidy from ICTC to complete a work placement in the digital economy during their post-secondary training. Additionally, this section incorporates

findings from ICTC's employer survey, which asked Québec digital economy employers if they had participated in a WIL program, what motivated them to do so, and how hosting a student affected business outcomes and objectives. Survey data is supported by insights from interviews and secondary literature on the role of WIL in enhancing workforce capacity in Québec and beyond.

⁶³ "Work Integrated Learning (WIL) Digital," Information and Communications Technology Council, accessed February 26, 2025, <https://etalentcanada.ca/for-employers/programs/work-integrated-learning-wil-digital>.

Enhancing Workforce Capacity in Québec Through Work-Integrated Learning

Work-integrated learning is a vital tool for workforce development. WIL is a form of experiential learning that bridges the gap between academic theory and professional practice. These programs typically include structured learning through work placements for students, such as co-ops, internships, and apprenticeships, and are designed to foster collaboration between industry and post-secondary institutions.⁶⁴ Given their collaborative nature, WIL programs provide benefits to both students and employers in the digital economy and beyond. WIL is a fundamental aspect of workforce development in Québec, and recent research on ecosystem development in Québec's technology sector recommends utilizing mechanisms like WIL to strengthen relationships between educational institutions and industry.⁶⁵

Student Experiences with Work Integrated Learning

In a competitive job market, students must distinguish themselves through additional qualifications, such as relevant experience that develops in-demand skills and competencies. WIL

programs provide students with an opportunity to achieve this. The impacts of WIL on key areas of professional development and growth, reported by students who participated in ICTC's WIL program, are significant and multi-faceted.

Approximately two-thirds (63%) of surveyed respondents noted that one of the main advantages of their WIL experience was the opportunity to explore different career paths and work environments to determine if they aligned with their long-term career goals (**Figure 14**).

Even in specialized fields like computer science, various career opportunities are available after graduation. Students reported that co-ops and internships helped them identify paths that best matched their interests and skills. Moreover, survey responses reveal that the program assisted students in enhancing their technical skills (62%) as well as their soft skills (60%). Other notable outcomes included better preparation for job interviews (57%), acquiring the work experience necessary to qualify for post-graduation roles (53%), improving adaptability (48%), and building connections with potential future employers (31%).

⁶⁴ Co-operative Education and Work-Integrated Learning Canada, "What is Work-integrated Learning (WIL)?," November 3, 2021, <https://cewilcanada.ca/CEWIL/CEWIL/About-Us/Work-Integrated-Learning.aspx>.

⁶⁵ "Vers un Québec Innovant," Conseil de l'innovation du Québec, April 2024, <https://conseilinnovation.quebec/rapport-vers-un-quebec-innovant/>.



I believe that work-integrated learning (WIL) experience (all internships, co-ops, etc.) during my degree had the following impacts. Please select all that apply.

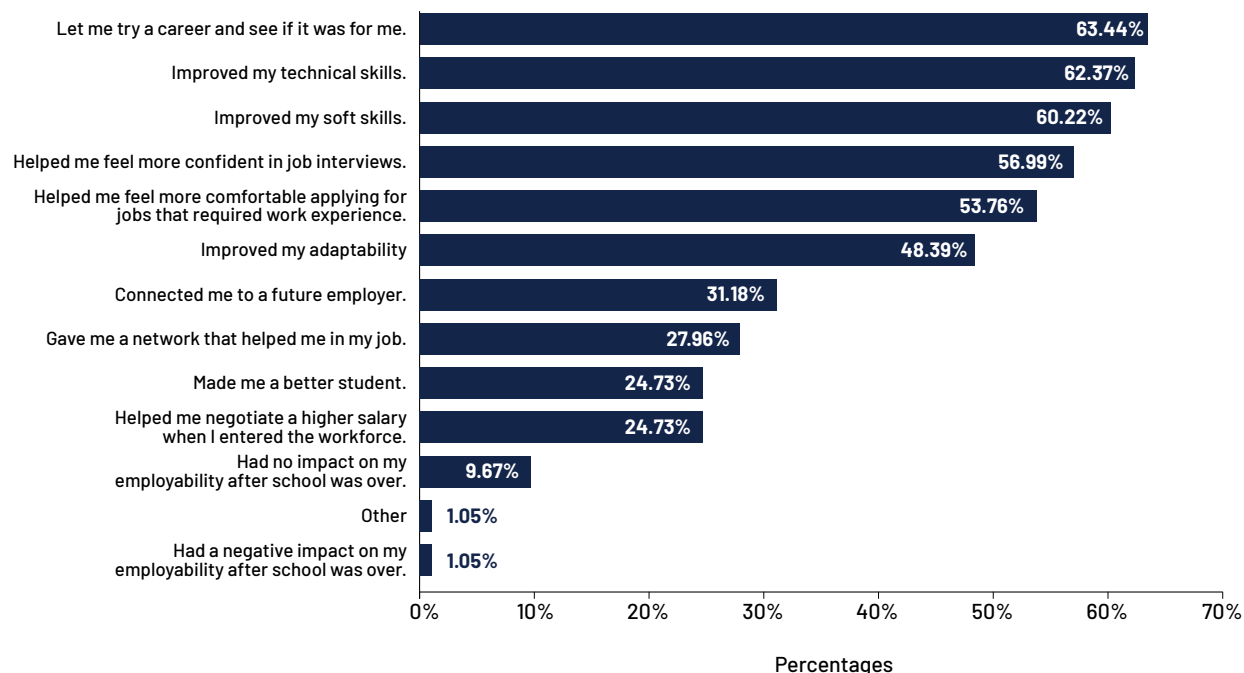


Figure 14. Impacts of WIL on key areas of professional development and growth for students. Source: ICTC WIL Alumni Survey (n=189).

The interviewees involved in this study concurred that WIL programs are an essential component of a student's learning journey. A Montréal-based tech employer highlighted the disparity between education and industry expectations, stating that "co-op placements prepare students for the workforce by helping them understand professional expectations, such as communication, meeting deadlines, and working with diverse teams." This employer stressed that these experiences are vital for equipping students with skills that differ from those developed in academic settings, ensuring they are workforce-ready upon graduation. An interviewee noted that WIL programs like internships and co-op placements offer significant benefits for both students and employers.

Another interviewee emphasized that WIL helps students acquire valuable experience beyond technical skills, stating, "It's not just about competencies; it's about experience gained during training, especially through internships." They stressed that internships offer a route to

employment that attracts employers and advised students to prioritize programs with strong practical components, like project management and teamwork, to develop desirable skills.

Indeed, employer perceptions regarding skill development in work placements help students secure employment after graduation. Over half (56%) of the WIL alumni surveyed for this study attained full-time, permanent employment immediately after graduation, while an additional 14% obtained full-time contract positions ([Figure 15](#)).

Similarly, 33.5% of respondents were able to secure roles with the same employer they worked for during their ICTC work placement, and an additional 6% found employment with an employer they had known from a previous WIL experience ([Figure 16](#)). Furthermore, 25.4% of the surveyed WIL alumni reported securing positions with other employers by leveraging the skills they gained during the WIL program. These findings highlight the significant impact WIL programs have on student employment outcomes ([Figure 16](#)).

Please select the answer that best applies to your employment experience right after graduation. After graduating from my post-secondary program, I:

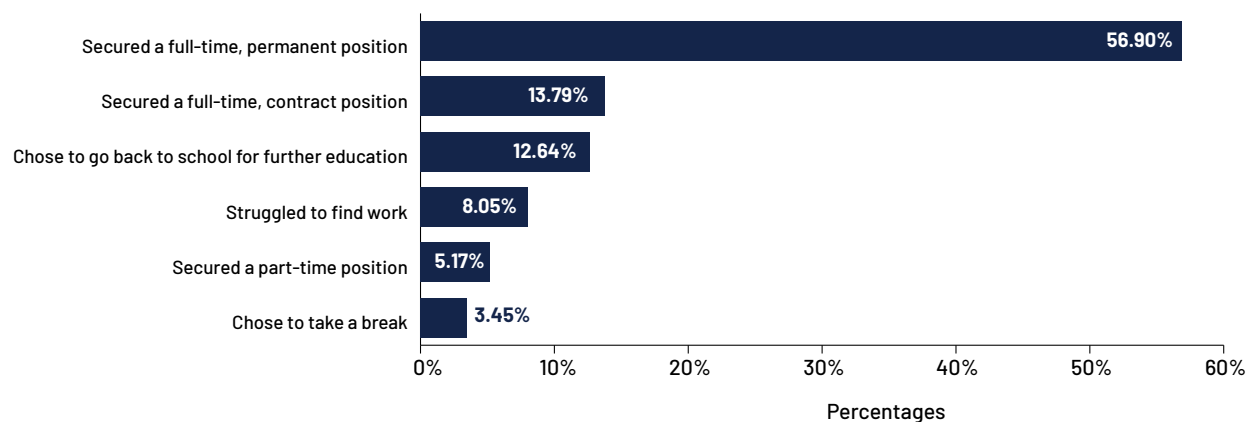


Figure 15. Alumni experiences finding employment following their post-secondary degrees. Source: ICTC WIL Alumni Survey (n=174).

Please select the answer that best applies to your employment experience right after graduation. After graduating from my post-secondary program, I:

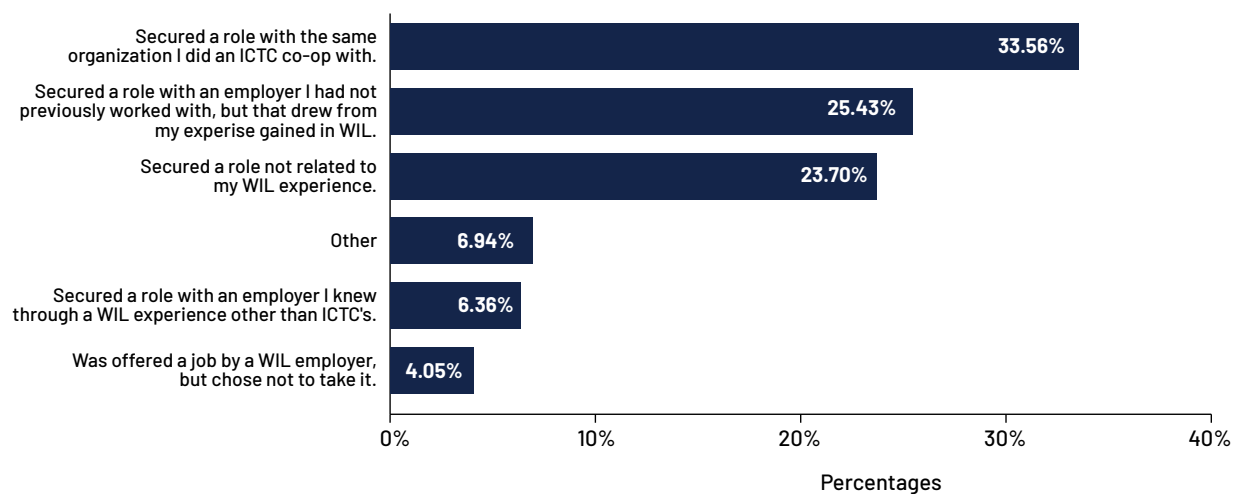


Figure 16. Alumni employment experiences following their post-secondary degrees. Source: ICTC WIL Alumni Survey (n=173).

In addition to the evaluation of ICTC WIL alumni, ICTC conducted a national assessment of the Student Work Placement Program (SWPP) in 2023, which compared SWPP WIL participants with other Canadian students in the same majors and fields of study. According to the 2023 ICTC SWPP evaluation, students who participated in WIL programs through SWPP were more optimistic about their future job prospects and were more likely to enjoy their academic programs.⁶⁶ Furthermore, these students reported a greater likelihood of graduating without debt compared to non-SWPP participants.⁶⁷ Interestingly, SWPP students were also less inclined to pursue further education after graduation, possibly due to their positive work experiences or the jobs they secured following their placements.⁶⁸

In 2021, ICTC conducted a similar assessment of SWPP's impacts on students, which also disaggregated findings by language group (anglophone versus francophone). The analysis

revealed that francophone students expected to earn \$15/hour without SWPP funding, compared to \$22/hour for their anglophone counterparts.⁶⁹ However, francophone students were more likely to turn their SWPP placement into a job offer, with 61% achieving this compared to 47% of anglophone students.⁷⁰ Overall, SWPP participation helped francophone students gain more from the program than their anglophone peers, as they were more likely to receive job offers and because they faced greater economic disadvantages without the program.⁷¹

WIL programs play a significant role in helping graduates transition smoothly into the workforce. These programs have been shown to enhance employment outcomes, including income levels, job stability, and alignment between a graduate's occupation and field of study. By providing practical, hands-on experience, WIL allows students to better position themselves in the job market after completing their education.

⁶⁶ Alexandra Cutean, Letitia Henville, and Faun Rice, "The Impact of Work-Integrated Learning on Student Success and the Canadian Economy: A Case Study of Canada's Student Work Placement Program (SWPP)," Information and Communications Technology Council, August 2023, <https://ictc-ctic.ca/reports/the-impact-of-workforce-integrated-learning-on-student-success-and-the-canadian-economy>.

⁶⁷ Ibid.

⁶⁸ Alexandra Cutean, Letitia Henville, and Faun Rice, "The Impact of Work-Integrated Learning on Student Success and the Canadian Economy: A Case Study of Canada's Student Work Placement Program (SWPP)," Information and Communications Technology Council, August 2023, <https://ictc-ctic.ca/reports/the-impact-of-workforce-integrated-learning-on-student-success-and-the-canadian-economy>.

⁶⁹ Idil Abdulahi, et al., "Assessing the Value of Canada's Student Work Placement Program for Students, Employers, and the Digital Economy," Information and Communications Technology Council, August 2021, <https://ictc-ctic.ca/reports/assessing-the-value-of-canadas-student-work-placement-program-for-students-employers-and-the-digital-economy>.

⁷⁰ Ibid.

⁷¹ Ibid.

Employer Experiences with Work Integrated Learning

Overall, respondents to the employer survey viewed WIL programs positively and recognized their impact on the competencies of recent graduates. These favourable perceptions highlight the significance of WIL as a benchmark of real-world experience that can distinguish recent graduates in an increasingly competitive labour market. Moreover, a clear majority of employers noted that WIL experiences enriched the resumes of recent graduates and enhanced both their soft and technical skills, indicating that WIL programs can address labour market skill demands by equipping recent graduates with the essential competencies needed to thrive in the workforce.

These positive perceptions were also evident in the percentage of employers who reported hiring recent graduates that had either completed a WIL experience with them or another employer (52%) (Figure 17).

Employers who hosted WIL students found WIL programs beneficial for workforce development and effective as extended interviews with potential new hires. Seventy-four per cent of respondents who had hosted WIL programs either agreed or strongly agreed that they participated to help develop their industry's workforce. Seventy-four per cent of respondents agreed or strongly agreed that they participated in WIL programs as a way to conduct extended interviews with students they might hire in the future.

Importantly, 51% of employers either agreed or strongly agreed that they participated in WIL due to the availability of subsidy funding (Figure 18). This outcome highlights that cost constitutes a significant barrier for some employers to engage in WIL programs, and WIL subsidies are instrumental in removing these financial obstacles. This finding underscores the significance of financial support mechanisms in encouraging greater employer participation in WIL programs.

Has your organization given a paid, full-time role to a student who formerly completed a co-op, internship, practicum, or other work-integrated-learning (WIL) placement?

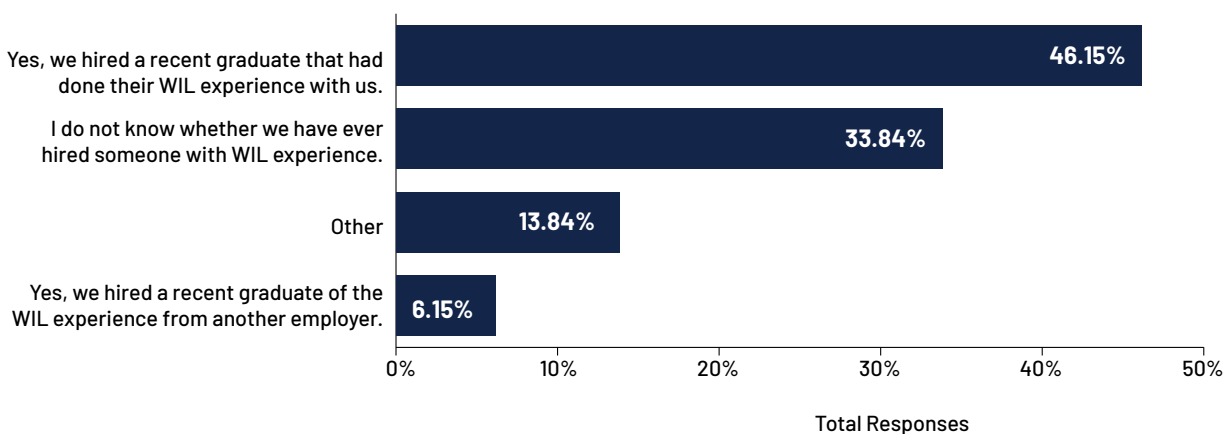


Figure 17. Data reflects answers to the following question: "Has your organization given a paid, full-time role to a student who formerly held a co-op, intern, practicum student, or other work-integrated-learning (WIL) placement?" Source: ICTC Québec Digital Economy Employer Survey (n=65).

Please rate the extent to which you agree with the following statements about work-integrated learning (co-ops, internships, practicums, for example).

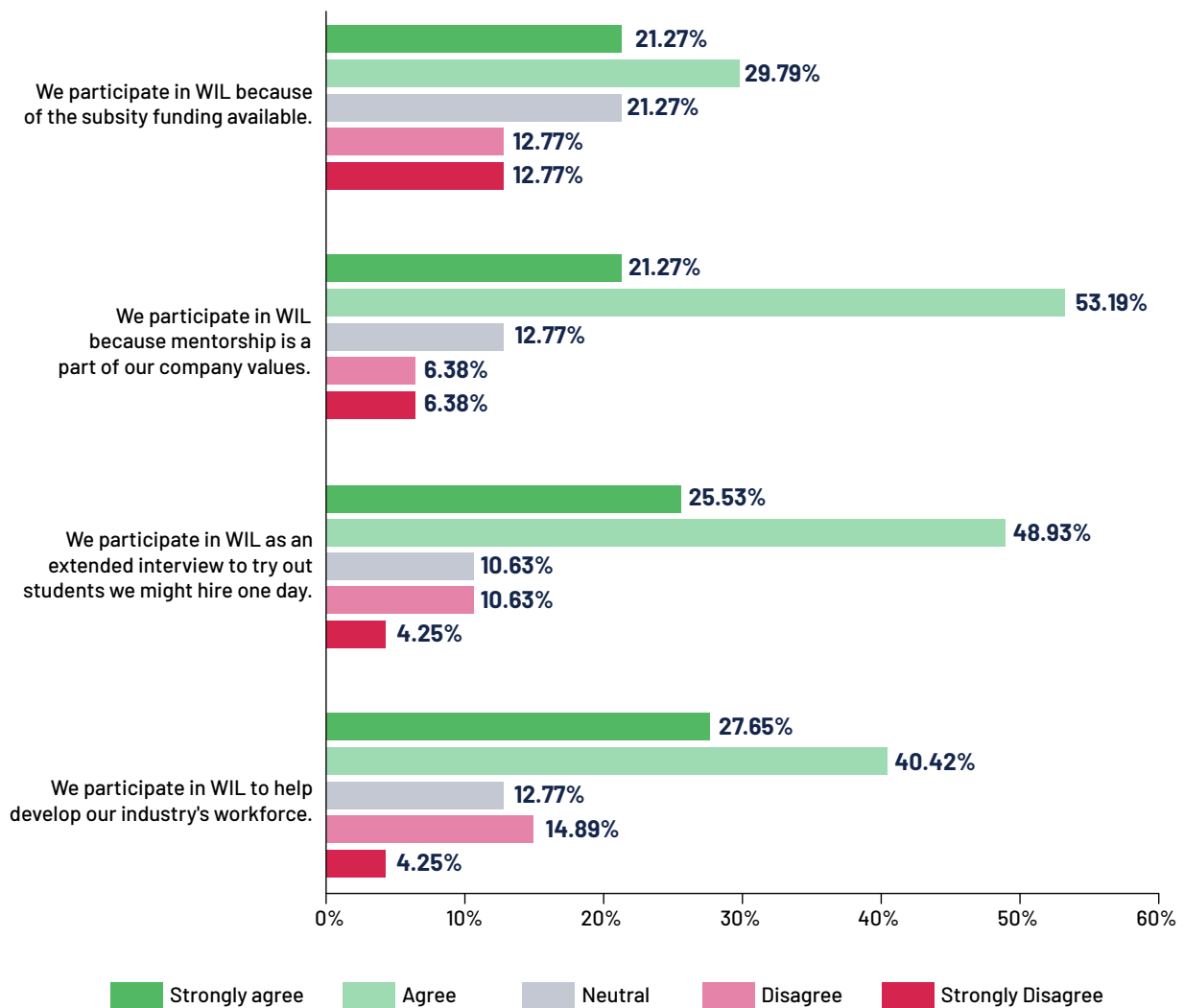


Figure 18. Data reflects answers to the following question: "Please rate the extent to which you agree with the following statements about work-integrated learning (co-ops, internships, practicums, for example)." Source: ICTC Québec Digital Economy Employer Survey (n=47).

Echoing the above findings, 76% of respondents to the employer survey agreed or strongly agreed that WIL provides graduates with stronger technical skills. Additionally, 81% of survey respondents agreed or strongly agreed that WIL experience enhances graduates' soft skills. 63% of employers disagreed or strongly disagreed

with the statement, "WIL experience on a resume does not make a difference to me." Furthermore, more than half of employers (52%) agreed or strongly agreed that WIL experience does not have to be perfectly related to their work; what is most important factor is that new hires have work experience (Figure 19).

Please rate the extent to which you agree with the following statements about work-integrated learning (co-ops, internships, practicums, for example).

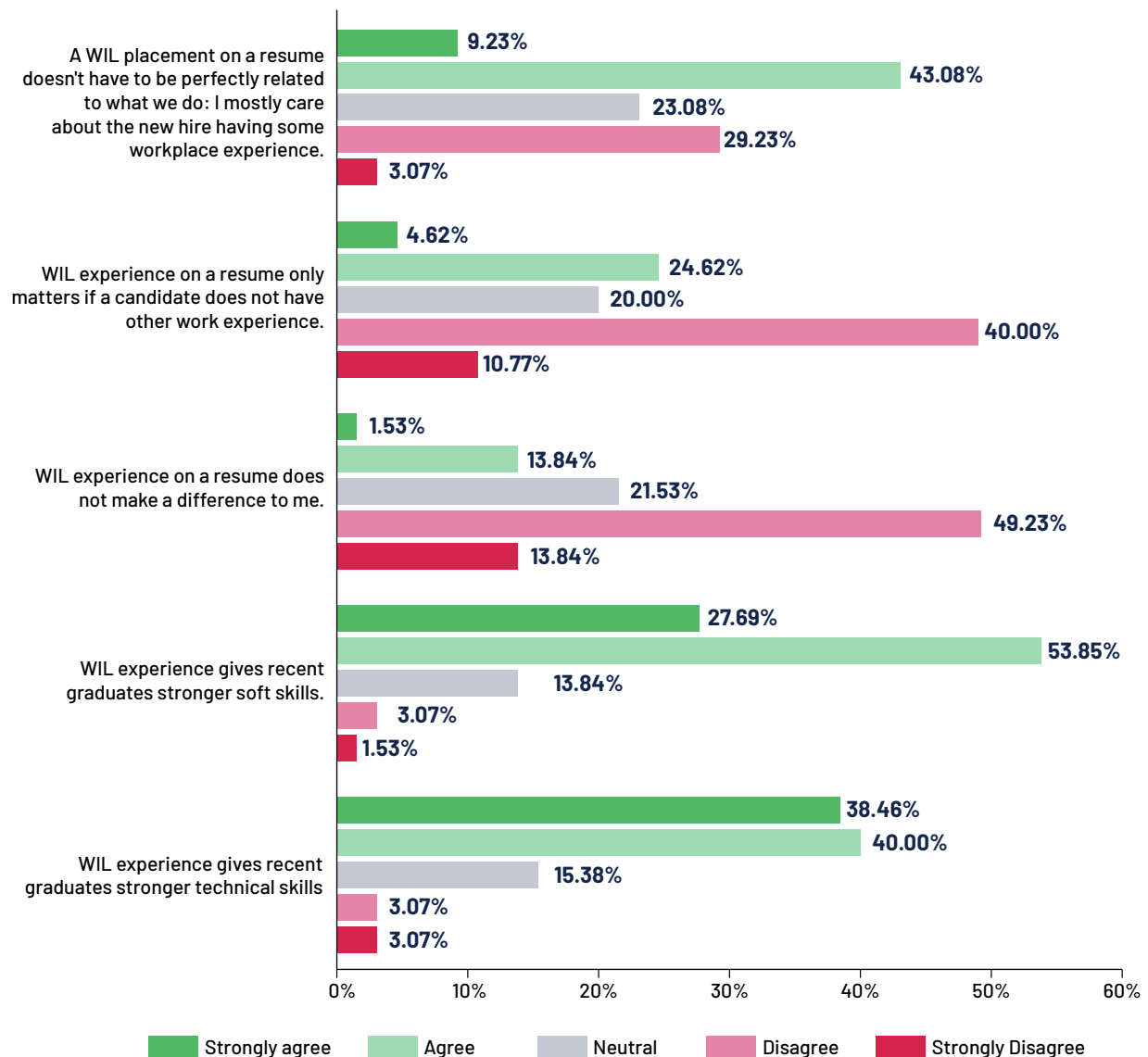


Figure 19. Data reflects answers to the following question: "Please rate the extent to which you agree with the following statements about work-integrated learning (co-ops, internships, practicums, for example)." Source: ICTC Québec Digital Economy Employer Survey (n=65).

One employer ICTC interviewed highlighted the benefits that WIL brings to companies, stating, “Hiring interns exposes us to new technologies and fresh approaches to software development.” This interviewee further explained that interns help improve organizational practices, such as onboarding processes, and enhance a company’s visibility on post-secondary campuses. Participating in job fairs alongside interns who advocate for the organization has positively influenced their company’s reputation among students and future job candidates.

Echoing these findings, ICTC’s 2023 assessment of the SWPP revealed that both students and employers reported significant economic benefits beyond the subsidies and salaries they received.⁷² Satisfaction levels were high, with 91.5% of employers and 92.1% of students rating their SWPP experience positively.⁷³ In addition to positive experiences, SWPP also delivers significant financial advantages to employers. Specifically, SWPP students generate an average of \$401 in added value per month through the work they complete. Furthermore, since April 2022, data from Orbis indicates that 8,311 employers participated in SWPP, totalling a net benefit of \$3.33 million per month.⁷⁴ The evaluation also found that during the COVID-19 pandemic, SWPP effectively supported small businesses within the digital economy, many of which were startups or early seed-stage companies with limited revenues.⁷⁵

Although employers were overwhelmingly positive when asked about their experiences with work-integrated learning, one-third (33%) of respondents who had not participated in WIL programs agreed or strongly agreed that they did not participate “because supervising students costs more than it is worth.” One-quarter of respondents strongly agreed or agreed that they did not participate in WIL programs due to their work being too technical for students, possibly

indicating negative perceptions of student competencies among some employers. Crucially, two-thirds (66%) of respondents who had not participated in WIL programs agreed or strongly agreed that their lack of participation stemmed from not being aware of financial support options for paying student salaries (Figure 20).

Some interviewees expressed similar views regarding work-integrated learning and the obstacles to its adoption. One interviewee noted that employers were not always satisfied with the performance of students engaged in WIL due to mismatched interests between industry and education, leading to differing expectations about graduate competencies. One interviewee from the post-secondary sector remarked, “Some employers were telling me, well, your students don’t have [the right] technical skills like Excel, Power BI, SRP, and Titan,” and added, “Employers were telling me the students know the concepts, but they don’t know how to use the software because they don’t learn that in university.... They don’t work with real tools.”

Some of these sentiments were also present in ICTC’s 2023 analysis of SWPP. Regarding employer barriers to participating in WIL, 55% of employers that took part in SWPP reported that time needed to supervise and train WIL students was a barrier to their participation. One-third (33%) of employers in other WIL programs reported that the underdevelopment of required skills was a barrier, and 20% indicated that participation in WIL was not a priority.⁷⁶

Raising awareness of WIL programs and simplifying access to financial support for employers is critical to increasing participation. Many employers are unaware of the subsidy programs or find the application process cumbersome and unclear. One interviewee noted the following when discussing the barriers

⁷² Alexandra Cutean, Letitia Henville, and Faun Rice, “The Impact of Workforce Integrated Learning on Student Success and the Canadian Economy: A Case Study of Canada’s Student Work Placement Program (SWPP),” Information and Communications Technology Council, August 2023, <https://ictc-ctic.ca/reports/the-impact-of-workforce-integrated-learning-on-student-success-and-the-canadian-economy>.

⁷³ Alexandra Cutean, Letitia Henville, and Faun Rice, “The Impact of Workforce Integrated Learning on Student Success and the Canadian Economy: A Case Study of Canada’s Student Work Placement Program (SWPP),” Information and Communications Technology Council, 2023: <https://ictc-ctic.ca/reports/the-impact-of-workforce-integrated-learning-on-student-success-and-the-canadian-economy>.

⁷⁴ Ibid.

⁷⁵ Ibid.

⁷⁶ Alexandra Cutean, Letitia Henville, and Faun Rice, “The Impact of Workforce Integrated Learning on Student Success and the Canadian Economy: A Case Study of Canada’s Student Work Placement Program (SWPP),” Information and Communications Technology Council, August 2023, <https://ictc-ctic.ca/reports/the-impact-of-workforce-integrated-learning-on-student-success-and-the-canadian-economy>.

Please rate the extent to which you agree or disagree with the following statements about work-integrated learning (co-ops, internships, practicums, for example).

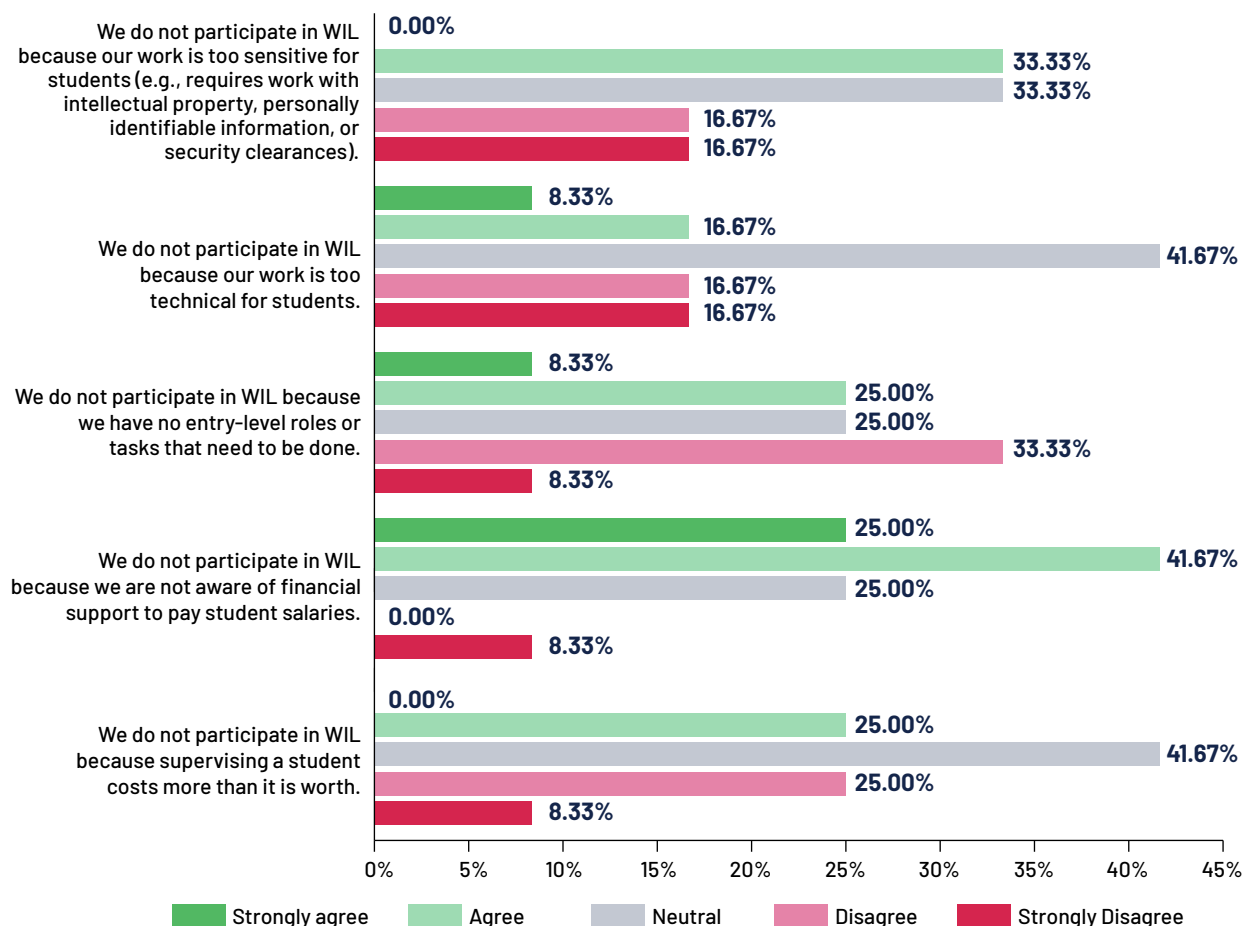


Figure 20. Data reflects answers to the following question: “Please rate the extent to which you agree with the following statements about work-integrated learning (co-ops, internships, practicums, for example).” Source: ICTC Québec Digital Economy Employer Survey (n=12).

and challenges to accessing WIL programs: “We had been on a waiting list for a while, and it was unclear whether we would be approved or not. The entire application process was long, and you [then] have to follow up all the time, so the approval process, it’s not the easiest.” This interviewee further explained that even locating WIL subsidy programs was difficult, stating they had discovered “the link on a university website for student careers, but it wasn’t presented as a program from the government. It was just a link—it wasn’t clear.”

Overall, survey findings and secondary data indicate that WIL is a significant driver of workforce development in Québec. Additionally, the survey results demonstrate that employers utilize WIL placements to evaluate the skills

and suitability of potential employees, thereby reducing the risks associated with recruitment. Furthermore, it’s important to highlight that while workforce development and recruitment benefits are key drivers, the survey findings also reveal that financial incentives play a crucial role in facilitating broader participation among some employers. In other words, the dependence of employers—especially SMEs—on subsidies for WIL placements suggests that ongoing investment in program funding could yield more WIL placements for Québec’s digital economy, thereby producing more qualified, work-ready graduates. Moreover, simplifying WIL application processes for employers is vital to encouraging uptake and is essential for the success of this path to talent development in the province.

CONCLUSION

Québec's ICT sector and broader digital economy have effectively weathered a tumultuous period of labour market change, but new challenges like productivity and AI adoption require a co-ordinated approach to ensure that new entrants to the labour market can effectively gain experience, secure work, and contribute to the province's innovation ecosystem. While software development dominates the technical landscape, with particularly strong demand for programming, cloud computing, and AI skills, the province's primary challenge lies not in a shortage of technical talent but in finding experienced professionals who can bridge technology with business functions such as marketing, sales, and commercialization.

Practical experience has become a crucial differentiator for job seekers. WIL programs provide a valuable pathway for students to acquire real-world experience while offering tangible benefits to both participants and employers. WIL programs act as an effective mechanism for developing the soft skills that employers consistently seek across all digital economy occupations. Educational institutions, employers, and public sector organizations all play a role in supporting WIL in Québec, thereby contributing to the advancement of the province's digital economy. By cultivating talent at the intersection of technology and business, Québec can enhance its position in the digital economy while better meeting the needs of both employers and job seekers.

APPENDIX

Research Methodology

Primary Research

EMPLOYER SURVEY

From March 2024 to November 2024, ICTC surveyed technology companies in Québec, particularly focusing on Québec technology SMEs involved in IT services, cybersecurity, big data and analytics, fintech, and automation and robotics, among others. Altogether, the employer survey included 113 respondents, of whom 96 were francophone and 17 were anglophone. The majority of respondents (53.24%) operate in the “professional, scientific, and technical services” sector and are based in Montréal (53.94%). Furthermore, among the 113 respondents, 18 reported working in organizations with over 100 employees. While the survey provided valuable insights on hiring needs and perceptions of WIL programs, its findings were limited due to respondent drop-off in the later parts of the survey, especially from Question 10 to Question 19 of the survey (survey question numbers do not align with figure numbers). Of the 113 respondents to the employer survey, 57 completed the entire survey, resulting in a total completion rate of 50.44%.

STUDENT SURVEY

In March 2024, ICTC surveyed students who had completed an ICTC WIL program. Of the 189 respondents, 17% were Québécois; however, due to the similarities in the benefits WIL programs provide to students and employers across Canada, responses from across the country were included throughout this report. This may affect how specifically applicable the WIL alumni survey findings are to the Québec context.

The majority of francophone survey respondents studied mathematics, computer and information sciences (40%), or business management and public administration (30%). Additionally, the highest percentage of respondents identified as women (49%), followed by men (46%) and non-binary individuals (1.16%). Furthermore, the highest percentage of respondents identified as white from North America (38%), followed by those from East Asia (22%) and white individuals from Europe (17%). Similar to the employer survey, the WIL alumni survey would have benefited from more consistent responses, and its findings are limited by respondent drop-off. Of the 189 respondents to the survey, 172 completed it entirely, resulting in a total completion rate of 91%.

KEY INFORMANT INTERVIEWS

From April 2024 to September 2024, ICTC interviewed 11 employers, educators, and experts from the digital economy in Québec. The majority of interviewees were employers, ranging from senior executives to HR specialists. Two questionnaires were developed: one for employers and subject matter experts, and another for educators. Both questionnaires focused on experiences with WIL programs, strengths of Québec's digital economy, challenges and barriers, perceptions of talent quality, and the benefits and drawbacks of WIL. Findings from the key informant interviews would have been enhanced by a larger pool of interviewees, particularly more from academic institutions.

FORECAST

ICTC used vector autoregressive (VAR) models to develop the forecasts presented in this report. VAR is a stochastic process (i.e., it relies on probability) used to identify the relationships among multiple variables over an extended period. This model calculates how the evolution of each variable is influenced by its own value in the previous period(s), the prior values of other endogenous (dependent) and exogenous (independent) variables, and the error term (i.e., the portion of the current period value that is not determined by the rest of the equation). The exogenous variables included in all models comprise oil prices, central bank interest rates, manufacturing sales, population levels, and unemployment rates. This methodology relies on the statistical correlation between these variables and our endogenous variables (employment, GDP), and causality does not need to be established for the findings to hold significance.

The Akaike information criterion and Bayesian information criterion were employed to determine the optimal number of lags in these models, balancing goodness of fit (how well the model predicts the data) and complexity. This approach also ensured that the models effectively captured comprehensive correlation dynamics between endogenous and exogenous variables, reducing bias or incompleteness in the point estimates. Subsequently, further diagnostic tests were conducted to assess overall stability.

The monthly Labour Force Survey data from Statistics Canada was used to forecast employment levels for Québec's digital economies, with the latter being determined through NAICS and NOC codes. Optimistic, baseline, and pessimistic scenarios were established by adjusting assumptions regarding the future progression of the unemployment rate. Values for the other exogenous variables were maintained at baseline levels and inserted.



Secondary Research

WEB SCRAPING

ICTC utilizes Vicinity Jobs data to analyze job postings in the digital economy and ICT sector, using NOC and NAICS codes. Vicinity Jobs provides real-time labour market information by leveraging advanced text-scraping and machine learning technologies to extract and organize data from publicly available online job postings. This approach provides insights into in-demand jobs and skills, locations, and education and experience requirements by employers. The web scraping analysis synthesized job postings for all occupations classified as belonging to the digital economy, posted between January 1, 2024, and December 31, 2024, across Québec.

STATISTICS CANADA DATA

ICTC utilizes the monthly Labour Force Survey data from Statistics Canada, which provides insights on the Canadian labour market. The data was used to forecast employment in Québec's digital economy. Further, this report made use of Statistics Canada research pertaining to productivity and innovation rates to gain insights into economic trends in Québec and throughout Canada.

II: Research Limitations

This study provides valuable insights into the digital economy and WIL landscape in Québec; however, it is essential to acknowledge its limitations. While efforts were made to ensure that a diverse sample of stakeholders, including employers, students, and academic institutions, were involved in the making of this study through surveys and key informant interviews, the findings may not fully represent all subsectors or regions of Québec's digital economy.

Broader qualitative research might reveal deeper nuances about stakeholder experiences and systemic barriers. Furthermore, employer and student survey responses were self-reported and may be subject to bias, such as over-reporting successes or under-reporting challenges. This could affect the interpretation of program effectiveness or workforce readiness. These limitations highlight the need for ongoing, iterative research to refine insights and adapt strategies to the evolving needs of Québec's digital economy.

The Limits of Forecasts

Given that the forecasts are stochastic, the projected outcomes are based on probabilities informed by historical relationships between GDP and employment, their prior values, and other variables in the model. The VAR relies on these statistical relationships within the time series and generates future values under the assumption that these interactions remain stable and are not affected by significant exogenous shocks (unexpected events).

The various unemployment rates and confidence intervals throughout the models capture the type of variability that could reasonably occur over the near-term horizon and how that would translate into best- and worst-case GDP and employment scenarios. However, significant changes in domestic or provincial policies, shocks to the economy more generally (e.g., the COVID pandemic), or developments in the United States' policy landscape are examples of factors that introduce an element of uncertainty to the analysis that cannot be foreseen or incorporated into the model. Thus, while the point estimates in the baseline forecasts can be regarded as the most likely outcomes for Québec's economy and labour force, economic outcomes outside this range are possible.





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