Accelerating Canada's Workforce

Micro-Credentialing in the Digital Economy

ICTC CTIC

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Research by

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Preface

The Information and Communications Technology Council (ICTC) is a not-for-profit national centre of expertise for strengthening Canada's digital advantage in a global economy. Through trusted research, practical policy advice, and creative capacity-building programs, ICTC fosters globally competitive industries enabled by innovative and diverse digital talent. In partnership with an extensive network of industry leaders, academic partners, and policymakers from across Canada, ICTC has empowered a robust and inclusive digital economy for over 30 years.

About This Project

Led by the Excellence in Manufacturing Consortium (EMC), *Skills Evolution* explored the feasibility of an industry-led micro-credential approach to skills upgrading, aiming to provide employers and industry stakeholders with timely solutions to address skills gaps, labour shortages, and key workforce development needs. *Skills Evolution* brings together multiple sectors—i.e., manufacturing, aviation and aerospace, bioeconomy and biotechnology, agriculture, tourism, and information and communications technology—to both foster an environment of cross-sectoral collaboration and build the critical mass of sectoral stakeholders to be the champions and driving force behind this skills development approach. Collaborating with EMC on this project are the Canadian Council of Aviation and Aerospace (CCAA), BiotTalent Canada, the Canadian Agricultural Human Resource Council (CAHRC), Tourism HR Canada, the Information and Communications Technology Council (ICTC), and the Social Research and Demonstration Corporation (SRDC).

To Cite This Report

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List of Key Terms

Credential: A “credential” is any verification of an individual’s qualification or competence issued by a third party with the relevant authority to issue such verification. The term “credential” encompasses educational certificates, degrees, certifications, and licences.

Certificate: A “certificate” is awarded upon the successful completion of a brief course of study. Certificates typically do not expire nor require any further action to retain.

Certification: A “certification” is awarded upon the successful completion of an assessment and validation of skills in cooperation with a business, trade association, or other industry group. Certifications are not tied to any specific educational program, and many, although not all, require ongoing education to maintain currency.

Competency: A “competency” (or “standard”) is a general statement expressing what an individual should be able to do. It identifies the knowledge, skills and abilities that are expected of a proficient or experienced practitioner with respect to some area of practice.

Digital badge: A digital token, or digital signifier, verifying the completion of a program of learning or training, such as a micro-credential. Digital badges can be displayed by their holders on web platforms such as website or social media profiles.

Learning objective (or learning outcome): A statement describing the knowledge, skill, and ability that is expected of a proficient or experienced practitioner in some measurable way. A learning objective is more detailed than a competency in that it breaks down a competency statement into a specific task, level of performance, and often, the conditions under which the task must be completed.

Skills taxonomy: The objective and systematic classification of occupational skills resulting in an inventory, or catalogue, of relevant skills, which can be mapped to specific jobs or work tasks. Skills taxonomies can be used to develop job descriptions, aid in developing education and training programs for specific jobs and industries, or analyze labour markets.

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Executive Summary

In early 2024, Canada faces a persistent and widespread structural labour shortage, as well as a critical skills shortage throughout its digital economy. This is despite having a highly educated workforce and the largest share per capita of college and university graduates in the G7.[1] To meet current and future talent needs, Canadian businesses are increasingly looking for a balance of job-specific technical skills and transferable social-emotional skills in their workforces. However, the recruitment and retention of skilled workers remains a challenge, and workers are looking for reskilling and upskilling opportunities to close skills gaps and better position themselves in the evolving labour market.

This skills gap in Canada is exacerbated by challenges in international credential recognition and aligning foreign education and experience with Canadian standards. While Canada enjoys one of the highest rates of population growth in the G20,[2] almost entirely due to international immigration, newcomers to Canada can face barriers to translating their professional skills into a Canadian context and thus may struggle to fully participate in Canada's workforce.[3]

One potential solution to solving these workforce problems is the use of micro-credentials as a vocational education and training tool. Micro-credentials are poised to become a mainstream rapid education and training solution in Canada. Yet, as micro-credentials are still relatively new in Canada, there remains a degree of confusion among employers, learners, and micro-credential providers themselves on what micro-credentials entail and how best to design them to the benefit of all stakeholders.

Without a standardized definition of what micro-credentials are and what they are not, micro-credential providers, such as post-secondary institutions, struggle to effectively communicate with employers and individual learners the benefits of micro-credential programs when compared to other sources of vocational education and training. Without an effective understanding of the benefits and drawbacks of micro-credentials in general, as well as the ability to easily compare and evaluate both the relevancy and quality of individual micro-credentials, employers do not have a basis for assessing job candidates who list micro-credentials on their resumes—and may discount such micro-credentials entirely during the hiring process.

With these concerns in mind, ICTC recommends a framework of common elements to provide a standardized approach to micro-credential design and delivery in Canada. The proposed framework requires micro-credentials to be connected to current labour market needs, include proof of mastery, be portfolio-based, be validated by a credible organization with relevant expertise on the subject matter, and provide flexible delivery options for learners. This report also presents insights from ICTC's pilot micro-credential learner surveys, identifying strengths and areas for improvement in its own programs. By sharing survey data, ICTC aims to contribute to the discourse on effective micro-credential programs in Canada, encouraging other providers to benchmark and ultimately enhance their micro-credential offerings.

For micro-credentials to be most effective as a workforce development tool, they should be designed and delivered in a way that imparts learners with practical, in-demand skills that are taught within specific industry contexts. They should be regularly updated and renewed by providers to keep up with industry as it evolves. Micro-credentials should offer learners practical and rigorous assessments, which ensure that learners graduating from micro-credential programs leave the programs with job-ready skills. This is a key element for employers to begin to trust the quality and validity of micro-credentials when making hiring decisions.

Furthermore, micro-credential providers should take pains to better involve industry during the micro-credential conceptualization, design, and delivery process, as well as seek to create recruitment pathways between the micro-credential program and employers for micro-credential learners. Post-secondary institutions should not only market micro-credentials to prospective learners but should also make efforts to market their micro-credential programs and the learners graduating from them directly to employers.

This study was undertaken with the goal of improving the relevance and effectiveness of micro-credentials, fostering acceptance in Canada's higher education and workforce development systems. Through the continuous improvement of micro-credential offerings that are relevant, timely, and effective, Canadian providers can contribute to the broader acceptance and understanding of micro-credentials within the country's higher education, training, and workforce development systems.

Introduction

Canada’s digital economy has seen rapidly increasing demand for skilled talent, yet employers struggle to find workers with the right mix of technical and social-emotional skills needed to fill jobs within the sector.[4] Without workers with the skills to enable innovative and often high-tech work, business activity stagnates and declines, hampering productive capacity, reducing income, and eventually eroding long-term gains in Canada’s standard of living. While record-high vacancies have retreated from their post-pandemic peak, they remain elevated alongside persistently low unemployment levels that, when combined with slowing labour force growth, point to structural labour and skills shortages across many regions, economic sectors, and occupations in the Canadian economy.[5]

Nevertheless, labour and skills shortages have long been a running challenge in Canada’s labour market, with certain regions, sectors, and occupations more acutely affected than others. Occupations in information technology, the skilled trades, and healthcare, for example, have consistently ranked among the most difficult to fill in Canada.[6]

The COVID-19 pandemic served to exacerbate this trend. In the second quarter of 2022, the number of total job vacancies increased by 77.4% from the same quarter in 2019, reaching a record high of 1,031,955. Occupations in information and communications technology (ICT) were particularly affected, as vacancies in this sector grew by 101% during this period.[7] Yet, employment in the sector is up. In 2021, employment grew 54.9% relative to 2006, and between the years 2020 and 2021, ICT had its largest year-over-year increase (9%)—three times higher than its average annual rate of 3% over the past two decades.[8]

While a strong demand for workers is usually indicative of a healthy economy, companies have and continue to report significant challenges finding workers with the right skills to fill the rising number of vacant jobs. Eighty percent of major employers, for example, said they are having trouble finding skilled workers, resulting in project delays (67%) and lost revenue (60%).[9] More than half (56.1%) of Canadian businesses also reported a skills gap among their current workforce,[10] and although many businesses have said it is the lack of social-emotional skills in particular that is holding potential hires back,[11] there is an urgent need for digital skills in tech and traditionally non-tech jobs as well.[12]

Finding the right solution for addressing this skills gap is a key priority. Various approaches to skill development and training, such as reforming Canada's K-12 education system, expanding work-integrated learning (WIL) opportunities, and revamping Canada's skills development ecosystem by investing in lifelong learning, adult education, and training,[13] can (and should) be taken. However, education reforms are likely to be a lengthy and complex process and will require years for the results to materialize.

Efforts to make progress in these areas will be critical, but there is an urgency with which skills need to be developed in today's labour market, and businesses, policymakers, and labour market experts for the digital economy have been demanding a solution that can yield results reasonably quickly while at the same time accommodating targeted skill development.[14] Moreover, skills within the ICT sector are constantly evolving, and there is a need to have an approach to skills development that is flexible to meet changing industry demands. One approach to achieving this is through micro-credentialing.

This study is one part of a multi-sector initiative that explores the role of micro-credential learning in Canada's digital skill evolution and explores best practices for developing micro-credential programs that will grow workforce capabilities.

This report and the conclusions it reaches on Canadian micro-credential programs were developed through an environmental scan of Canadian and international approaches to micro-credentials and program delivery; in-depth interviews with higher education institutions, as well as individual researchers and thought leaders working in the micro-credential space; a cross-country series of employer roundtables to discuss digital economy employer perceptions of micro-credentials and labour market needs; as well as ICTC's own experience delivering two pilot micro-credential programs on big data and cloud computing. By taking a multi-method approach to the question of micro-credentials in Canada, this study hopes to triangulate a robust micro-credential framework for the Canadian digital economy that addresses the needs of post-secondary institutions and other micro-credential providers, government and policy leaders, employers, and individual learners

What are Micro-Credentials?

Micro-credentials (and micro-credentialing) are a relatively new concept in education.[15] As a result, there is no standardized definition of a micro-credential in Canada, but in general, they can be understood as short-duration, targeted, skills-based learning focused on helping learners develop and demonstrate a predefined set of competencies. Some widely adopted definitions in Canada are as follows:

- **Colleges and Institutes Canada:** "A micro-credential is a certification of assessed competencies that is additional, alternate, complementary to, or a component of a formal qualification."[16]

- **Higher Education Quality Council of Ontario** (HEQCO)**:** "A micro-credential is a representation of learning, awarded for completion of a short program focused on a discrete set of competencies (i.e., skills, knowledge, attributes), and is sometimes related to other credentials."[17]

- **Alberta Post-Secondary Institutions Micro-Credential Forum** (draft definition): "Micro-credentials are awarded learning experiences that recognize competencies, skills, or knowledge that meet a distinct function within an industry or community. Micro-credentials may be supplementary, alternate, or supportive to a component of traditional learning credentials. Micro-credentials hold the purpose of aiding in specific, uniquely identifiable training for the purpose of advancing gainful employment, providing community skills, or laddering into other education."[18]

In contributing to the global conversation on micro-credentials, UNESCO provides a definition of micro-credentials as:

- A record of focused learning achievement verifying what the learner knows, understands, or can do.
- Including assessment based on clearly defined standards and is awarded by a trusted provider.
- Having standalone value and may also contribute to or complement other micro-credentials or macro-credentials, including through recognition of prior learning.
- Meeting the standards required by relevant quality assurance.[19]

The landscape of micro-credentials is diverse, encompassing subjects such as inclusive education planning, communication strategies, technology (e.g., Python foundation boot camps), and specific fields like fish health diagnostics. Within the realm of digital economy skills, the prevalence of computer science and data science micro-credentials is linked to the popularity of these subjects in degree programs. Furthermore, while some micro-credentials are designed explicitly for the purposes of lifelong learning or individual knowledge enrichment, this paper will discuss micro-credentials in the context of skills and career development, employability, and professional-oriented learning.

With no current standardized definition of a micro-credential, the frameworks for developing micro-credential programs also lack consistency, leading to a wide variety of program characteristics, including their delivery, focus, and use. Table 1, below, illustrates the variations in features among existing micro-credential program frameworks in Canada and internationally.

The need for a standardized framework for micro-credentials in Canada is underscored by the acknowledgement that micro-credentials as a model of training and education delivery will struggle to take hold without a widespread understanding of common attributes of micro-credential programs or agreement on a common framework. As one higher education leader puts it, “A lack of a widely adopted national framework for micro-credential qualifications is one of the biggest issues holding micro-credentials back. It's a foundational piece.”

As a relatively new education and training product, micro-credentials can benefit from a degree of definitional flexibility, allowing for further refinement of the concept and program innovation, however, the lack of clear definitions and standards makes it difficult for learners, employers, and educators to talk meaningfully about micro-credentials and assess their benefits—and understand their drawbacks. This emphasizes the fundamental need for an integrated strategy to ensure credible and consistent availability of micro-credentials to support and develop talent for Canada’s digital economy.

Additionally, implementing a national-level micro-credential framework or skills framework in Canada holds the promise of addressing the challenge of inter-provincial labour mobility. Embracing such a framework would enable individuals to navigate seamlessly across provinces, fostering a more agile and responsive workforce. To this end, the Information and Communications Technology Council

(ICTC) has developed insights into adopting a unified approach for advancing Canada's micro-credential landscape.

This report puts forward a research-backed framework for digital economy micro-credentials, based primarily on the findings from key informant interviews with micro-credential providers, employer roundtables, and learner feedback from ICTC's own pilot of two micro-credential courses. Each of the elements of ICTC's micro-credential framework and supporting evidence is explored in more depth throughout subsequent sections of this report.

Micro-credential framework	Competency or outcome-based	Short duration	Industry or employer driven	Flexible	Stackable	Assessment focused	Online or on-demand delivery	Personalized	Portable/ shareable
Algonquin College	X	X	X	X	X	X			X
B.C.'s Ministry of Advanced Education and Skills	X	X	X	X		X			
College and Institutes Canada	X		X			X			X
Higher Education Quality Council of Ontario	X	X							
Ontario Tech University	X		X			X			X
Sheridan College	X	X	X			X		X	
Athabasca University	X	X			X	X	X		
British Columbia Institute of Technology	X	X				X			X
Digital Promise	X		X			X	X	X	X
National Education Association	X	X		X		X		X	
State University of New York	X	X		X	X				X
Oregon State University	X		X				X		
Micro-credentials linked to Bologna key Commitments	X	X	X			X			
European Commission	X	X		X		X			X
Australian Department of Education	X		X			X			
Malaysian Qualifications Agency	X	X	X			X			
New Zealand Qualifications Authority	X	X	X						
UN Educational, Scientific and Cultural Organization	X	X							

Table 1. Features of micro-credentials from 18 domestic and international frameworks [20]

ICTC's Micro-Credential Framework

With the purpose of developing a common definition and supporting the effective integration of micro-credentials into the Canadian workforce, ICTC has identified the following as “must-have” elements for digital economy micro-credentials in Canada:

- Connected to current labour market needs
- Includes proof of mastery
- Validated
- Portfolio-based
- Flexible delivery options

Furthermore, digital economy micro-credentials can be designed to “stack” or “ladder” with additional micro-credentials or further coursework toward larger awards, such as certificates, diplomas, or degrees. The potential for micro-credential stacking and laddering is a situationally useful attribute for some, but not all, micro-credentials, depending on the topic of learning and program goals.

ICTC's

Micro-Credential Framework

1 Connected to current labour market needs

Each micro-credential should be developed based on industry demand and mapped to a recognized and relevant skill taxonomy.

2 Proof of mastery

Micro-credentials must be outcome-based and include an assessment of learner skills and or competencies.

3 Validated

Learners who successfully complete the micro-credential must receive proof of completion that is validated by a recognized organization with knowledge in that space.

4 Portfolio-based

Learners should have the opportunity to put their knowledge into practice and display their skills, such as through completing a real-life case study, capstone project, or other skills-based assessment that can be added to a professional portfolio.

5 Flexible

Learners must be able to complete programs online and follow an individualized pace.

6 *Optional for digital economy

Can be designed to be built upon or “stacked” or “laddered,” potentially cumulating in a certificate or other designation.

Micro-Credentials Versus Digital Badges

The terms micro-credential and digital badge are often conflated, leading to great confusion among students, learners, employers, and educators. This confusion stems from the newness and novelty of micro-credentials as both an education product and an education program delivery model. Like all things related to micro-credentials, the exact definitions of “digital badges” and “badging” are open to debate. In this context, ICTC puts forward that a micro-credential is the program of learning, the learning product, and learning achievement, while a digital badge is a visual signifier or “emblem” of the successful completion of the micro-credential that a learner could display in an online profile.[21]

Analysis of Employer and Post-Secondary Institution Data

Challenges to Micro-Credential Integration in the Workforce

The main challenge facing micro-credential uptake and development is that employers in the digital technology sector have a low understanding of what constitutes a micro-credential within their field. This is exacerbated by the lack of standardization among micro-credentials and the concern employers hold for the quality of micro-credentials currently on the market in Canada.

Training providers and post-secondary institutions entering the micro-credential space also recognize that standardization is important to make micro-credentials a credible indicator and a hallmark of the acquisition of the skills or competencies in question. In conversations with educators, ICTC found that post-secondary institutions expressed concern that with so many different models of micro-credentials currently on the market, it is confusing for employers to understand what a micro-credential represents, and without establishing common definitions and frameworks, the term “micro-credential,” may lose its meaning for employers.

One employer in Calgary described the current system as the “wild west,” with employers reporting loose definitions, varying standards, and differing levels of effort required to complete micro-credential programs offered by various post-secondary institutions, industry and professional associations, and private training providers. Because of this, employers reported that it was difficult to characterize the value of a micro-credential for their workforce or how they should evaluate a job candidate who lists a micro-credential on their resume. In most cases, it's difficult for a hiring manager to qualify what a specific micro-credential a job candidate holds means or how it should be valued by an employer.

For example, a candidate’s employability can, in the eyes of an employer, hinge on how their micro-credential was taught—self-directed versus taught synchronously—or whether it had an applied or experiential learning component versus simply consisting of content delivery followed by a purely knowledge-based assessment. These factors lead to different outcomes or verifiability of knowledge and skills obtained through micro-credentialing, according to the employers consulted for this research.

With universities, colleges, private training organizations, and companies across Canada all providing micro-credentials without adhering to a single set of standards or common frameworks, employers find it difficult to understand the quality of individual micro-credentials. Employers consulted for this study recognized that there are many high-quality micro-credential programs on the market but often felt these programs are buried under numerous poor-quality programs. As stated by an employer in Halifax, “At this point, [having a micro-credential] is still a claim, not proof of the skill.”

While micro-credentials are largely seen by employers as a practical and relevant skills development tool for digital economy work—particularly as they are quicker to bring to market than traditional degree or certificate programs—employers agreed that the current system needs vast improvement. In this way, employers felt current micro-credential development in Canada needs more backing by research and feedback from industry and greater consideration of the employer as a micro-credential “consumer” rather than just the individual learner enrolled in the micro-credential.

The Marketing of Micro-Credential Programs Should Be Directed at Both Learners and Employers

The majority of colleges and universities interviewed for this research conduct the marketing of their micro-credential programs along traditional channels such as email newsletters, printed continuing education program guides, and a dedicated section for micro-credentials on institutional websites. In almost all cases, the marketing materials and tactics used are entirely geared toward potential learners. Sales channels are structured primarily as institution-to-learner.

Yet, directing marketing entirely toward learners is a traditional, and not necessarily a wholly effective, approach to marketing skills- and career-oriented learning programs such as micro-credentials. Forward-looking providers should also market their micro-credential program offerings—and the learners graduating from the programs—to relevant employers. Colleges and universities should embrace an institution-to-employer sales channel for their micro-credential programs as well.

In this way, micro-credential programs should be framed by providers as a strategic talent pipeline for the specific industries each micro-credential caters to. Micro-credential providers should strategically target individual firms as potential future workplaces for their learners, and firms interested in hiring learners from specific micro-credential programs should be notified when new cohorts complete their respective programs.

Expiring or Sun-Setting Micro-Credentials and Re-Certification Requirements

Employers consulted during this research noted that skills obtained from micro-credential programs may fade over time before they can be effectively utilized on the job. This leads to the question of whether micro-credentials should expire or require periodic re-certification. While many employers said that continual training and professional learning are necessary in the technology sector, requiring micro-credential holders to maintain or periodically recertify their credentials through ongoing learning or exams was viewed by most employers as unrealistic.

While a number of employers did see some merit to this idea, the time and expense involved would put an onerous burden on micro-credential providers and micro-credential holders, particularly those who hold multiple micro-credentials. Many employers also deemed such a practice unfair to those who earned the micro-credential. Instead, most employers felt that indicating the date the credential was earned would provide sufficient information regarding the relevance and currency of the knowledge acquired.

Industry–Educator Collaboration: Industry Relevance, Linkages, and Employment

Industry Perspective: Industry Involvement in Micro-Credential Program Design and Delivery

Poll results from the roundtables revealed that the three most important characteristics of a micro-credential for its overall quality were whether the credential is tied to a skill taxonomy or competency framework (77%), when the credential is certified by an industry association (75%), and whether the program is developed in partnership with a private sector organization (49%). See Table 2 below.

As an important contributor to the quality of a program, according to employers, effective micro-credentials hinge on robust connections to industry and employment. To maximize learner employability, these programs should integrate job-readiness content. Employers underscored the significance of maintaining close linkages between micro-credential providers and employers in order to stay attuned to industry needs. This alignment ensures that programs are up to date with industry best practices and emerging technologies. In this way, micro-credentials can meet their full potential for students, workers, and employers.

Regular interaction between micro-credential providers and industry throughout the lifecycle of a micro-credential, from planning and design to quality assurance and curriculum updates, is essential. Additionally, employers favour learning assignments completed within micro-credential programs that focus on practical applications rather than purely academic exercises.

Employers advised that these practical assignments should aim to catch the attention of the industry and help facilitate the hiring or career advancement of micro-credential program graduates. To this end, micro-credential providers can benefit by hiring instructors and curriculum designers from industry when developing these programs.

Overall, industry-recognized or industry-backed micro-credentials, as well as industry contribution to their development, are considered essential to ensure the quality of micro-credentials. There was a strong stated belief among some employers that, when possible, private sector technology providers (e.g., Microsoft, Cisco, etc.) should come together with post-secondary education institutions to offer micro-credentials. However, other employers consulted favoured industry certification rather than direct industry-academic collaboration in micro-credential content.

It was commonly felt that it is important for industries to be willing to be part of work-integrated learning programs and otherwise actively engage in the micro-credential ecosystem. For many employers, however, their participation would be determined by the financial support available to participate in such programming. As suggested by an employer in Mississauga, creating a “sandbox” type of environment where organizations could partner with other organizations to give work-integrated learning experiences would be beneficial.

By involving industry experts in the development of micro-credentials, a circular process of updating and improving micro-credential programs could be established. The key takeaway employers discussed is the importance of micro-credential usability. Employers want to see industry involvement and contributions to ensure the knowledge imparted through micro-credentials remains relevant to industry’s current and future needs.

Post-Secondary Perspective: Industry Involvement in Micro-Credential Program Design and Delivery

A number of post-secondary institutions that have been involved in Canada’s micro-credential space since the beginning felt that the initial development phase was geared toward institutional revenue generation, rather than growing out of consultations with business and industry to understand their specific workplace needs and required competencies. However, universities, colleges, and other training providers agreed that industry collaboration should not be an afterthought but a core part of the development process.

The design of skilled-oriented, career-focused, and industry-relevant micro-credentials benefits greatly from regular interface and cooperation with industry. Industry engagement should not just involve a letter of support and a perfunctory annual industry advisory committee meeting; rather, industry representatives should be regularly engaged throughout a micro-credential program’s lifecycle.

As one representative from the Canadian higher education sector noted, “We have to get a lot better at making sure that employers are there on the front-end of micro-credential planning, not just simply endorsing something that happens and doesn't quite fit.” Industry needs skin in the game for micro-credentials to be successful in Canada.

Industry cooperation should take place throughout a micro-credentials design and delivery lifecycle, including conceptualization and design, as well as delivery and periodic evaluation and review. Employer input should be central to all aspects of micro-credential program curriculum design. For example, one college located in urban Canada allocates a fifty-fifty burden of effort split between employers and the institution when it designs new micro-credentials. Employers are expected to step up in the design phase and contribute time and expertise in the development of new micro-credentials that will benefit their respective industry. Finding, or failing to find, such strong industry engagement acts as a litmus test to how much employers actually need any specific micro-credential. It is indicative of how well a potential micro-credential will do in the market.

While it is imperative that micro-credentials offered by post-secondary institutions are linked to employer needs, a higher education sector agency pointed out that “employer demands may be kind of fleeting.” Due to institutional governance structures, approval processes, and program review cycles, post-secondary institutions may struggle to be agile enough to meet quickly changing employer demands.

Despite this, in the context of micro-credentials, providers need to move from industry engagement to industry involvement to offer the most effective programming. Micro-credential providers should encourage industry to not just feel like a stakeholder but also a co-owner of micro-credential programs. Considerations of industry involvement in micro-credential programs are especially relevant as micro-credentials remain relatively obscure, ill-defined, and misunderstood by many employers. Bringing willing employers on board can only serve to promote and refine micro-credentials as a trusted education and rapid-training product in Canada.

Answer	Victoria Respondents	Ottawa Respondents	Toronto Respondents	Calgary Respondents	Vancouver Respondents	Mississauga Respondents	Montreal Respondents	Halifax Respondents	Total Respondents
The credential is tied to a skill taxonomy or competency framework	50%	91%	71%	82%	71%	88%	83%	75%	77%
The credential is certified by an industry association	67%	91%	71%	82%	43%	88%	83%	75%	75%
The credential was developed in partnership with a private sector organization	50%	82%	50%	45%	57%	38%	17%	42%	49%
The credential can be stacked with other micro-credentials	17%	0%	50%	27%	43%	50%	0%	50%	32%
The credential is connected to a university	67%	18%	14%	9%	14%	0%	67%	25%	23%
The credential is provided by a private training provider with a good reputation	17%	0%	14%	36%	57%	13%	33%	8%	20%
Other	33%	9%	14%	0%	0%	25%	17%	8%	12%
The credential is connected to a college	0%	18%	14%	0%	0%	13%	0%	17%	9%

Percentage of respondents that selected this answer (%)

Table 2. Which three characteristics of micro-credentials delivery are most important to its overall quality?

Validating Learning in Micro-Credentials

Industry Perspective: Verification and Evaluation Practices

A component of discussion among employers was verifiable proof of learning and skills development. To be able to validate micro-credentials to ensure job candidates or employees had developed the necessary skills for jobs was emphasized as highly valuable during consultations with Canadian employers. Further, because micro-credential programs are relatively new in Canada and hiring managers do not have an intuitive understanding of the quality, credibility, and effectiveness of individual programs, validation of learning was noted as being of critical importance to help build trust and acceptance. Without a validation process, it may be challenging to verify and authenticate the skills and knowledge acquired by learners and may impact the integrity of a micro-credential program. To this end, verification must include:

- The ability to verify that job candidates have actually earned the micro-credential they purport to hold.

- The ability to validate that job candidates, in fact, have the skills to the mastery level the micro-credential purports to have taught them.

A variety of suggestions were made regarding how this verification could be enacted. Some employers suggested that skills verification could come in the form of a third-party verification network or simply provide a platform for the student to show projects they completed to earn the micro-credential (e.g., a GitHub page). Other employers suggested that capstone projects completed during a micro-credential be available to review online as a good way to verify learning. Another common suggestion was a public ratings network to collect feedback from students and employers on the quality of micro-credential courses.

In terms of current evaluation practices, employers reported finding it easier to evaluate the success of micro-credentials with existing employees. Since they are familiar with the employee's performance and capabilities, employers can assess how effectively the acquired micro-credentials have contributed to their employee's professional growth. This evaluation allows employers to identify the value and impact of micro-credentials within their own workforce.

Post-Secondary Perspective: Building Credibility and Validity

Feedback and impact evaluation are vital for continuous improvement of education programming and alignment with industry needs. Post-secondary institutions should always build in ways for both students and industry to provide feedback and comment on credential relevance, as well as seek anecdotal data on the outcomes of micro-credentials. Some post-secondary institutions also collect market research, conduct a gap analysis to identify areas where specific skills are lacking in the industry, and collaborate with external organizations, such as the Diversity Institute,[22] to evaluate the impact and effectiveness of micro-credentials.

Post-secondary institutions echoed concerns held by employers regarding the potential for learners to earn a micro-credential "just by showing up." Micro-credentials should signify mastery of a specific skill or competency, and a number of post-secondary institutions consulted for this study placed emphasis on ensuring that micro-credentials are designed and evaluated for their value-add in terms of knowledge or skill transfer. To create and maintain credibility and validity, post-secondary institutions suggested that micro-credentials must:

- Be purpose-built programs designed around desired competencies that have been mapped in advance.
- Actively involve employers in the development process, from defining requirements to validating taught skills.
- Have an assessment that evaluates students by competency and ability to perform a practical, individual, skill-based task or project(s).

To ensure quality and value, post-secondary institutions aim to have micro-credentials focused on distinct competencies achievable within a learning experience and validated through competency-based assessments.

For post-secondary institutions to make micro-credentials credible with learners and industry, it is “critical” they follow strict assessment requirements that prioritize rigorous, hands-on assessments that demonstrate individual skills, overassessments based on participation, group work, or simple multiple-choice or true/false tests. Across all interviews, post-secondary institutions emphasized the importance of making sure learners possess demonstrable skills. Many post-secondary institutions also underscored the importance of learners completing micro-credentials to develop a body of practical work they can share with potential employers.

Focusing on specific skills rather than comprehensive programs requires a shift in education principles, but micro-credentials still serve as a generalized “representation of learning,” akin to other types of credentials offered by post-secondary institutions. Effective communication of the value of micro-credentials to both students and employers is essential. To this end, many post-secondary institutions believe that significant outreach needs to take place to promote micro-credentials as a rapid skilling solution, as well as educate employers, policymakers, and individual learners on micro-credentials and their differentiation from traditional higher education programs. As one interviewee observed, “There’s still some work that needs to be done in translating to the public [and industry] what it means to be pursuing short-term, micro-credential-based learning.”

For post-secondary institutions, the present focus is on creating micro-credentials that lead to meaningful employment outcomes. However, without industry recognition, micro-credentials risk lacking significance. As discussed earlier in this report, higher education institutions agreed that strong industry connections and employer recognition are critical for successful micro-credential delivery.

As one Alberta-based college shared, “We learned our strongest lesson is that unless you have an industry sector that’s going to recognize these micro-credentials and give students who have achieved them some advanced standing or an ability to move up in their job or to get a job, there is no value to the credential at all.”

Affordability, Accessibility, and Inclusivity of Micro-Credentials

Industry Perspective: Micro-Credential Value and Inclusive Skilling

Employers across all roundtable sessions valued the flexibility, career-focused education and training, and practicality offered by micro-credential programs. Specifically, employers responded positively to micro-credentials that offer flexible delivery options, such as the ability to complete the programs online and at an individualized pace. One employer in Victoria liked how “nimble” micro-credential programs could be, while another suggested that micro-credentials were ideal vehicles for “rapid reskilling.” In a constantly changing digital economy, the short and focused nature of micro-credentials is an aspect that provides significant value to Canadian employers.

Micro-credentials are seen as a more affordable, accessible, and inclusive way of acquiring skills compared to traditional degree programs. With digital platform availability, micro-credentials give learners different options for completing courses, learning and mastering skills, and progressing their careers. Accessibility due to low program costs can help individuals from marginalized communities access micro-credential programming and support company DEI initiatives.

Cost effectiveness, in general, was seen as an attractive quality of micro-credentials among employers. One Mississauga employer referred to micro-credentials as “inclusive skilling,” where individuals can focus on a specific skill rather than spending thousands of dollars and four years to complete a full degree program. The opinion was generally held among employers that micro-credentials are “an equitable solution to learning and development for individuals who cannot afford degrees or taking time out of their careers to get advanced degrees.”

Additionally, employers—particularly those in cities with access to high levels of foreign talent—saw micro-credentials as a useful way to validate foreign education, experience, and/or certifications, helping to address labour shortages by providing newcomers with Canadian education. The short duration and modest cost of most

micro-credential programs provide a promising tool for newcomers to translate their prior education and training credentials earned abroad to the Canadian labour market.

Overall, employers highlighted that micro-credentials provide value in their ability to bridge the gap between self-taught candidates and those with higher education but in need of practical (i.e., work) experience. Micro-credential programs also offer the possibility of reducing the time and resources needed to hire and train a new employee. Some of the employers that ICTC interviewed also noted the possibility of using the successful completion of a relevant micro-credential as a skills development and validation tool in the hiring process.

Post-Secondary Perspective: Flexibility and Other Inclusive Design Considerations

As articulated by interviewees from the post-secondary sector, flexible options and individually customized learning experiences empower learners to directly translate their education into tangible career outcomes, aligning with their individual goals and aspirations. These attributes underscore micro-credentialing as an inclusive education delivery model.

One crucial aspect of inclusive design is the consideration of learner financial accessibility and the importance of making micro-credential programs financially viable for micro-credential providers. Establishing a pricing structure for cost recovery ensures that these programs can continue to provide valuable learning experiences without placing undue financial burdens on participants.

One Ontario-based institution interviewed for this study noted that its micro-credentials are designed along Ontario Student Assistance Program (OSAP) guidelines in order to be eligible for learner funding. For other universities, monetization is not always the primary driving force behind micro-credential offerings. One Ontario-based university secured grant funding to subsidize free programs, while others cited seeking and developing partnerships with workforce development organizations to help deliver accessible micro-credentials.

Online delivery further enhances the inclusivity of micro-credentials, with post-secondary institutions recognizing how flexible delivery can widen their reach and attract a more diverse learning community. Flexibility allows learners to choose the mode that suits their needs. For many post-secondary institutions, this helps break down barriers to traditional post-secondary education access and provides more equitable opportunities for learners who may face challenges in accessing traditional on-campus programs.

These programs can serve as stepping stones for traditionally underserved groups, such as Indigenous learners, offering an alternative path to education. However, one Ontario-based training provider cautioned against the perception of offering “post-secondary lite” micro-credential options that risk undermining the value of traditional diploma and degree-bearing post-secondary programs for Indigenous learners. Micro-credentials cannot be seen by employers or learners as an inferior or less rigorous education product but as an alternative and distinct product with its own advantages.

Colleges in Ontario and Alberta promote inclusivity by acknowledging diverse learning journeys and are adopting an approach that allows non-traditional leaders to leverage their existing skills and knowledge through recognizing prior learning and competency-based assessments to award micro-credentials.

Another point addressed by post-secondary institutions was how micro-credentials can serve as valuable tools for young people exploring different career paths before committing to apprenticeships, new jobs, or university/college programs. For instance, a college providing trades apprenticeship programs had an employer express their frustration with “wasted time and money on apprentices who didn’t want to be apprentices” and their desire for a “quick micro-credential to see if [the trades were] right for them [the apprentices].” By offering a flexible-to-needs, quick and cost-effective way to assess career preferences, micro-credentials contribute to informed decision-making for jobseekers and help individuals align their educational and career choices with their true interests, talents, and goals.

The diverse motivations behind learners enrolling in micro-credential programs further underscore the need for inclusive design. From career switchers and upskillers to lifelong learners, micro-credentials have the potential to cater to a wide array of learner styles and educational goals.

While flexibility is a must-have for widely beneficial micro-credentials, post-secondary institutions face challenges such as navigating constraints to program innovation, addressing diverse perspectives and needs, and ensuring equitable access through competency-based approaches.

These challenges, as noted by a university in Nova Scotia, highlight the ongoing commitment required to refine and improve micro-credential programs, ensuring they remain effective and accessible to all. By addressing financial, cultural, and educational diversity, the inclusive design and delivery of micro-credential programs offer a pathway to flexible, accessible, and personalized education.

Reskilling and Upskilling Focus

Once in a job, employees often find it challenging to take time off work to pursue further education and acquire new skills. Recognizing this issue, employers have acknowledged the significant advantages of micro-credentials in facilitating upskilling and reskilling for job seekers and current employees. Effective micro-credentials offer the flexibility that traditional educational programs lack, allowing individuals to obtain valuable skills without committing months or years to full-time education.

Poll results and discussion from the employer roundtables revealed that micro-credentials are considered most useful for upskilling (77%) and reskilling (67%) purposes (Table 3).

Technology evolves rapidly, with the lifespan of specific knowledge ranging from three to five years. Given the fast-paced nature of the technology industry, employers believed that continual training would be necessary for technology sector careers. Employers said that it is crucial that workers continually update and develop their skills and competencies or risk falling behind and stagnating in their careers. Employers acknowledging this need to stay up to date with advancements in one’s field were hopeful about the potential of micro-credentials to support ongoing training to ensure employees remain competitive and capable of meeting the evolving demands of the tech sector.

Answer	Victoria Respondents	Ottawa Respondents	Toronto Respondents	Calgary Respondents	Vancouver Respondents	Mississauga Respondents	Montreal Respondents	Halifax Respondents	Total Respondents
Upskilling	71%	91%	73%	80%	90%	44%	67%	83%	77%
Reskilling	71%	64%	40%	73%	90%	56%	67%	75%	67%
Job readiness / general	57%	45%	53%	33%	20%	44%	11%	25%	37%
Other	0%	0%	33%	7%	0%	44%	33%	17%	17%

Percentage of respondents that selected this answer (%)

Table 3. "In which situations do you consider micro-credentials to be most useful? (Choose two)"

External factors often drive change, necessitating the upskilling and reskilling of employees to remain relevant. However, employers in Mississauga observed that once an individual is employed, the organization takes responsibility for providing ongoing training and skill development opportunities. This helps employees stay up to date within their current job roles, reducing the need for individuals to return to the micro-credential system unless they change sectors or leave the organization. However, other employers placed a greater emphasis on employees taking the initiative and responsibility for their career development and professional learning.

Industry Perspective: Technical Skill Versus Soft Skills Development

Employers in various industries, particularly the technology sector, favour micro-credentials as a means of "precision-based training." Workers can pursue specific micro-credentials that provide them with essential foundational technical skills quickly, which they can then build upon in their respective workplaces or through additional micro-credentialing. This targeted approach to training enables employees to adapt to changing technological landscapes and stay ahead in their careers.

However, even in highly technical roles, soft skills—such as social and emotional skills, teamwork, and communication skills—were deemed critically important to employee success. Employers expressed concerns that hiring individuals with only technically oriented micro-credentials may result in a lack of soft skills and suggested that there was a market for micro-credentials that could successfully impart soft skills as well. Employers recognize that most soft skills are highly

contextual (such as communication or leadership) and difficult to prove or validate through completing a micro-credential, though most employers consulted believed that most in-demand soft skills can be effectively taught.

While employers emphasize the importance of combining soft skills with technical skills to enhance job readiness, micro-credentials are currently seen by employers as isolated courses, which on their own may not be highly effective at imparting soft skills. Accordingly, employers desire better integration of soft skills learning and development into more technically oriented micro-credentials. Many employers reported being interested in micro-credentials that can impart both soft and technical skills. The soft skills identified as most complementary to hard skills in candidates included business etiquette, communication, critical thinking, empathy, and how to work in a team.

Employers acknowledge that synchronous learning, as well as in-person learning and interaction, are crucial for developing soft skills. However, the digital nature of micro-credentials reduces exposure to an environment where these skills can be learned. To address this challenge, employers proposed more hybrid models of micro-credentials or providing soft skills sessions or models of behaviour to learn from as part of the micro-credential program. “If we are designing micro-credentials, [we] have to check what will make learners employable,” an employer said.

Despite the interest among employers in the potential for micro-credentials to teach soft skills, documenting and verifying these skills still poses a challenge. While employers acknowledged that soft skills are critical to succeeding in the workplace, there was a high degree of skepticism about how they could be validated through a micro-credential.

Post-Secondary Perspective: Soft Skills Versus Technical Skills

Learner motivations for pursuing micro-credentials are related to upskilling and reskilling for job search and career advancement purposes. An Alberta-based university noted that “people are not enrolling in these programs because they think it would be interesting; they’re enrolling in these programs because they think it’s going to directly connect either to the job that they have right now or to the future job that they would like to have.”

Colleges, inherently focused on turning out skilled professionals, find themselves well-positioned to excel in delivering technical micro-credentials. The skills-based

approach resonates with the “*raison d'etre* of colleges” and aligns with the expectations of students who seek employability. For universities, micro-credential programs hosted by continuing education faculties or departments were a common administrative approach. A continuing education administrator from an interviewed post-secondary institution noted how they often operated outside traditional academic governance, allowing for greater flexibility to innovate and offer relevant education and training programs.

While post-secondary institutions recognize that micro-credentials are particularly effective for teaching and assessing technical skills, especially in areas where solutions are concrete and not subject to judgment or interpretation and provide opportunities for auto-grading, the challenge lies in effectively delivering and assessing soft skills. However, transferable skills, such as critical thinking, communication, and problem solving (referred to as "enduring skills" by one post-secondary interviewee), are crucial career progression elements for learners to develop.

A college in Ontario finds some of their most popular micro-credentials are in soft skills-intensive subjects like leadership and management. These programs are popular as they are general enough to be applicable in many different contexts across many different fields and industries, and feedback from graduates suggests that learners see these soft skills as very important to their future career development. Currently, programs largely dedicate their focus to either technical (hard) skills or soft skills, leaving an opportunity for micro-credential providers to offer programs that convey both in a concurrent or integrated manner.

The challenge lies in quantifying soft skills such as interpersonal skills, communication, and critical thinking in a practical manner. Nevertheless, institutions are committed to addressing this challenge and are engaging with the most effective ways to deliver and assess both technical and soft skills. Post-secondary institutions that participated in this study acknowledged the complexity of evaluating soft skills, with one college emphasizing that a balanced approach in micro-credential offerings is important and that a commitment to teaching both types of skills is imperative to match industry needs.

Coexistence of Micro-Credentials and Traditional Higher Education Programs

The coexistence of micro-credentials and traditional forms of higher education was heavily discussed among employers, but the consensus was that while micro-credentials are seen as complementary to traditional degrees or a viable, more cost-effective alternative, they are not a replacement. When asked about qualifications, in most cases, employers saw the micro-credential as burnishing an employee's or job candidate's other educational qualifications. However, micro-credentials were not considered a substitute for a requisite degree or diploma, even when such degrees or diplomas were from unrelated fields.

As micro-credentials are still a relatively new education product, providers have not yet earned employers' trust in the way traditional degree or diploma programs have. When compared to traditional educational credentials, such as diplomas or degrees, employers will not be as familiar with what a micro-credential signifies in terms of learning and skills development.[23] Among employers engaged for this study, there was a divide between employers that value candidates with traditional credentials, such as university degrees and college diplomas when seeking skilled employees and those who would prefer to hire individuals with specific micro-credentials rather than traditional graduates without relevant experience.

Micro-Credential Meta-Data

According to research commissioned by the Ontario Council on Articulation and Transfer (ONCAT), both the European Union and Australia have mandatory meta-data standards within their respective micro-credential frameworks.[24] Both the European Union and Australia require micro-credentials to list key attributes such as micro-credential title, provider name, date of issue, learning outcomes, workload/learner hours, assessment type, delivery mode, and quality assurance. The meta-data standards can also voluntarily include other useful information parameters such as prior knowledge/pre-requisites, depth of learning, grade achieved, language of instruction, stackability, and occupation/industry alignment.[25]

Such micro-credential meta-data can play an important role in increasing micro-credential "transparency" on how and when a micro-credential was issued, by whom

it was issued, and what skills and competencies it was designed to develop, thus enhancing “legibility” for employers.[26] By standardizing micro-credential meta-data across Canada’s post-secondary and training system, learners and employers are better able to make informed decisions on which micro-credentials meet their professional learning and career development needs.

While most employers do not view micro-credentials as a replacement for traditional degrees, they are open-minded about candidates with only micro-credentials. Most employers indicated that in many cases if a candidate had one or more relevant micro-credentials but did not have a degree or diploma in the field, they would be considered for the job, but it would be an “uphill battle” for them. As an example, this consideration would be similar to how graduates of coding bootcamps are assessed versus computer science university degree graduates.

Overall, the consideration of job candidates with micro-credentials but lacking relevant degrees or diplomas is context-specific and dependent on the specific job role. In most cases, employers still indicated that candidates with more relevant degrees/diplomas would still be at a major advantage in hiring decisions, and job candidates with relevant degrees/diplomas *and* relevant micro-credentials would be highly attractive.

In other scenarios, such as job candidates with a micro-credential and a non-related degree, employers were resolute that candidates would still need to demonstrate they had the requisite skills and could perform at the same level as those holding related degrees/diplomas. Employers indicated they valued higher education degrees/diplomas even in a non-related field, as these academic credentials still developed skills such as critical thinking and fundamental knowledge.

Many employers also believed that traditional higher education programs impart graduates with valuable theoretical knowledge that a micro-credential would just not have time to teach. For example, a micro-credential could teach popular software packages used in data science but not fundamental mathematical knowledge, such

as how to do calculus. To this end, for highly specific technical roles such as data scientists, a relevant micro-credential would probably not be enough, and a relevant degree/diploma would still be required.

An employer in Halifax said, “Micro-credentials teach you what to think. University teaches you how to think.” Employers reported viewing micro-credentials as a way for workers to continue to develop their skills and knowledge after completing a traditional education program. Some employers thought that micro-credentials could be a way for individuals who do not have access to traditional college or university studies to access the education and training they need to gain quality employment.

Some employers would consider candidates without formal post-secondary education credentials if they did possess a relevant micro-credential. This was especially true for soft skills-dependent roles and less so for professional and technical roles. The employers who responded positively to hiring someone with no formal post-secondary education but with a relevant micro-credential noted a trend that younger people who are eager to learn will be more committed to building their career with a specific company.

Some employers referred to the improved “stickiness”—or commitment—of an employee who did not complete traditional post-secondary education. By hiring candidates with base skills and knowledge from a micro-credential and giving them “the right direction,” employers benefited from these hires staying for longer at the organization. This mindset around the benefit of on-the-job training was held by several employers.

Part of the discussion around education preferences relates to the signalling inherent to different pathways. Employers thought that completing a two-year college diploma or four-year university bachelor’s degree demonstrates that job candidates have the ability to plan years in advance, pursue something that is challenging, and achieve long-term goals. Employers also argued how having a micro-credential shows a certain level of dedication, desire, or willingness to learn or enter a specific industry or type of work. Employers also recognized that to complete a micro-credential, one must have some base knowledge or strong interest in the topic and that, generally, the skill or competency is not a new thing someone just learned.

Overall, employers were interested in micro-credentials for their ability to rapidly and inclusively skill employees and job candidates, but most tended to still highly value

traditional education programs that develop base critical thinking, analytical, technical, and communications skills. As one employer in Calgary put it, a degree is akin to “building a house,” whereas a micro-credential is like “buying a new fridge to put in the house.”

Career Services and WIL Programs for Micro-Credential Learners

Individual micro-credentials designed from the ground up to meet employer needs should keep employability front-and-centre in their design and delivery. Indeed, micro-credential providers can take this focus on employment outcomes one step further and offer career supports to learners and recent graduates of micro-credential programs. For example, some Canadian universities are already planning to roll out campus career services to learners enrolled in their micro-credential program offerings.

Such career supports could include access to campus job boards, career exploration sessions, resume reviews, and job interview skills and career coaching services. The most ambitious micro-credential providers could even develop work-integrated learning (WIL) programming—like practicums, co-op and internship placements, and industry projects—[27] for learners enrolled in micro-credential programs.
While offering such career supports could be challenging for smaller, resource-constrained micro-credential providers, larger providers such as colleges and universities that already have large, established campus career services have the opportunity to extend these services to learners enrolled in micro-credential programs.

There is also an opportunity for micro-credential providers to develop partnerships with third-party groups such as workforce development agencies, industry groups, and professional associations to offer enhanced career supports for micro-credential learners. Providers that are able to offer career services and WIL programs for micro-credential learners would have significant value-added services that could positively differentiate their micro-credential programming from an increasingly crowded Canadian micro-credential market.

Contributor to Quality: Stacking Micro-Credentials

From the post-secondary institution perspective, stackable micro-credentials are an important design consideration, particularly for learners who are seeking an alternative to a four-year degree program. In addition to their short length, industry verification, and inclusion of competency-based assessment, many post-secondary institutions indicated stackability (the ability for a credential to be stacked with other micro-credentials into a larger program of study) as a key characteristic of their micro-credentials.

The importance of bundling or “stacking” credentials was also an aspect emphasized by employers, particularly industry “veterans.” Just under one third (32%) of employers polled during the roundtables saw stackability as an important contributor to a micro-credential’s overall quality (Table 2). While individual micro-credentials are desirable and enhance workforce readiness, a learner pursuing bundles of multiple micro-credentials demonstrates a commitment to lifelong learning and self-development.

By combining multiple micro-credentials, individuals can demonstrate a broader range of skills and qualifications, making them more appealing to employers. Employers valued the concept of multiple micro-credentials coalescing around specific skill sets over time and felt that bundling allows for a more comprehensive evaluation of a candidate's abilities and increases their competitiveness in the job market.

ICTC Pilot Micro-Credential Programs

To gain insights into the design and operational challenges of delivering micro-credential programs and providing a positive learner experience, ICTC offered two pilot micro-credentials to a group of motivated learners over nine weeks in Spring/Summer 2023. These micro-credentials were offered free of charge to learners and were delivered fully virtually (online).

Pilot programs are a way in which a new product or service can be deployed on a limited trial basis to test feasibility and make improvements before it is offered at scale. Piloting education programs, such as micro-credentials, can help researchers, curriculum designers, and educators better understand the dynamics of a novel program in a real-world but scaled-down setting.

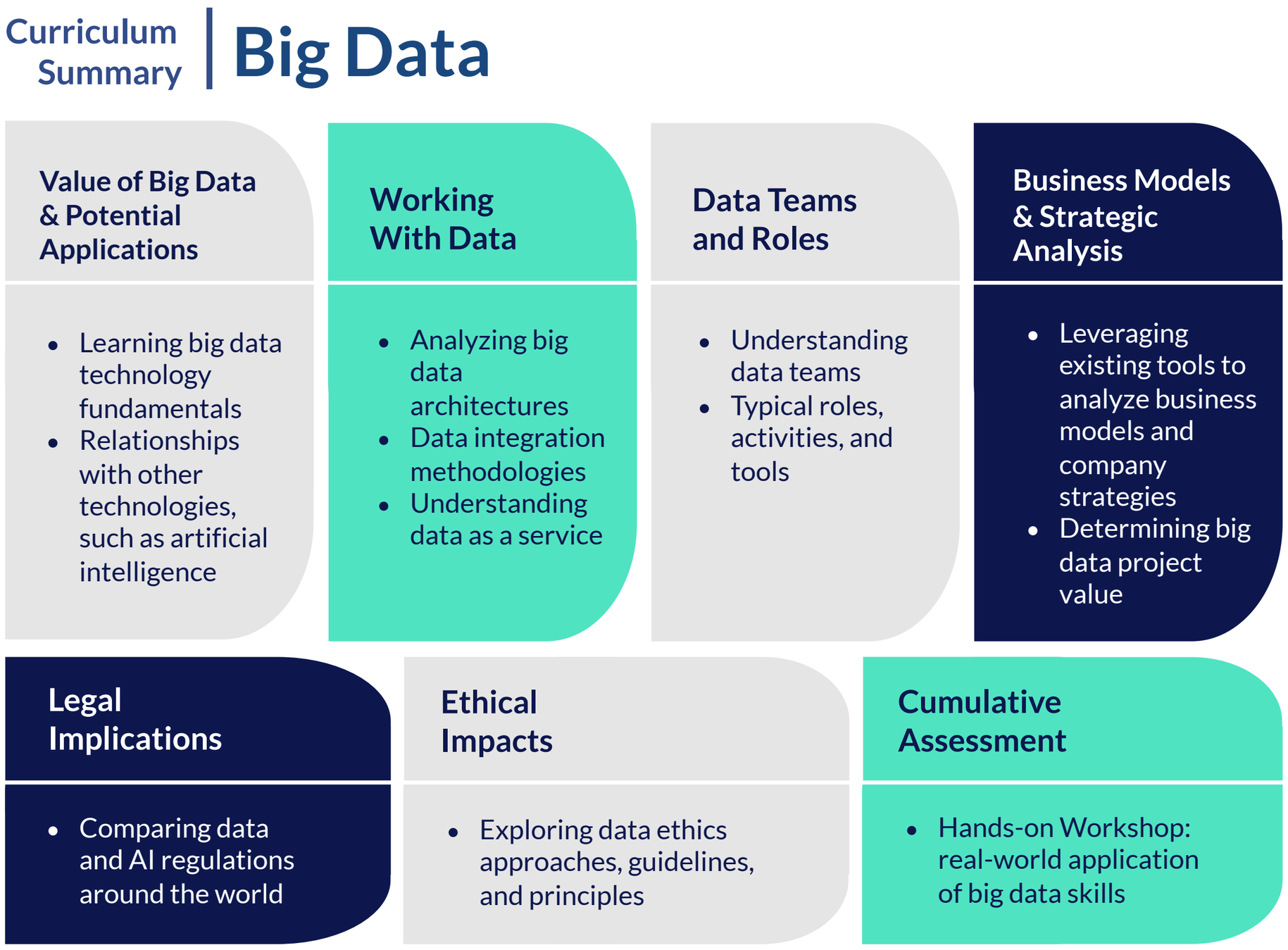
A white paper published by the Institute of Education Sciences notes, “Pilot studies are generally conducted with a small sample of intended users in real-world conditions to test the feasibility of implementing a new initiative and the likelihood of reaping its benefits at scale.”[28] The piloted education program can be improved and optimized before major investments of resources are made. By conducting a pilot of specific micro-credentials before scaling, data can be collected, and real-world insight can be deduced.

The two micro-credential programs ICTC offered as part of its pilot were on big data and cloud computing:

- **ICTC Micro-Credential in Big Data**—ICTC’s big data micro-credential was designed to provide learners with the fundamental technical skills and practical knowledge to work with and analyze large complex datasets. The big data micro-credential included lessons on big data architectures, integration methodologies, data-as-a-service models, and big data’s relationship to other technologies such as artificial intelligence. Learners were trained in tools and methods to analyze and manage large, complex datasets. Learners were also exposed to regulations and ethical issues related to big data, as well as considerations for managing a big data project and assembling a project team. The program culminated in a hands-on workshop that exposed learners to a real-world application of big data to provide a solution to a practical business problem. Learners completing ICTC’s pilot big data micro-credential are qualified to take on a junior role as a data analyst or data technician with an industry big data project team.

- **ICTC Micro-Credential in Cloud Computing**—ICTC's cloud computing micro-credential was designed to provide learners with the fundamental technical skills and practical knowledge to develop and deliver cloud computing resources in a complex enterprise information technology environment. The cloud computing micro-credential included lessons on business analysis and economic use cases of cloud computing, key technologies and infrastructure considerations for cloud computing, and understanding cloud-native service delivery models. Learners were trained in developing business cases for cloud computing projects, assessing different cloud computing technologies, and working in a cloud development environment. Learners were also exposed to the environmental and social impacts of cloud computing technologies, as well as career paths for cloud computing specialists in Canada. The program culminated in a hands-on workshop that exposed learners to a real-world cloud computing application scenario to provide a solution to a practical business problem. Learners completing ICTC's pilot cloud computing micro-credential are qualified to take on a junior role as a business analyst or cloud developer within an enterprise cloud computing team.

These topics were chosen due to their importance to Canada's digital economy and their current high employability in the Canadian labour market. The program criteria is outlined below.



Curriculum Summary | Cloud Computing

Introduction to Cloud Computing

- Understanding the history of cloud technologies, different service models, and different cloud infrastructure

Cloud-Native Application Development

- Exploring the cloud-native industry, key technologies, and their impacts on developers

Cloud Economics

- Understanding the economics of cloud computing
- Diving into the business case of building processes to justify cloud investments

Business Applications

- Analyzing real-life industry use cases and cloud-based implementations

Societal Impacts

- Exploring environmental and social impacts of cloud-enabled systems

Canadian Context and Careers

- Understanding key actors and related opportunities for cloud computing careers in Canada

Cumulative Assessment

- Hands-on Workshop: real-world application of cloud computing skills

In total, 79 learners participated in the two programs. A total of 64 learners across the two micro-credential pilots (81%) successfully completed the programs and earned their digital badges. ICTC offered learners a modest incentive in the form of gift certificates for a food delivery service and a chance to win a $250 gift card. These modest incentives may have increased the rate of completion of the two pilot micro-credentials. Table 4 outlines the delivery parameters ICTC adopted for the two pilot micro-credential programs.

	Big Data	Cloud Computing
Timeframe	May 1 to June 30, 2023 (9 weeks)	May 1 to June 30, 2023 (9 weeks)
Instructional mode	Virtual (online)	Virtual (online)
Delivery method	Non-concurrent	Non-concurrent
Delivery platform	Canvas	Canvas

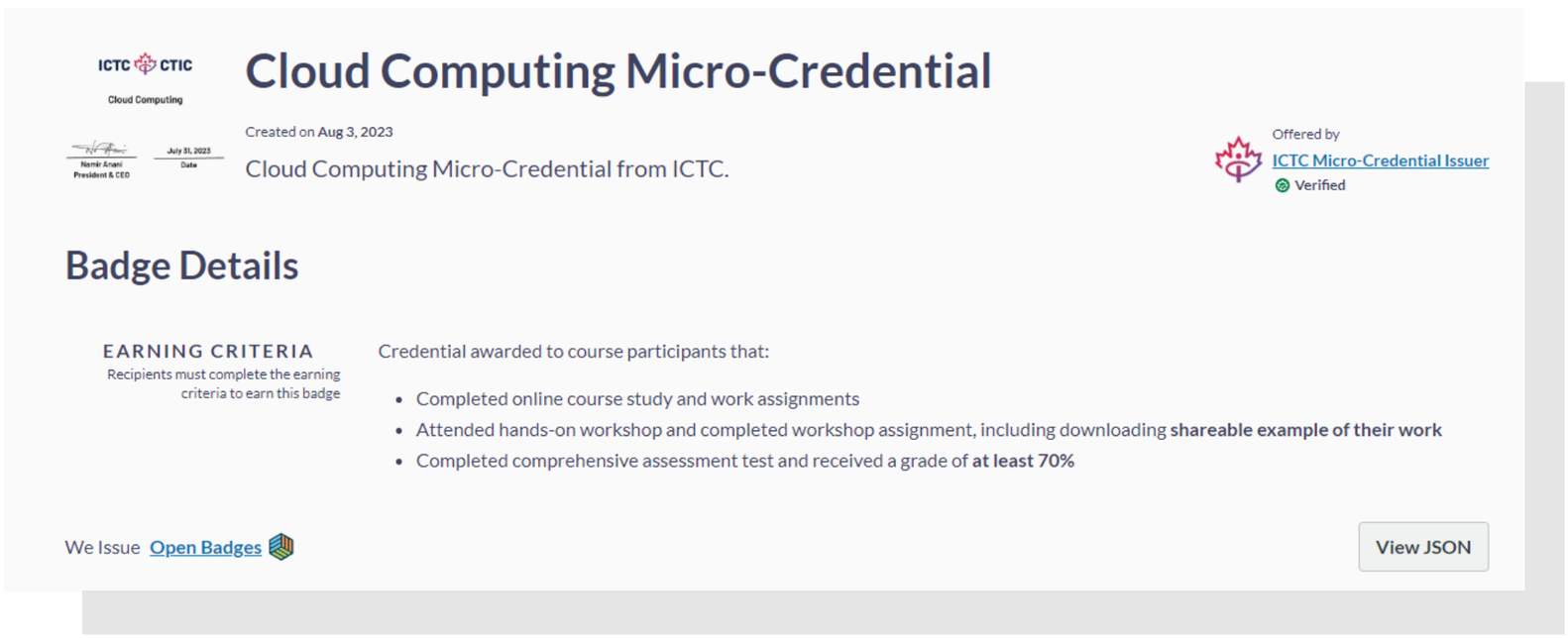
Language of instruction	English	English
Award	ICTC digital badge	ICTC digital badge
Badge platform/format	Open Badges	Open Badges
Cost	Free of charge	Free of charge
Program completion incentives	- $35 food delivery voucher - Entered to win $250 gift card	- $35 food delivery voucher - Entered to win $250 gift card
Estimated level of effort	2-5 hours/week	2-5 hours/week
Number of learners	36	43
Pass grade	70%	70%
Completion/pass rate	88%	72%

Table 4. Summary of ICTC Pilot Micro-Credentials on Big Data and Cloud Computing. Source: ICTC, 2023.

Digital Badges

Learners who successfully completed the micro-credentials were awarded digital badges issued by ICTC. These digital badges were based on the Open Badges format and are sharable across social media platforms such as LinkedIn.[29] The badges included important meta-data such as the name of the micro-credential, name of the recipient, name of the micro-credential issuer, date of issue, verification details, and awarding criteria. By using the JSON open standard, the digital badges are also flexible in how they can be incorporated into different web applications and digital platforms, providing a degree of future-proofing and continued relevancy. See Figure 1 below.

Figure 1. Example of ICTC Digital Badge (Cloud Computing Micro-Credential)



ICTC Micro-Credential Pilot: Instructor Reflections

To better understand the nuances of micro-credential content delivery and improve future ICTC micro-credential program offerings, three instructors responsible for delivering the pilot micro-credentials in big data and cloud computing were interviewed by ICTC researchers.

When designing and delivering micro-credential programs, the instructors recommended making the content practical in nature and leaning toward teaching application over theory in most cases. This includes adopting tools, software, and methods used in industry as much as possible. Furthermore, micro-credentials will be of most use when the specific skills they are designed to impart are mapped to existing jobs. Job mapping should not only take technical skill requirements into account but also domain knowledge specific to different industries. This allows assignments to be structured and contextualized in a way that is relevant to employers and thus enhances graduating learners' career outcomes.

According to the three instructors, micro-credentials are also best designed and delivered in a way that emphasizes transversal technical skills as opposed to application-specific skills. Transversal technical skills are less subject to change and will remain relevant to learners for longer. For example, one instructor mentioned it is more valuable to teach data visualization in general rather than teach one specific data visualization software package. Micro-credentials that are application agnostic are of more general interest than those that stress learning a specific application—though teaching using industry-standard software was also important for industry applicability and job readiness. There is a balance to maintain.

A major challenge faced by ICTC's micro-credential pilot instructors was structuring the learning in such a way that was useful to cohorts of learners who entered the program from a variety of different educational backgrounds and fields of work. It was not possible—nor reasonable—to have all learners entering the micro-credentials start at the same level of knowledge. As one instructor reflected, the challenge in any highly technical program offering was understanding prior learning experience and knowledge level upon intake into a program. For instructors delivering the big data micro-credential, learners entered into the program with varying levels of skill and comfort writing code using common languages such as Python. To help get all learners up to speed, instructors offered bonus workshops in Python coding to supplement the core learning in the data science micro-credential.

When micro-credentials are used as an upskilling or reskilling tool, it is important that instructors meet learners where they are in their learning journeys and have the flexibility to implement learning interventions to help learners succeed. Yet, this learner-centric approach does take more time and resources.

Finally, instructors also stressed the importance of designing opportunities for learners to produce industry-relevant work that can be included in a professional portfolio. For ICTC's two pilot micro-credentials, instructors encouraged students to upload their projects to GitHub to act as a professional portfolio for future employers. A readily accessible portfolio of learner work could be a decisive advantage during a job search, so it is important that micro-credentials are designed to encourage this whenever practical.

Big Data & Cloud Computing Micro-Credential Pilots: Learner Survey Results

To gain insights into micro-credential learner experience, ICTC asked learners enrolled in the big data and cloud computing micro-credential pilot programs to complete intake and post-course surveys. Together, these intake and post-course surveys allowed ICTC researchers to better understand learner attributes, such as demographics, motivations, perceptions, previous experience with micro-credentials and online training, overall satisfaction and experience, challenge and skill mastery, and application to careers.

By making these data publicly available, ICTC hopes to promote transparency in the reporting of micro-credential program effectiveness as well as help micro-credential providers, such as post-secondary institutions, non-profits, and private training organizations, to benchmark their own micro-credential programs. As a relatively novel education and training program format, Canadian micro-credential providers continue to seek best practices and learn from one another's experiences.

Learner Education and Employment Status

For job seekers, micro-credentials offer relatively inexpensive and flexible learning options while they focus their energies on conducting their job search. For those already employed, micro-credentials can provide valuable opportunities or pathways for upskilling to better excel in their current roles and advance their careers in the long term.

Micro-credentials also offer those who already hold a traditional post-secondary education credential, such as a degree or diploma, a method to complement their past studies with a relatively inexpensive, flexible, part-time learning option. There is a stated concern in the Canadian higher education sector as to whether micro-credentials might replace, reduce in value, or otherwise commodify traditional higher education,[30] yet, to an overwhelming degree, the learners who enrolled in ICTC's pilot micro-credentials already held traditional post-secondary credentials.

Education Status

For the big data program, a majority of learners reported completing a university-level program prior to enrolling in the big data micro-credential pilot (91%), with 44% completing an undergraduate degree and 47% completing a post-graduate degree (i.e., master's, PhD, etc.). Smaller shares of learners reported having some post-secondary (3%), a college diploma or certificate (3%), or trades certification or apprenticeship (3%).

For the cloud computing program, a majority of learners reported to have completed a university-level program prior to enrolling in the big data micro-credential pilot (86%), with more than half (56%) having completed a university undergraduate degree, and almost a third (30%) having completed post-graduate university education (i.e., master, PhD, etc.). Smaller shares of respondents had either some post-secondary education (5%), a college diploma or certificate (7%), or other education (2%). See Figures 2 and 3 below.

Figure 2. Big Data Micro-Credential Pilot, Learner Education Profile. Data source: ICTC and LabourX, 2023.

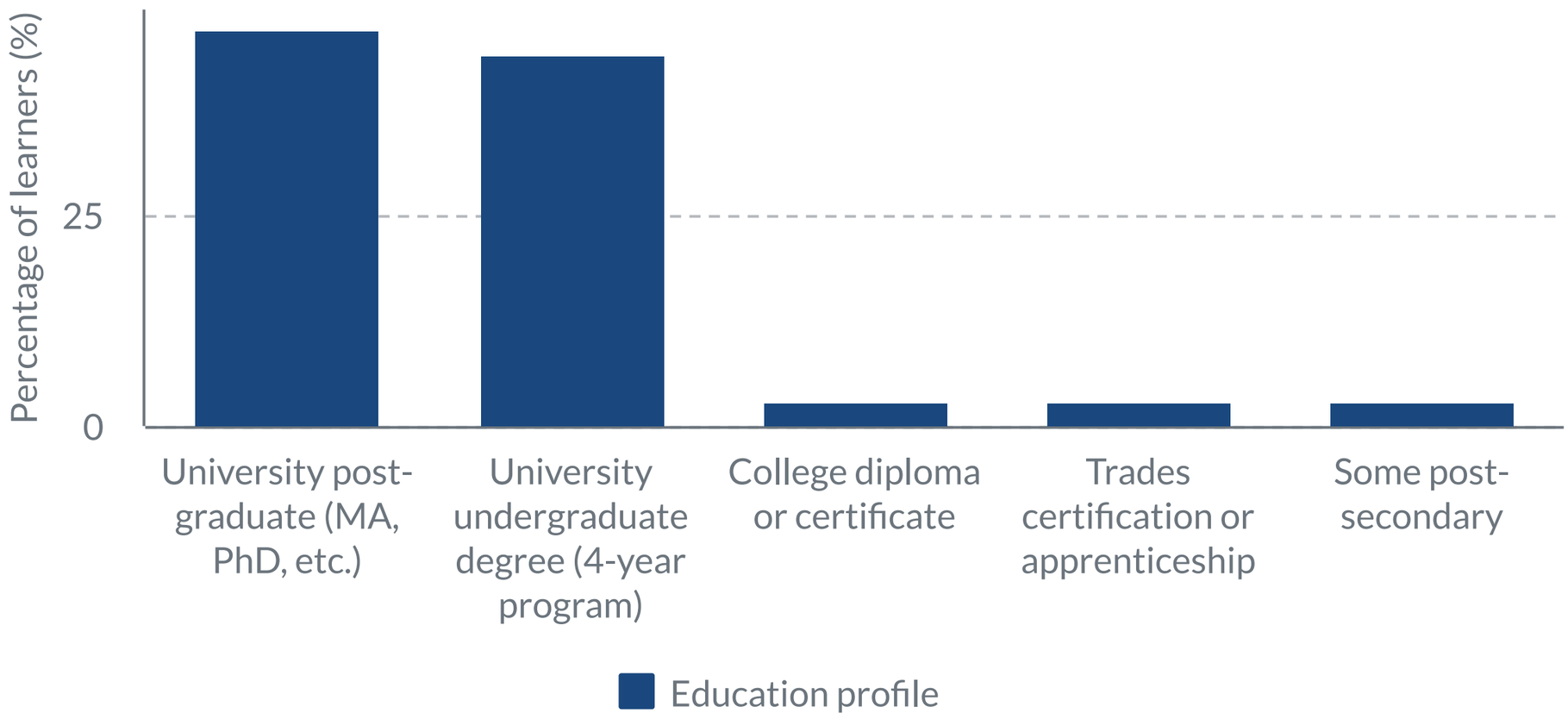
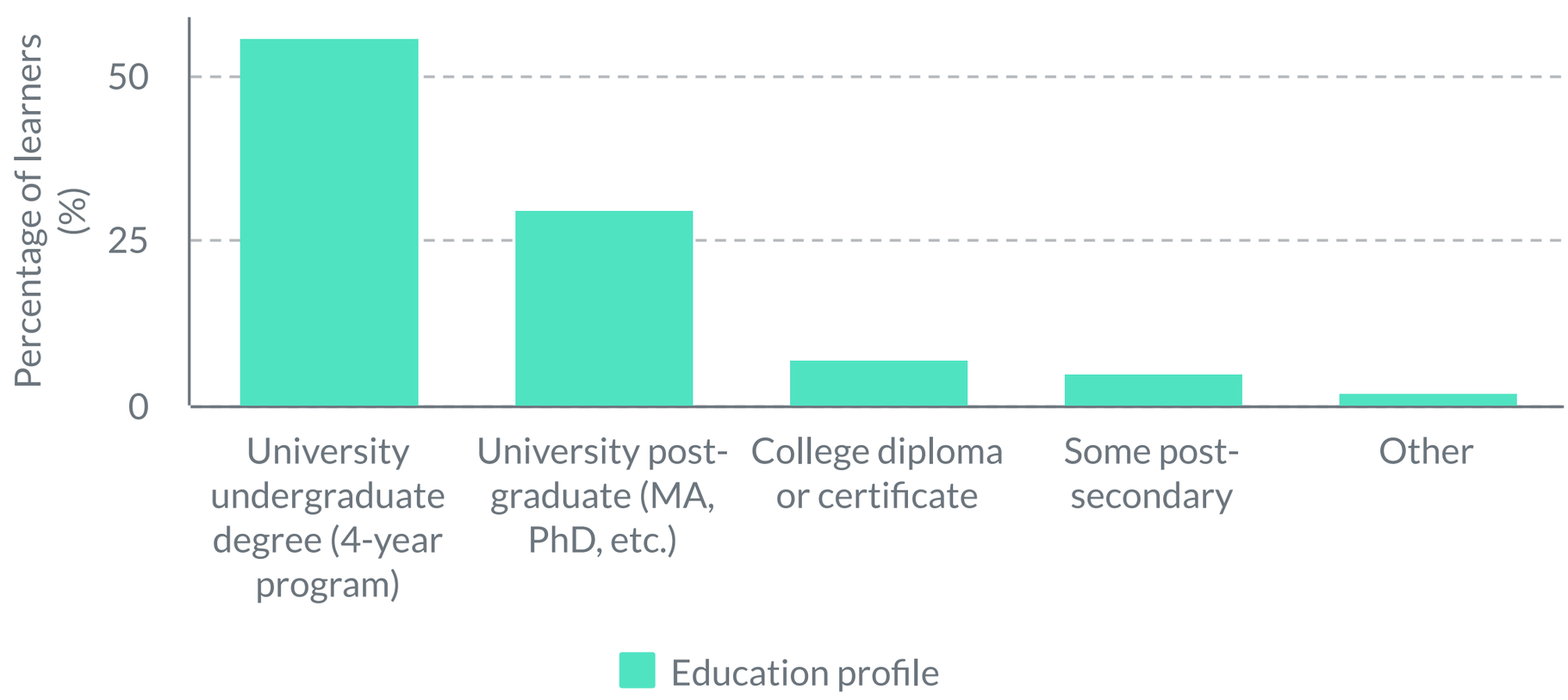


Figure 3. Cloud Computing Micro-Credential Pilot, Learner Education Profile. Data source: ICTC and LabourX, 2023.



Employment Status

For the big data micro-credential, a plurality (44%) of learners were unemployed at the time of enrolling in the program pilot. Of the remainder of learners, 39% were employed full-time, while 8% reported being employed part-time. Eight percent of respondents preferred not to answer the question.

For the cloud computing program, just over half (51%) were employed full-time at the time of enrolling in the pilot. Of the remainder of the learners, 30% were unemployed, while smaller shares were employed part-time (9%), employed seasonally (5%), or self-employed (2%). Two percent of respondents preferred not to answer this question. See Figures 4 and 5 below.

Figure 4. Big Data Micro-Credential Pilot, Learner Employment Status. Data source: ICTC and LabourX, 2023.

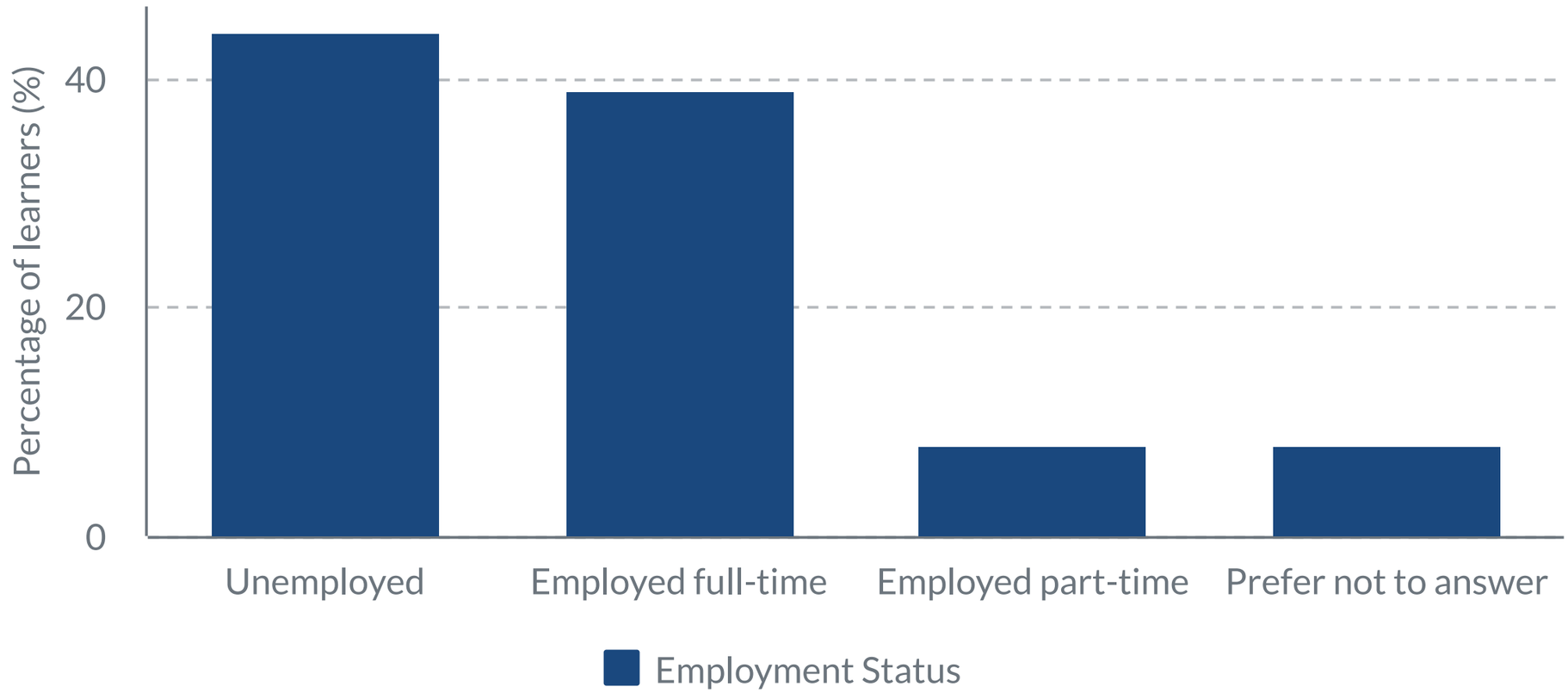
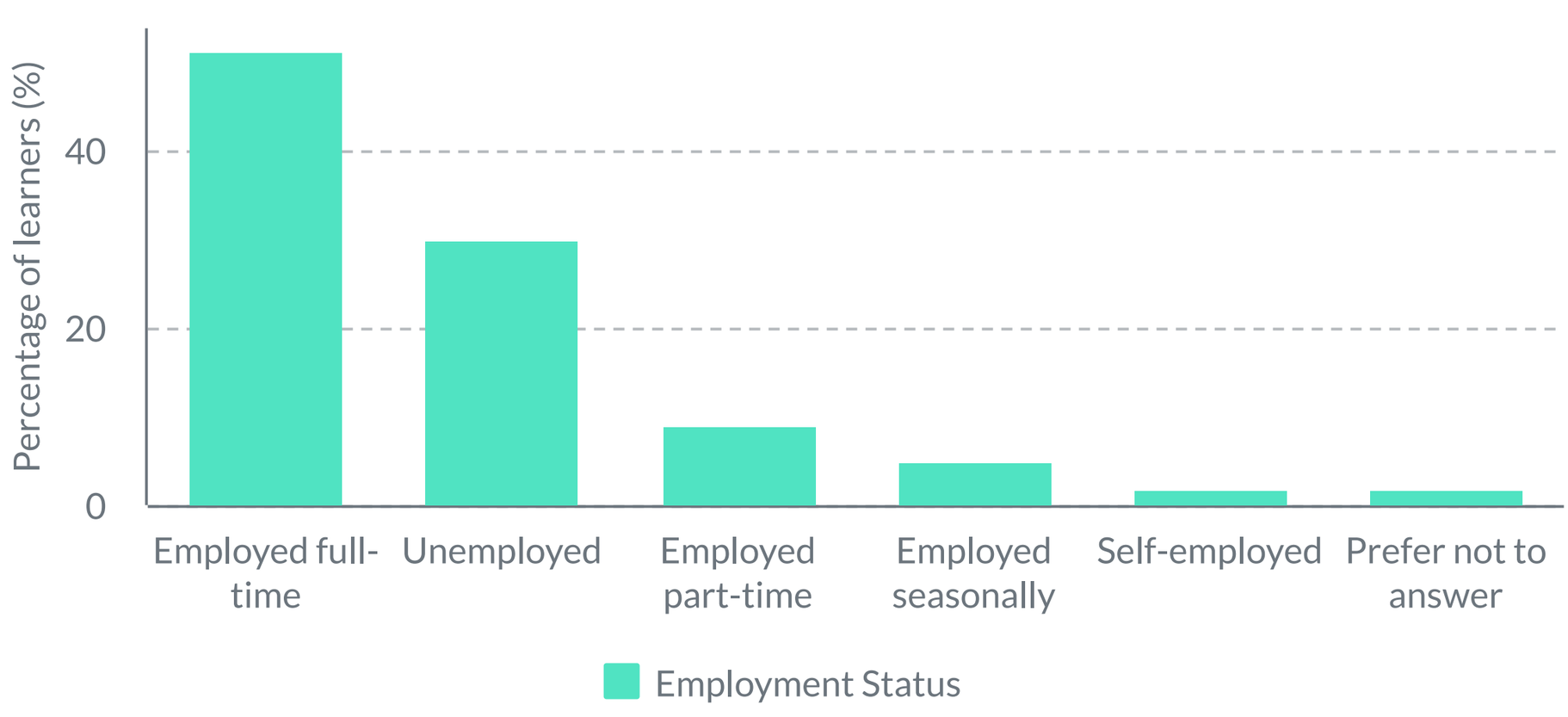


Figure 5. Cloud Computing Micro-Credential Pilot, Learner Employment Status. Data source: ICTC and LabourX, 2023.



Learner Motivations

The learner intake surveys for the big data and cloud computing micro-credentials posed a series of questions regarding learner motivations for enrolling in the two micro-credential pilots, as well as a self-assessment of baseline levels of skills and experience. Understanding learning motivations for pursuing a micro-credential can be enlightening for micro-credential providers as they develop and update curricula.

For the big data program, the majority of learners (69%) indicated that they were currently seeking a new job/career, while 17% said they were not currently seeking a new job/career, and 14% preferred not to answer the question. Two-thirds (66%) of learners said that there was a specific job/career they hoped to pursue after completing the big data micro-credential. Desired job titles reported by learners included data scientist, data manager, data analyst, and business analyst, among others. As one learner responding to an open-ended question in the survey stated, “The big data course has opened doors to a broader range of job opportunities as data analysts, data engineers, data scientists, or big data architects.”

For the cloud computing program, the majority of learners completing the intake survey (63%) indicated that they were currently seeking a different job/career, while 21% reported not currently seeking a new job/career. Sixteen percent of learners preferred not to answer the question. Half (50%) of respondents said that there was a specific job/career they hoped to pursue after completing the cloud computing micro-credential. Desired job titles included system administrator, cloud architect, cloud specialist, data engineer, and cloud computing engineer, among others.

When learners were asked to specify their top three motivations, the two most common reasons for learners enrolling in both the big data and cloud computing programs were to “further studies/learn a new skill” and “transition to a new career/job,” while “personal interest” and “help with promotion/career advancement” were tied for the third top reason. See Figures 6 and 7 below.

Figure 6. Big Data Micro-Credential Pilot, Top Three Motivations for Enrolling. Percentages due not sum to 100% because respondents were asked to select all that apply. Data source: ICTC and LabourX, 2023.

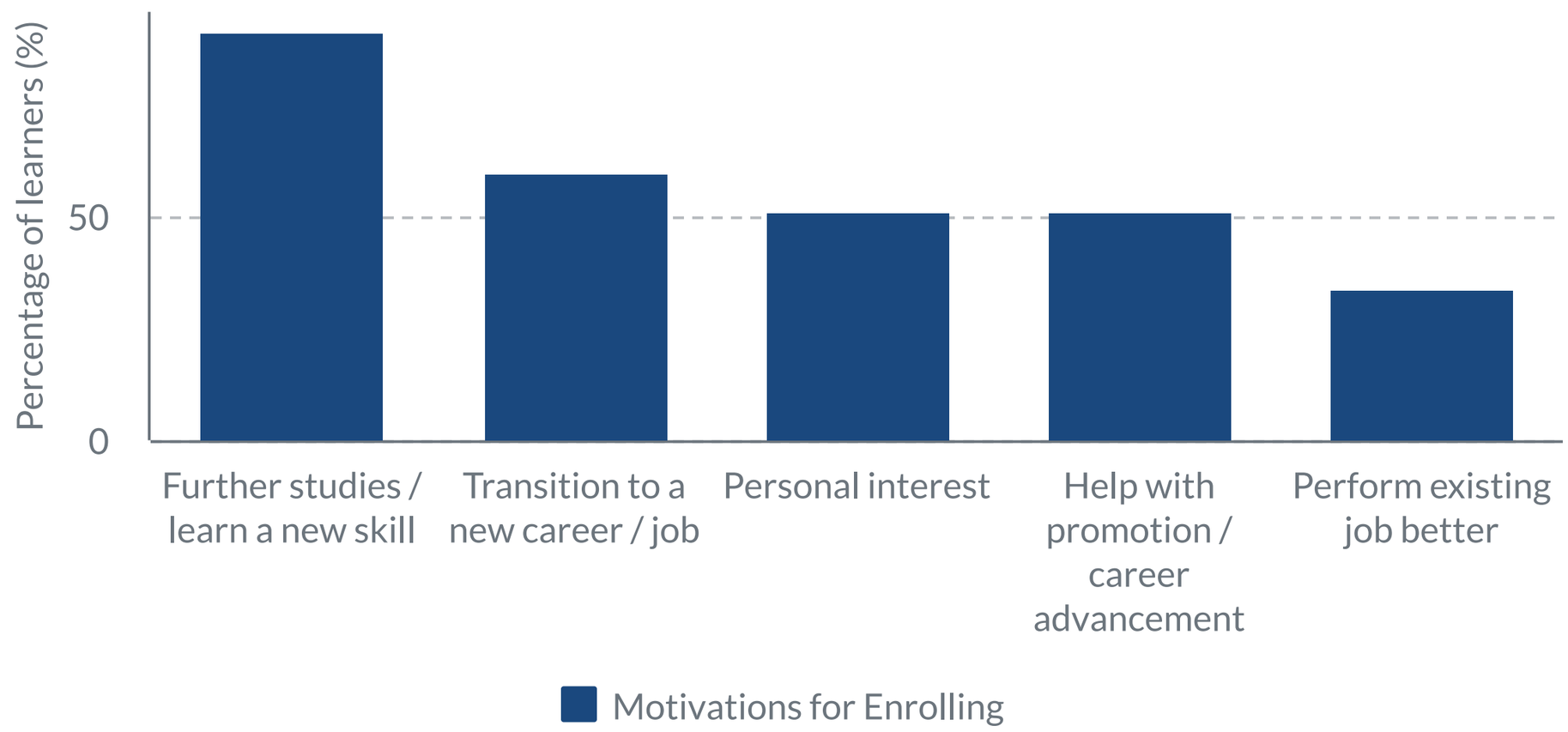
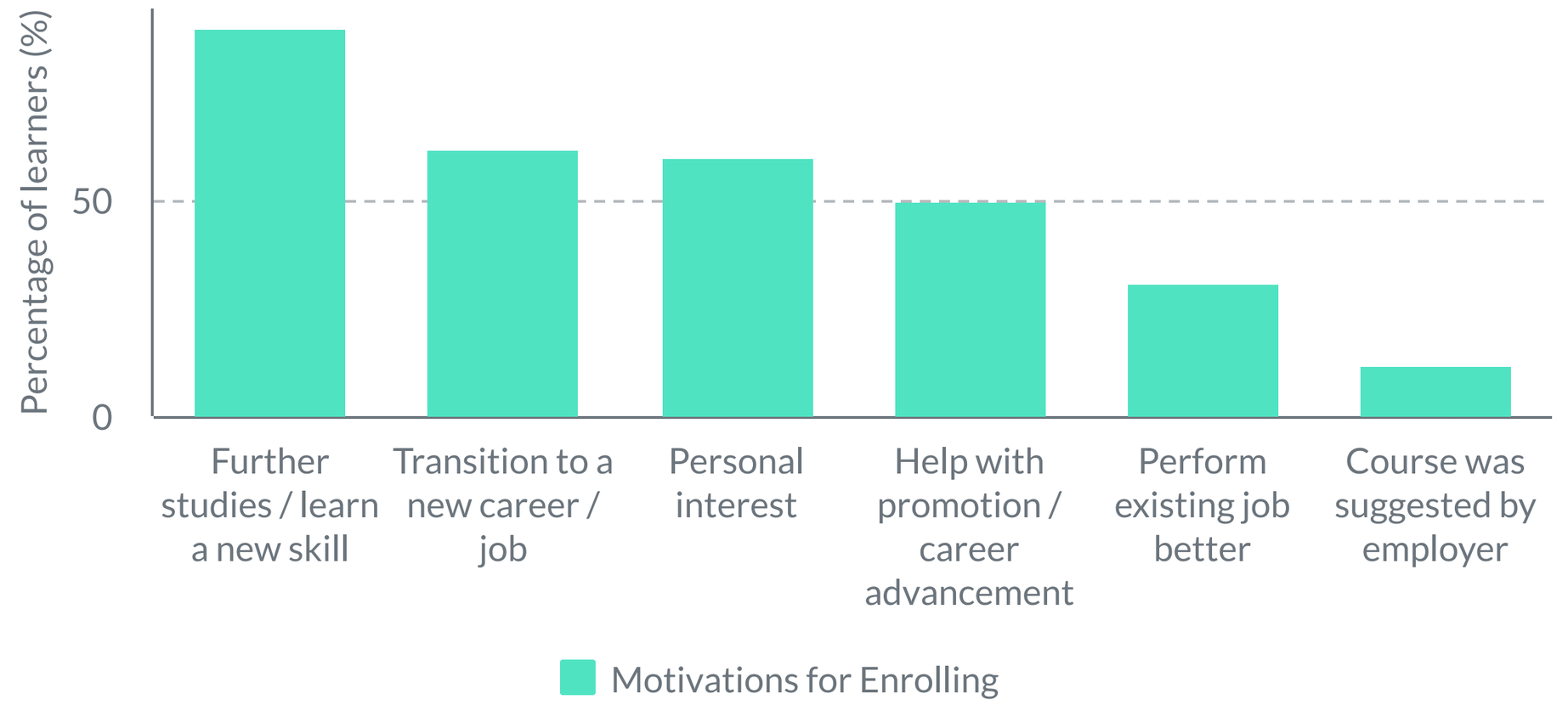


Figure 7. Cloud Computing Micro-Credential Pilot, Top Three Motivations for Enrolling. Percentages due not sum to 100% because respondents were asked to select all that apply. Data source: ICTC and LabourX, 2023.



Self-Assessment: Learner Baseline Level of Experience

When asked about their skill/experience level prior to beginning their respective programs, 51% of learners enrolled in the big data program reported having no prior knowledge or experience (introductory), 40% of learners reported being novices with some foundational knowledge but with less than two years of work experience, while 9% indicated having intermediate levels skills with two to five years of work experience in big data or a related field.

For cloud computing, 38% reported having no prior knowledge or experience (introductory), 57% of learners reported being novices with some foundational knowledge but less than two years of work experience, while only 5% indicated having intermediate levels skills with two to five years of work experience in cloud computing or a related field. See Figures 8 and 9 below.

Figure 8. Big Data Micro-Credential Pilot, Learner Baseline Level of Experience Self-Assessment. Data source: ICTC and LabourX, 2023.

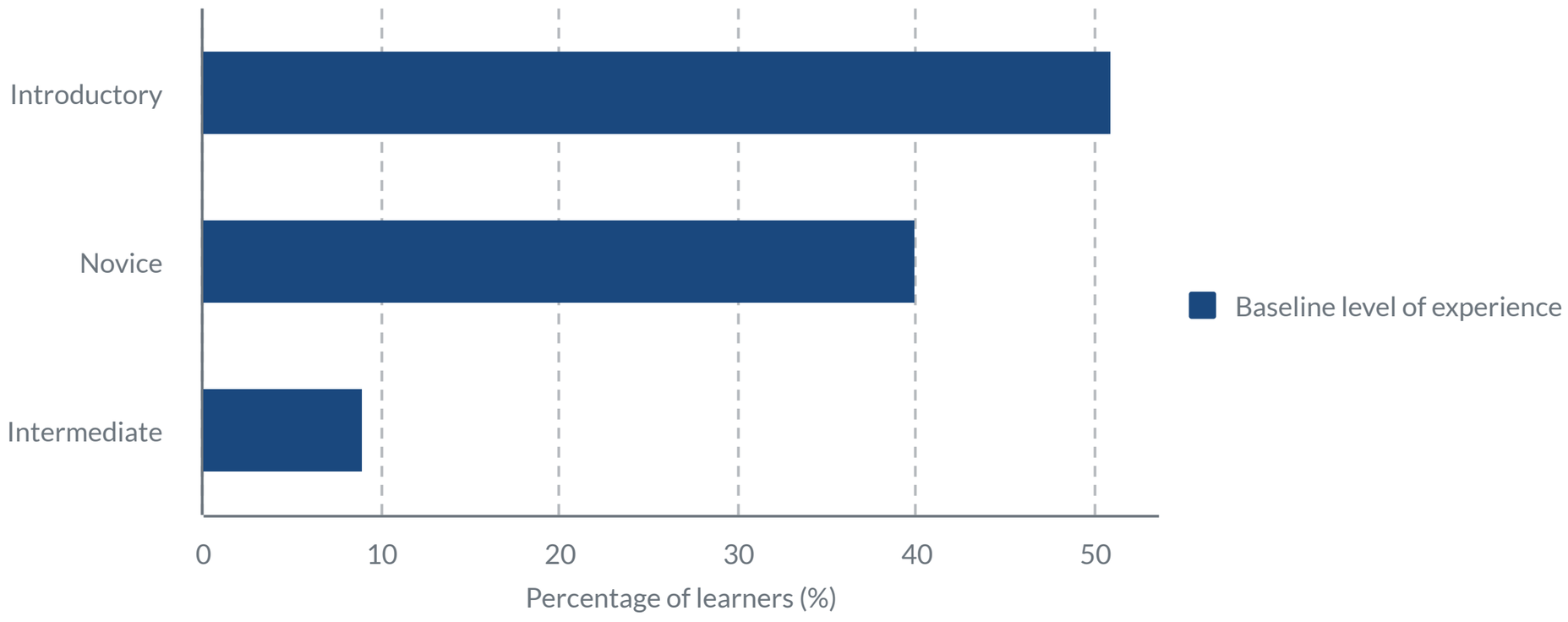
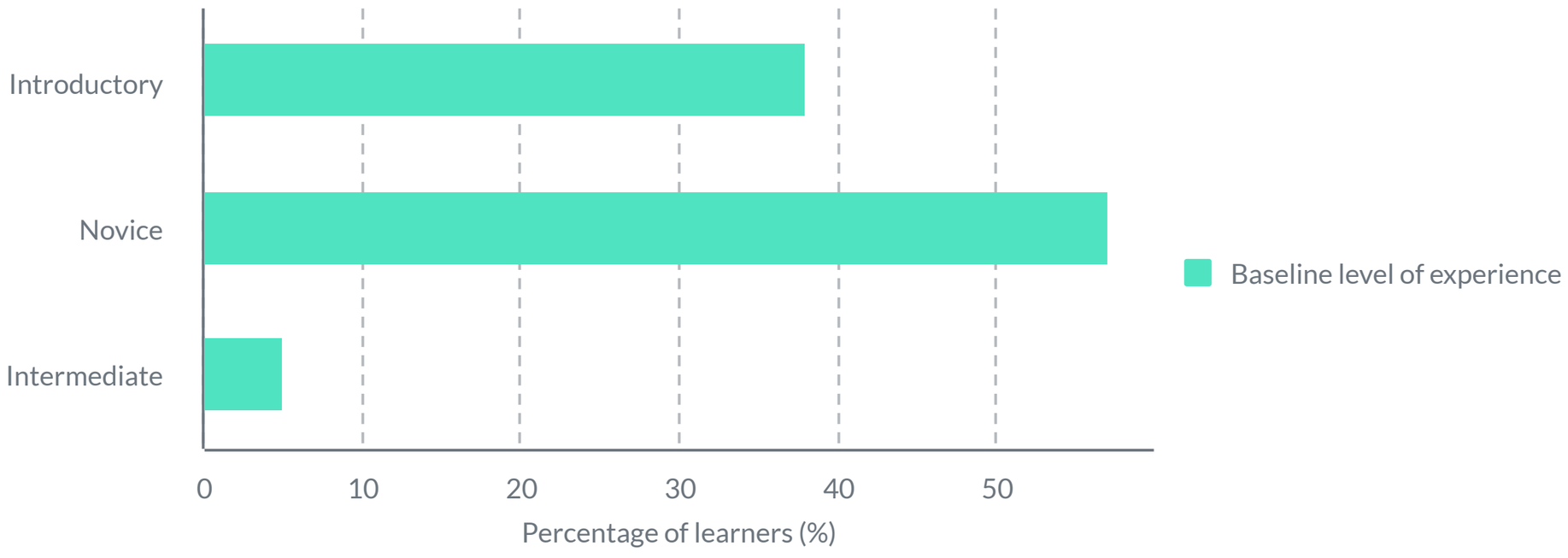


Figure 9. Cloud Computing Micro-Credential Pilot, Learner Baseline Level of Experience Self-Assessment. Data source: ICTC and LabourX, 2023.



Self-Assessment: Learner Baseline Confidence in Core Skills

In the intake surveys, learners were asked to self-assess their levels of confidence in core skills essential for each micro-credential program. Many learners entering the big data micro-credential reported being “not confident” in four of the five core skills, with only “understanding data types” having a plurality of respondents being somewhat confident. For cloud computing, learners entering the program reported being “not confident” in four of the six core skills, with only “working with data in the cloud” having a plurality of students being “somewhat confident,” and “understanding cloud economics” being tied with equal numbers of learners reporting being “not confident” and “somewhat confident.” See Figures 10 and 11 below.

Figure 10. Big Data Micro-Credential Pilot, Learner Baseline Confidence in Core Skills Self-Assessment. Data source: ICTC and LabourX, 2023.

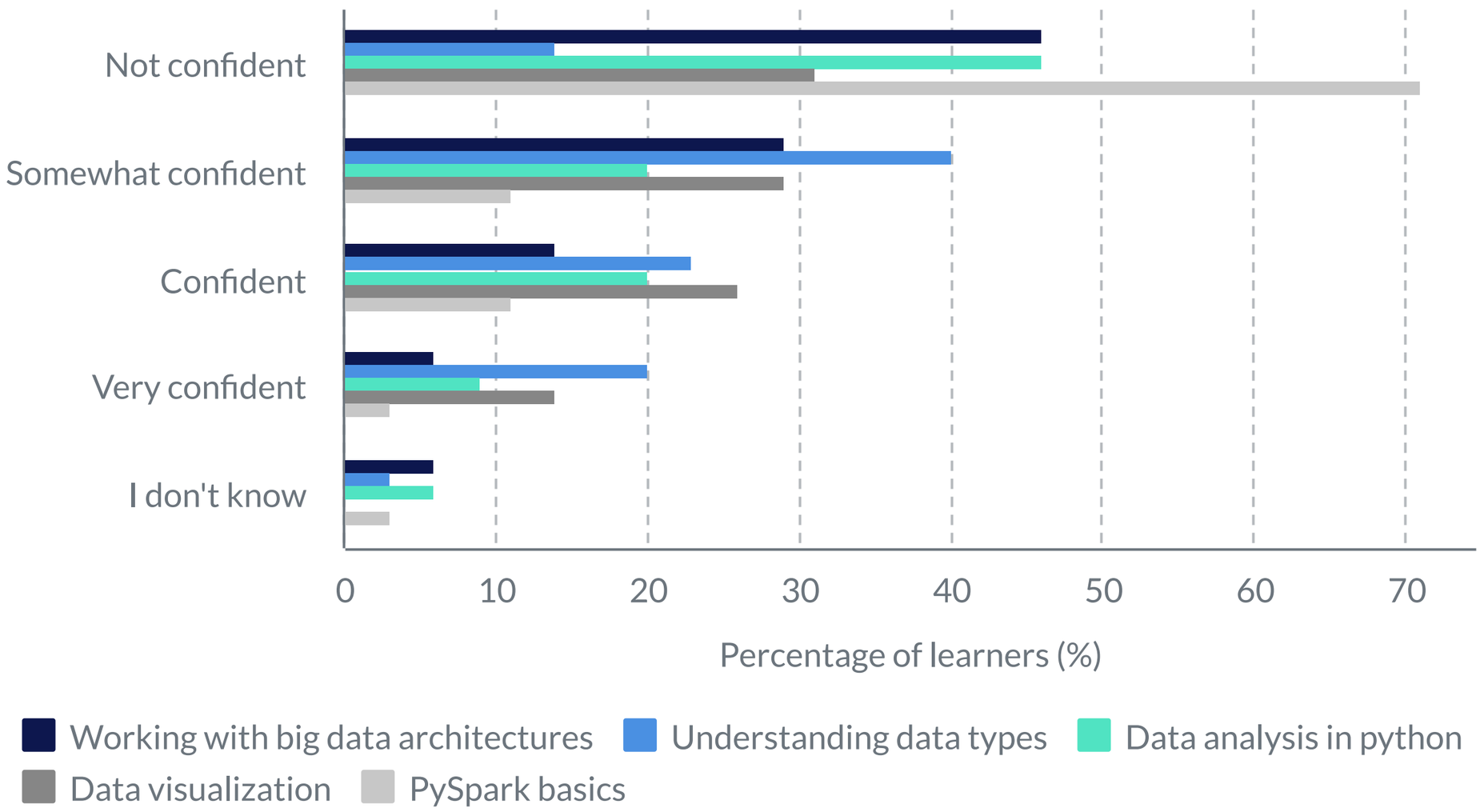
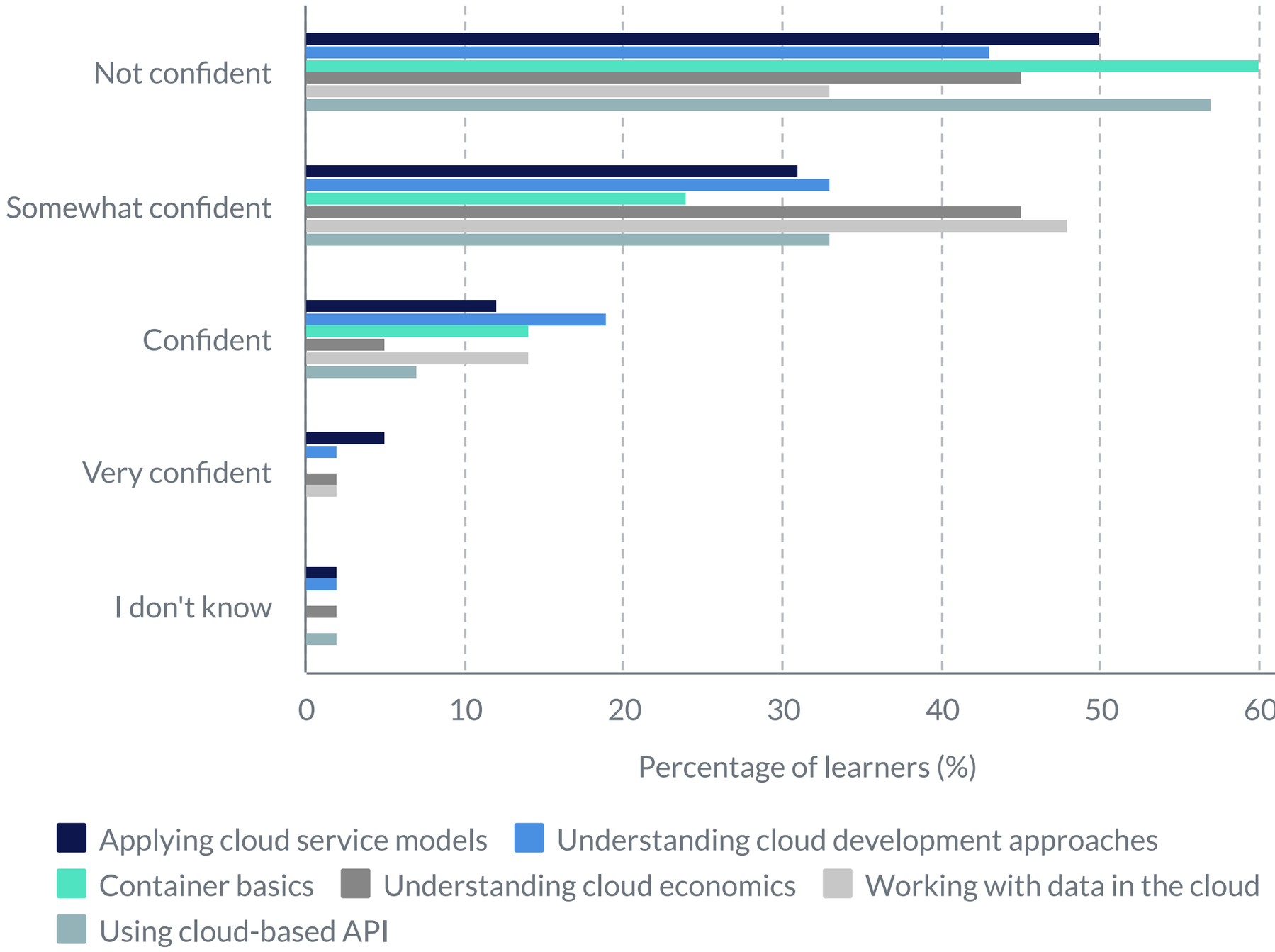


Figure 11. Cloud Computing Micro-Credential Pilot, Learner Baseline Confidence in Core Skills Self-Assessment. Data source: ICTC and LabourX, 2023.



Learner Familiarity with Micro-Credentials & Online Training

When asked about previous experience taking online education or training, 94% of learners enrolled in the big data program and 95% of learners enrolled in the cloud computing program reported having taken online education or training previously. Only 6% of learners enrolled in the big data program and 5% of learners enrolled in the cloud computing program reported having no previous experience with online education/training.

When asked about their familiarity with micro-credentials, the majority of learners in both the big data and cloud computing programs were familiar with the term “micro-credential.” In fact, only 29% of learners enrolled in the big data program and cloud computing programs reported being unfamiliar with micro-credentials. See Figures 12 and 13 below.

Figure 12. Big Data Micro-Credential Pilot, Learner Familiarity with Micro-Credentials. Data source: ICTC and LabourX, 2023.

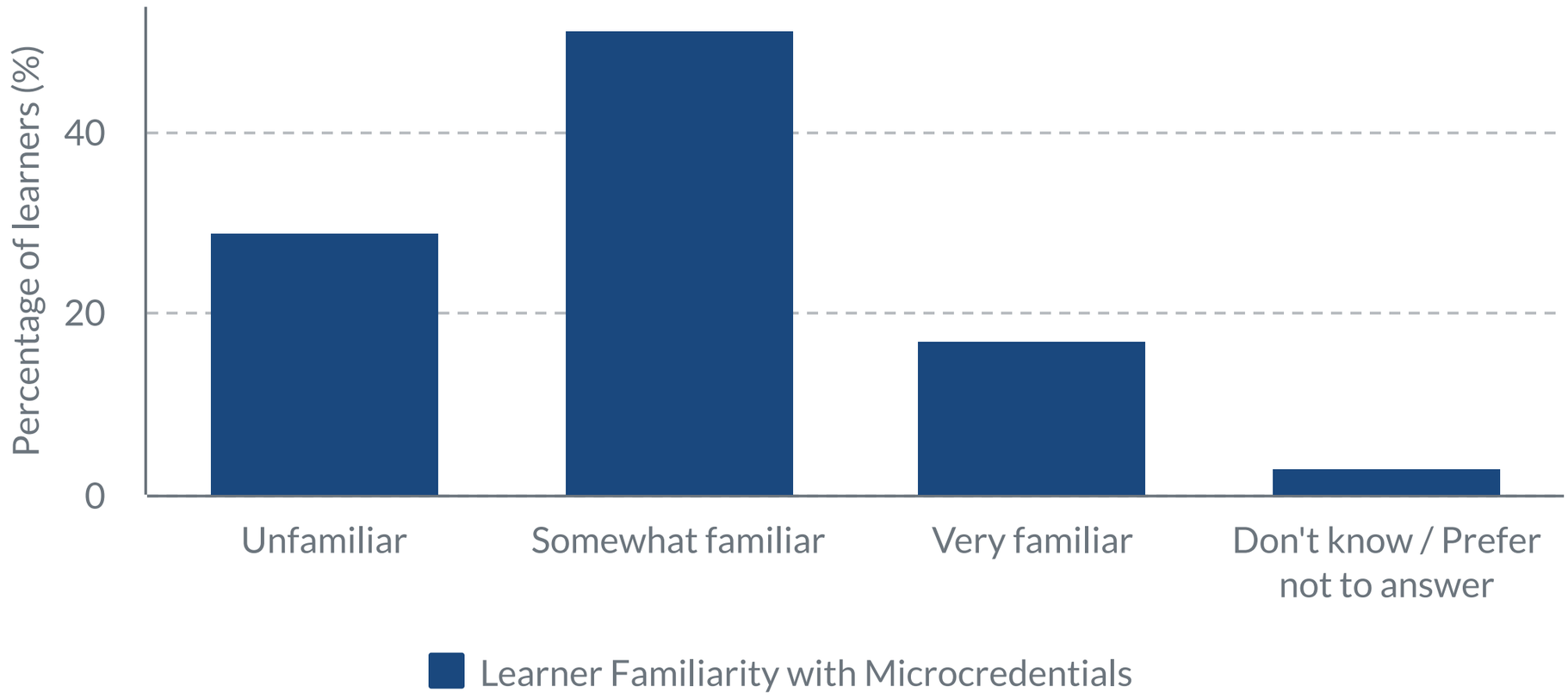
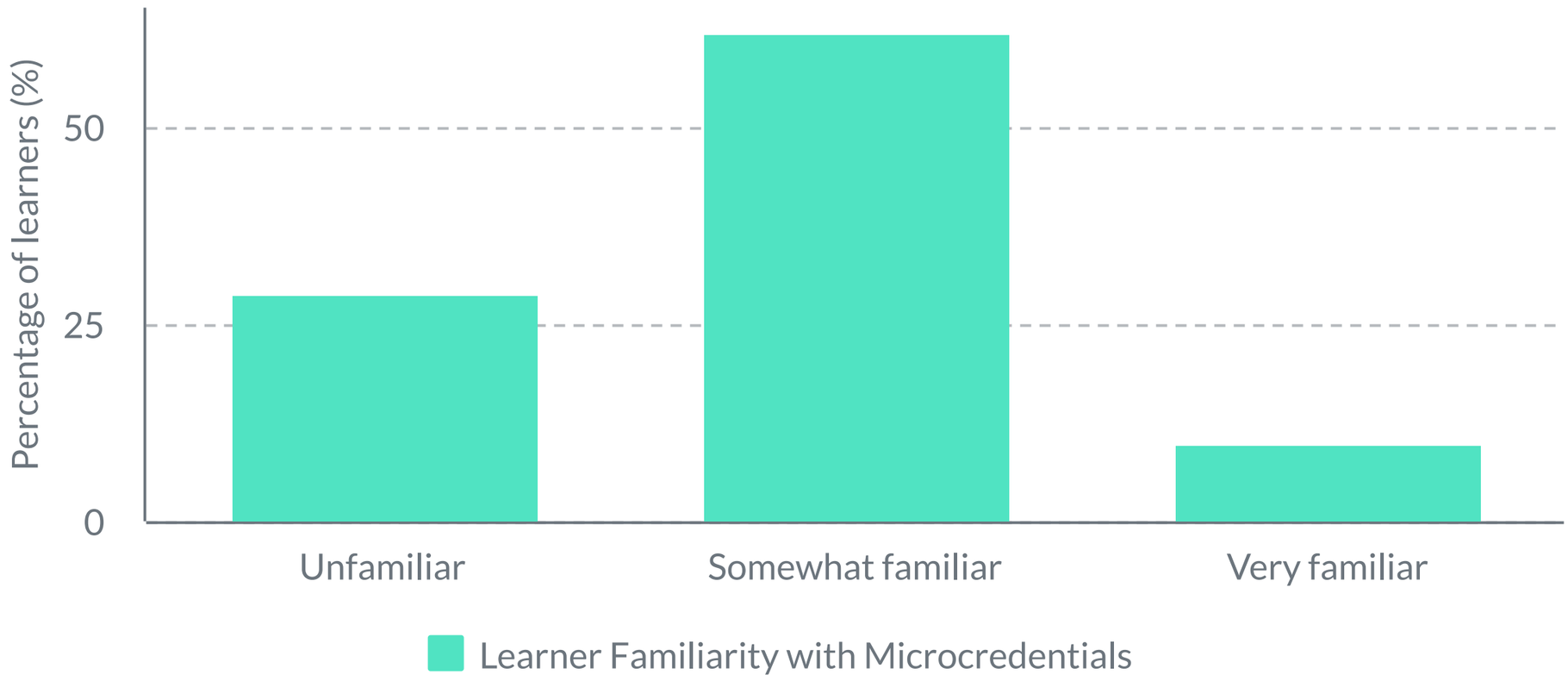


Figure 13. Cloud Computing Micro-Credential Pilot, Learner Familiarity with Micro-Credentials. Data source: ICTC and LabourX, 2023.



Learner Experience and Satisfaction

Of the original cohort of learners to enrol in and complete the two micro-credential pilots, 24 learners from the big data program and 37 from the cloud computing program responded to the post-program survey, which sought to gather information on learner experience and satisfaction.

On the questions of overall program satisfaction and enjoyment, the majority of learners who completed the big data and cloud computing programs indicated that

their overall level of satisfaction with their course was either “very good” or “excellent,” at 75% and 84%, respectively. At the same time, a majority (96%) said that they “agree” or “strongly agree” with the statement that “Overall, I enjoyed the learning experience during the big data course.” For learners who completed the cloud computing program, a majority (86%) said that they “agree” or “strongly agree” with the statement, “Overall, I enjoyed the learning experience during the cloud computing course.” See Figures 14 and 15 below.

Figure 14. Big Data Micro-Credential Pilot, Learner Overall Satisfaction and Enjoyment. Data source: ICTC and LabourX, 2023.

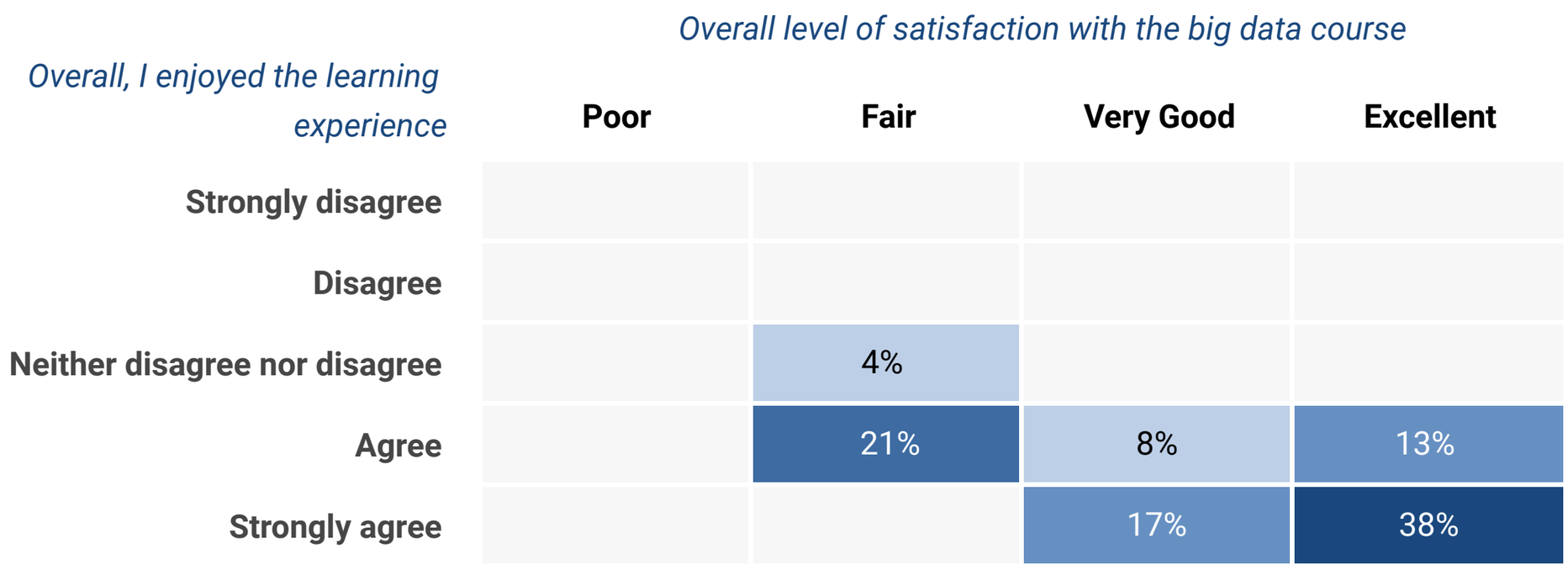
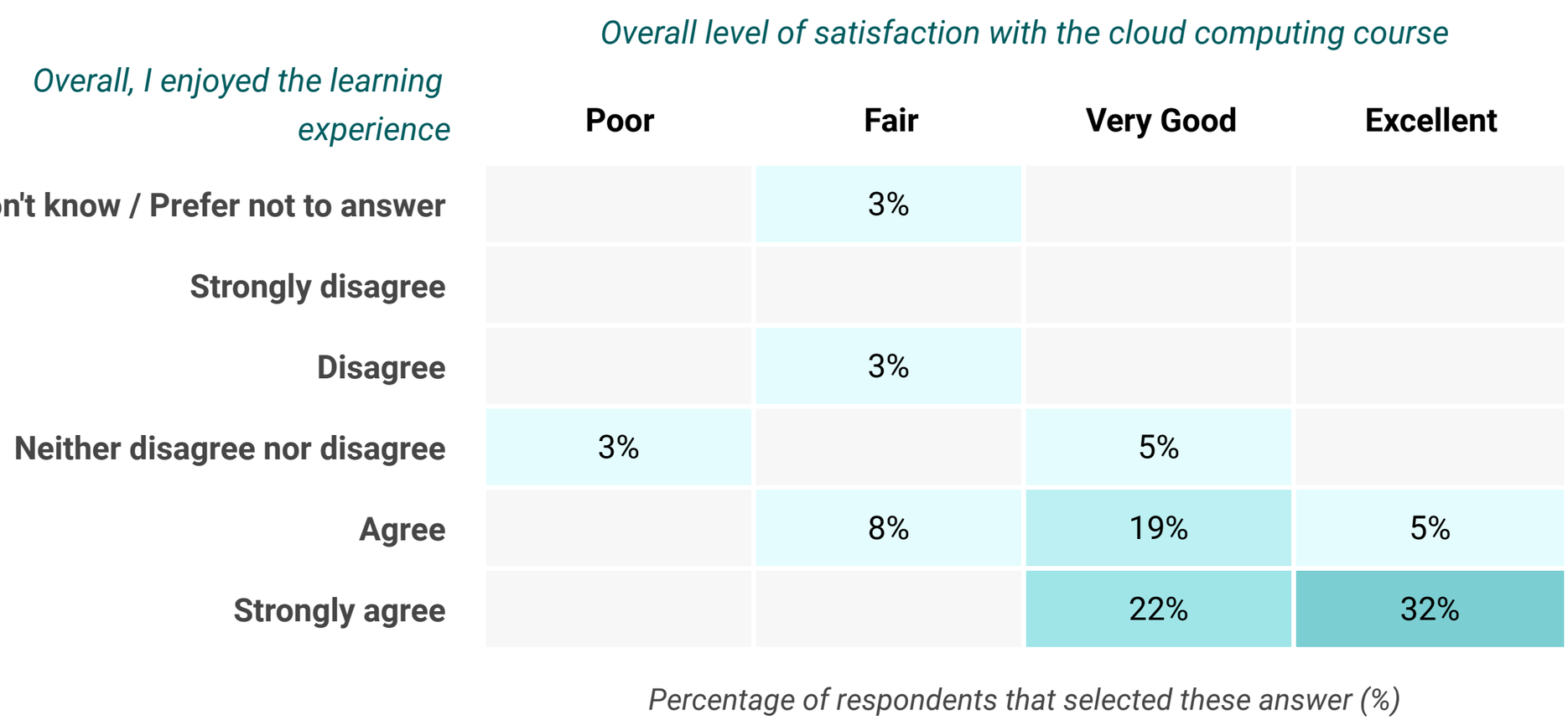


Figure 15. Cloud Computing Micro-Credential Pilot, Learner Overall Satisfaction and Enjoyment. Data source: ICTC and LabourX, 2023.



Time Investment & Meeting Student's Professional Needs

Learners seeking professionally oriented learning are much more likely to value micro-credential programs that directly meet their professional learning needs in a time-effective manner. For such learners, micro-credential programs will compete with other priorities such as work, family commitments, rest, and leisure. Micro-credentials need to be perceived as a good time investment by busy working professionals to be a legitimate option.

On the question of whether pursuing the micro-credentials was perceived as a good investment in learner time, the majority (92%) of learners completing the big data program indicated agreement ("agree" or "strongly agree") with the statement "Pursuing a micro-credential in big data was a good investment of my time." In addition, 75% of learners from the big data program agreed or strongly agreed that the course met their professional development/learning needs.

Likewise, the majority (86%) of learners who completed the cloud computing program also indicated agreement ("agree" or "strongly agree") with the statement, "Pursuing a micro-credential in Cloud Computing was a good investment of my time." In addition, 72% of learners from the cloud computing program agreed or strongly agreed that the course met their professional development/learning needs. See Figures 16 and 17 below.

Figure 16. Big Data Micro-Credential Pilot, Time Investment & Meeting Student Professional Needs. Data source: ICTC and LabourX, 2023.

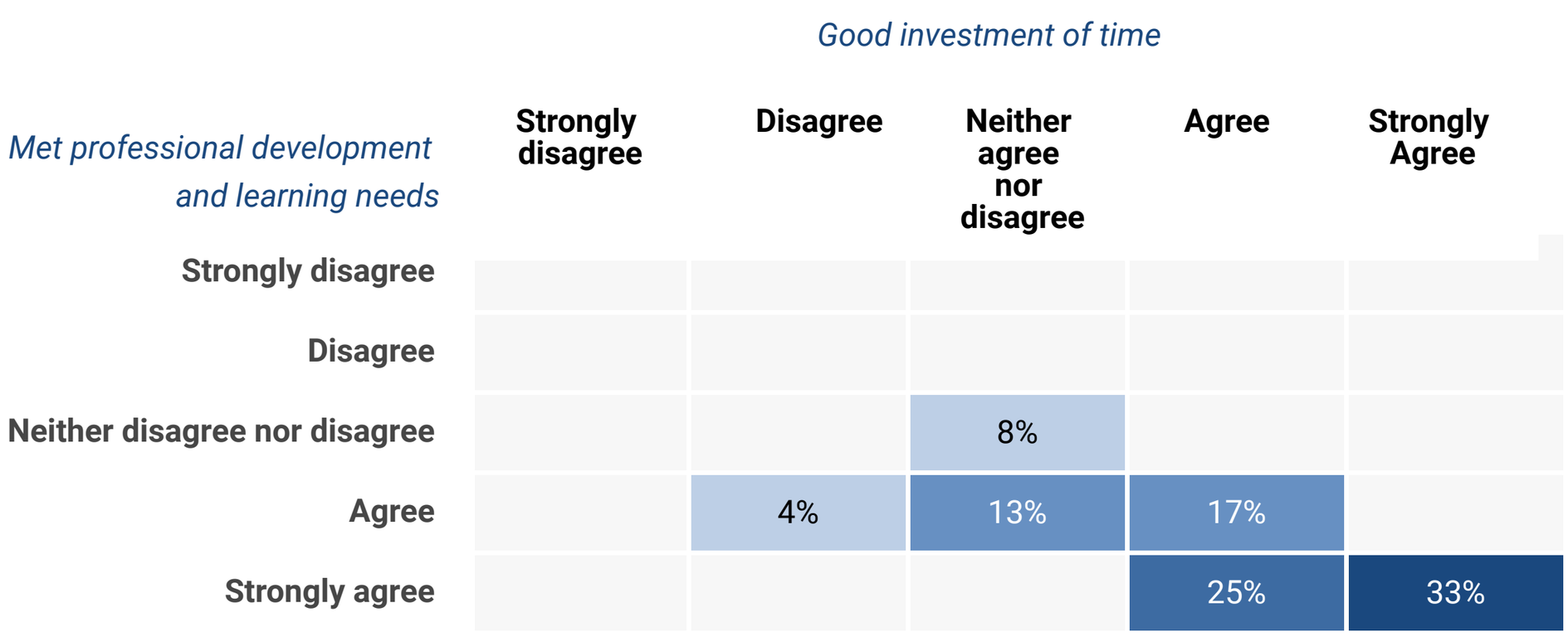
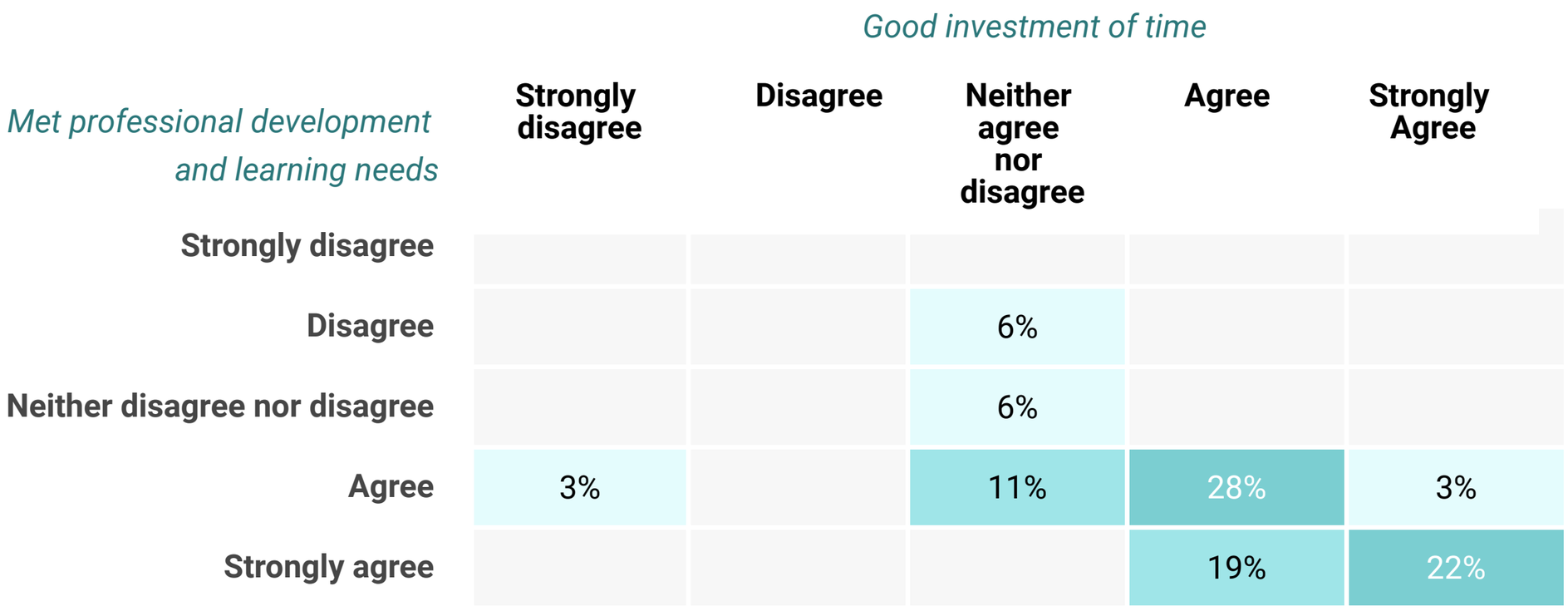


Figure 17. Cloud computing Micro-Credential Pilot, Time Investment & Meeting Student Professional Needs. Data source: ICTC and LabourX, 2023.



Ease of Understanding & Academic Challenge

One of the major challenges in micro-credential design is producing learning content that is clearly communicated and aids in learner understanding but that is also academically rigorous and intellectually challenging.

For ICTC's pilot micro-credentials, on the question of the ease with which content was presented and understood by learners, all respondents completing the big data program either agreed or strongly agreed that the content presented during the course was easy to understand. There was greater diversity in the responses to the question about academic challenge, with 25% of big data learners strongly agreeing that they felt academically challenged when completing the big data program, 33% agreeing, 21% neither agreeing nor disagreeing, and 21% disagreeing or strongly disagreeing.

For learners completing the cloud computing program, nearly all learners (97%) agreed or strongly agreed that the content presented during the course was easy to understand. Similarly to the big data post-program results, there was greater diversity in the responses to the question about academic challenge, with 22% of cloud computing learners strongly agreeing that they felt academically challenged when completing the cloud computing program, 27% agreeing, 14% neither agreeing nor disagreeing, and 38% disagreeing or strongly disagreeing. See Figures 18 and 19 below.

Figure 18. Big Data Micro-Credential Pilot, Ease of Understanding & Academic Challenge. Data source: ICTC and LabourX, 2023.

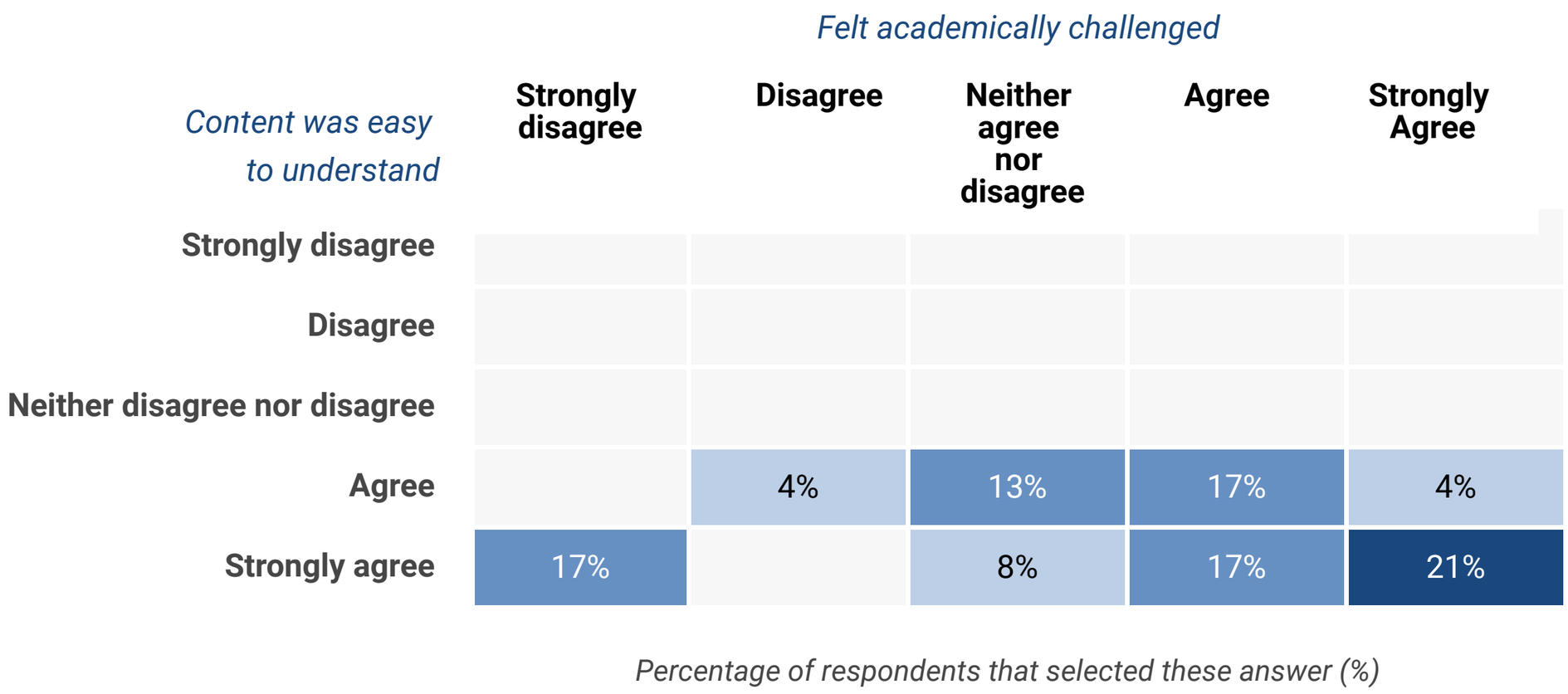
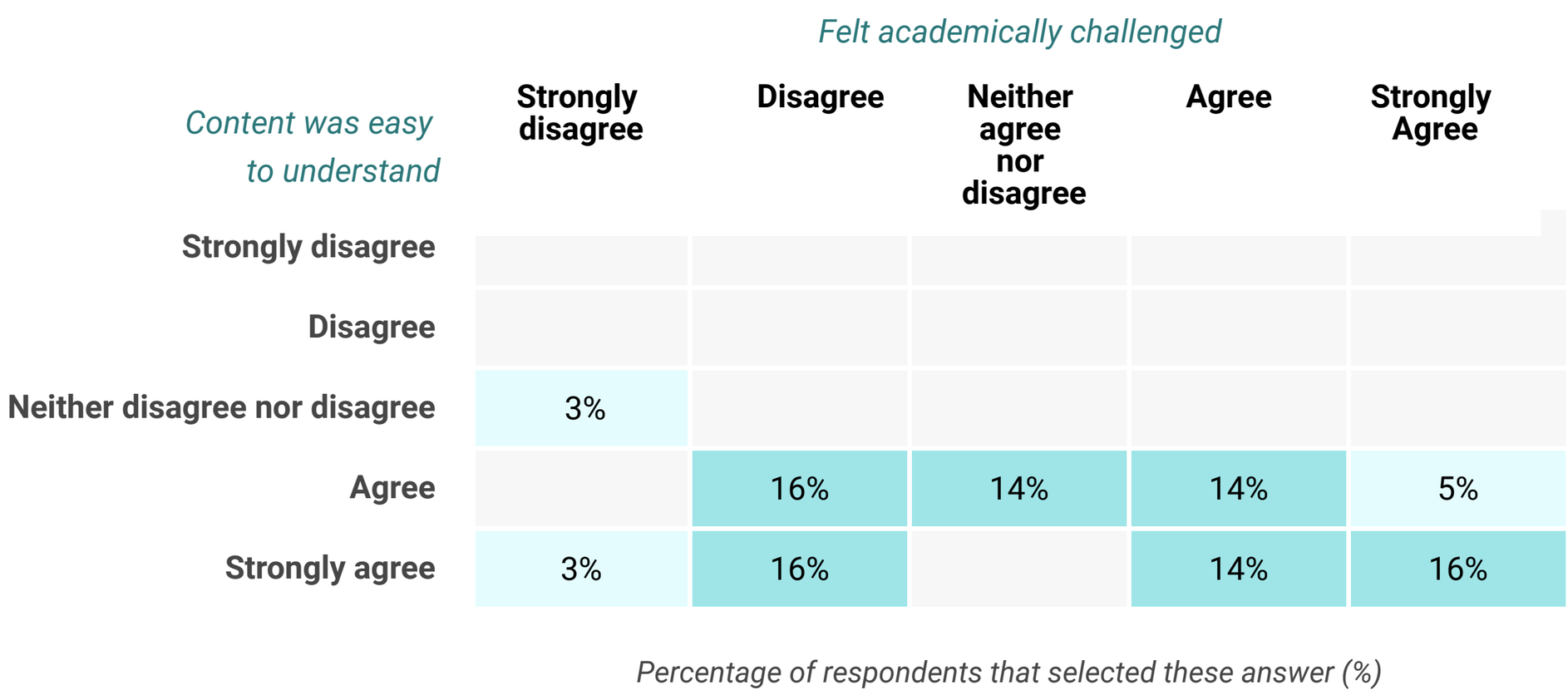


Figure 19. Cloud Computing Micro-Credential Pilot, Ease of Understanding & Academic Challenge. Data source: ICTC and LabourX, 2023.



Achieving Program Learning Objectives & Final Workshop Effectiveness

A central design consideration for micro-credentials is how to apply learning to real-world contexts and applications. Final projects and cumulative workshops can act as both learner evaluation tools, while also solidifying the learning and skills development achieved throughout the program. Practical learner projects can also be incorporated into professional portfolios to aid in job searches.

For the big data program, more than two-thirds (71%) of learners said that the big data course's workshop was "very effective" at contributing to learning. At the same time, 42% of big data learners reported the course itself was "very effective" at helping the learner achieve specific learning objectives and goals, with 38% saying it was "moderately effective." As one learner completing the big data course reflected in an open-ended response, "The workshop was really good…. It has given me a sense of the new technology's potential."

For the cloud computing program, almost a third (32%) of respondents said that the course was "very effective" at helping the learner achieve specific learning objectives and goals, with an additional 43% saying it was "moderately effective." At the same time, 41% said that the cloud computing program's workshop was "very effective" at contributing to learning, with another 38% saying it was moderately effective. See Figures 20 and 21 below.

Figure 20. Big Data Micro-Credential Pilot, Achieving Program Learning Objectives & Final Workshop Effectiveness. Data source: ICTC and LabourX, 2023.

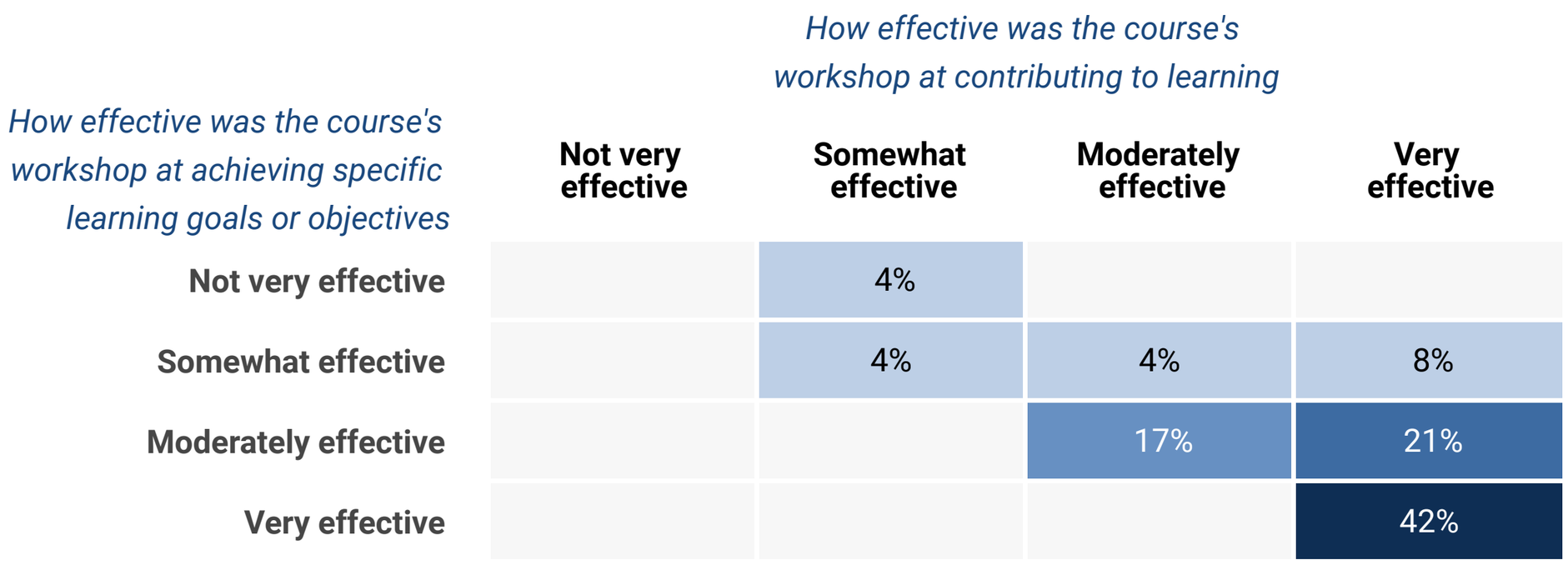
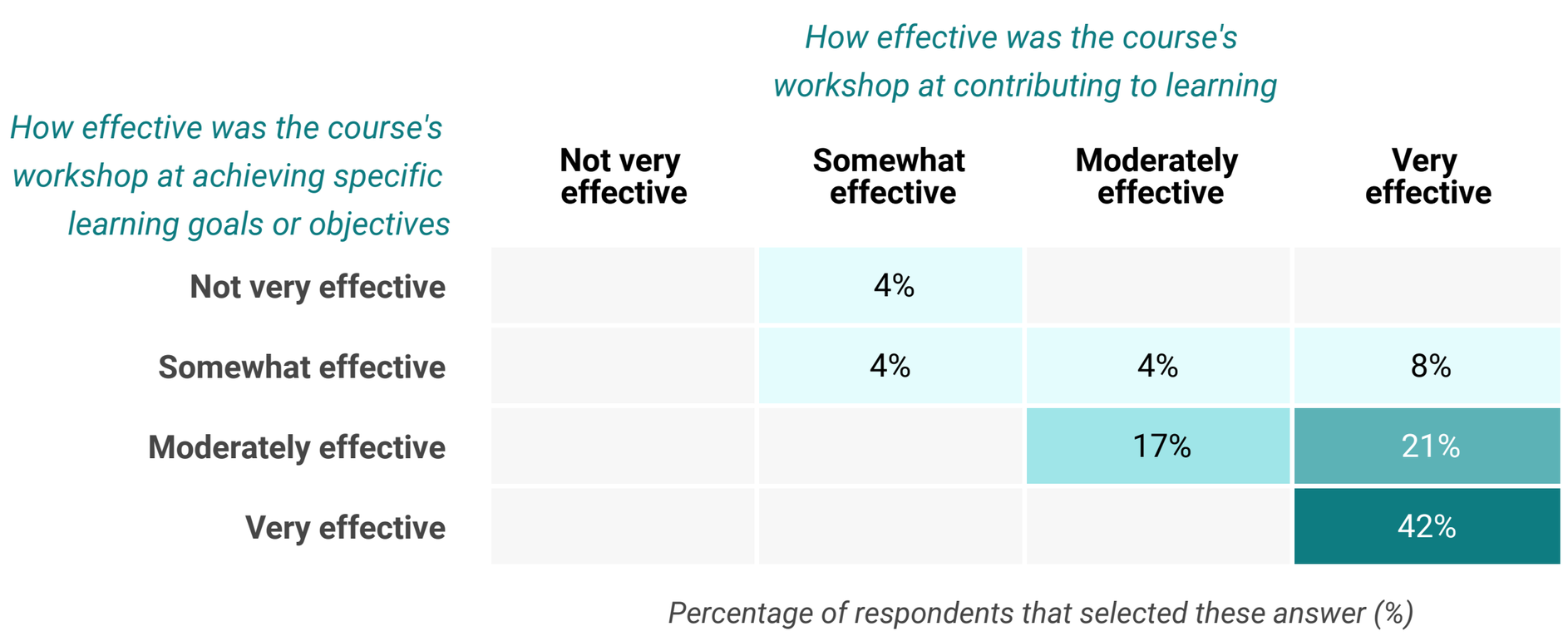


Figure 21. Cloud Computing Micro-Credential Pilot, Achieving Program Learning Objectives & Final Workshop Effectiveness. Data source: ICTC and LabourX, 2023.



Skills Mastery

Professionally oriented micro-credentials need to be designed to help learners develop a degree of mastery of skills that can be applied immediately in a work environment. After all, a significant part of the value proposition for micro-credentials is in rapid skills development and validation.

For the big data program, half (50%) of learners completing the program said that they had “somewhat” mastered data skills through completion of the big data course. Given that the course was a micro-credential rather than a multi-year instructional program and that half of respondents stated they had an “introductory” level of skills and experience with big data before beginning the big data program, it is perhaps not surprising that only about a third (29%) of learners said that they “completely” mastered data skills through completion of the program.

Likewise, half (50%) of learners completing the cloud computing program stated that they had “somewhat” mastered data skills through completion of the cloud computing program. Eleven per cent of respondents indicated that they had “not at all” mastered data skills through completion of the course. These same respondents all disagreed or strongly disagreed that they felt academically challenged when completing the course. Similar to the results seen in the big data post-program survey, only about a third (29%) of learners said they “completely” mastered data skills upon completion of the course, however, it is important to keep in mind that micro-credentials are different in nature than a multi-year instructional program, and that 38% of respondents had only an “introductory” level of skills and experience with cloud computing before beginning the micro-credential. See Figures 22 and 23 below.

Figure 22. Big Data Micro-Credential Pilot, Skills Mastery. Data source: ICTC and LabourX, 2023.

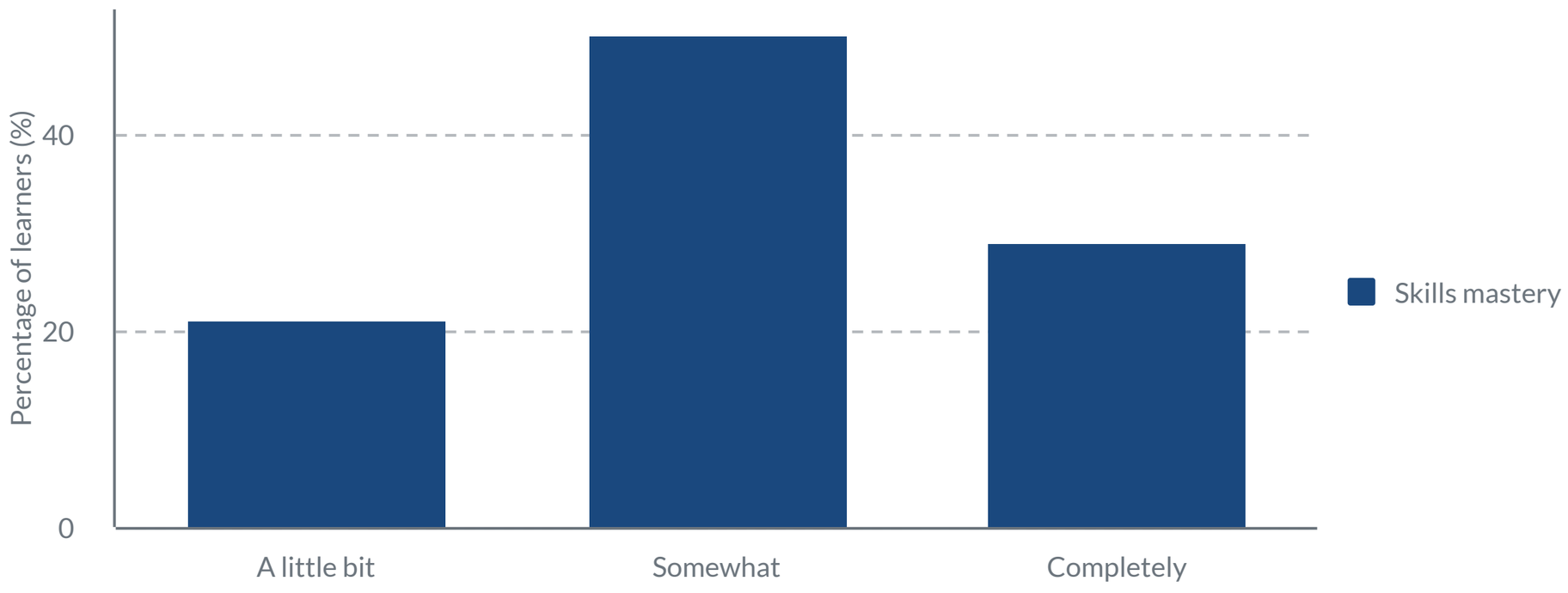
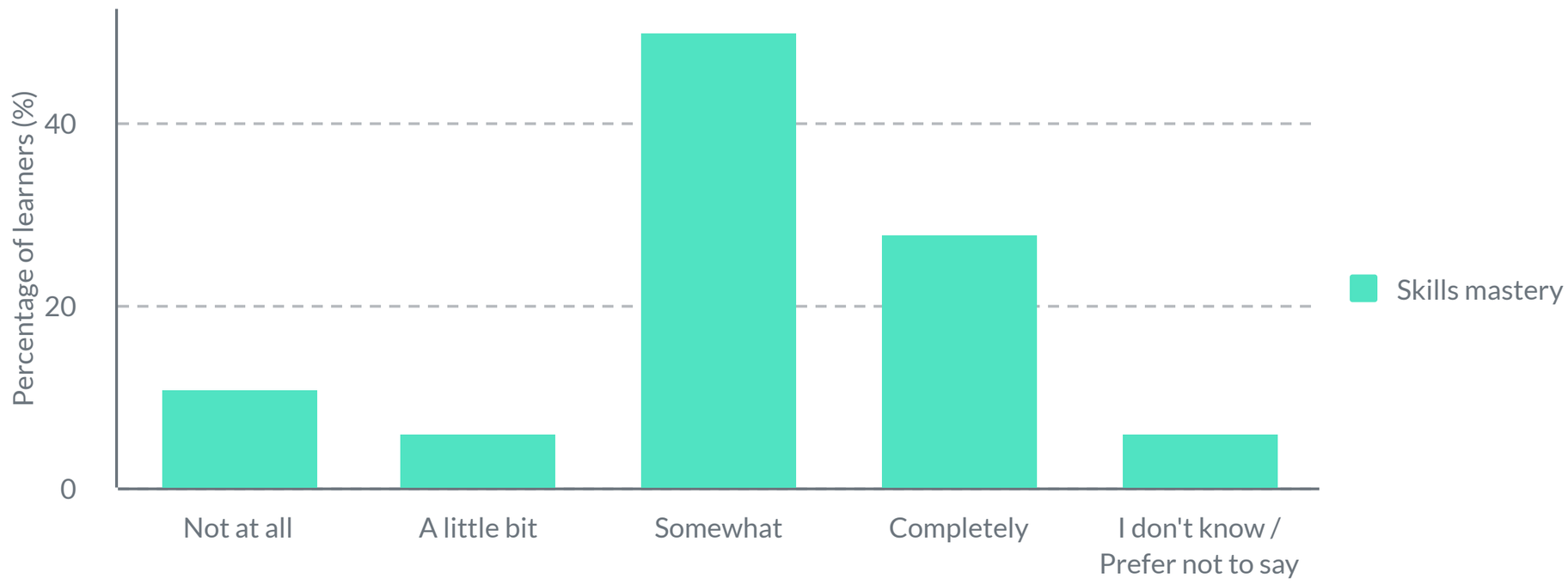


Figure 23. Cloud Computing Micro-Credential Pilot, Skills Mastery. Data source: ICTC and LabourX, 2023.

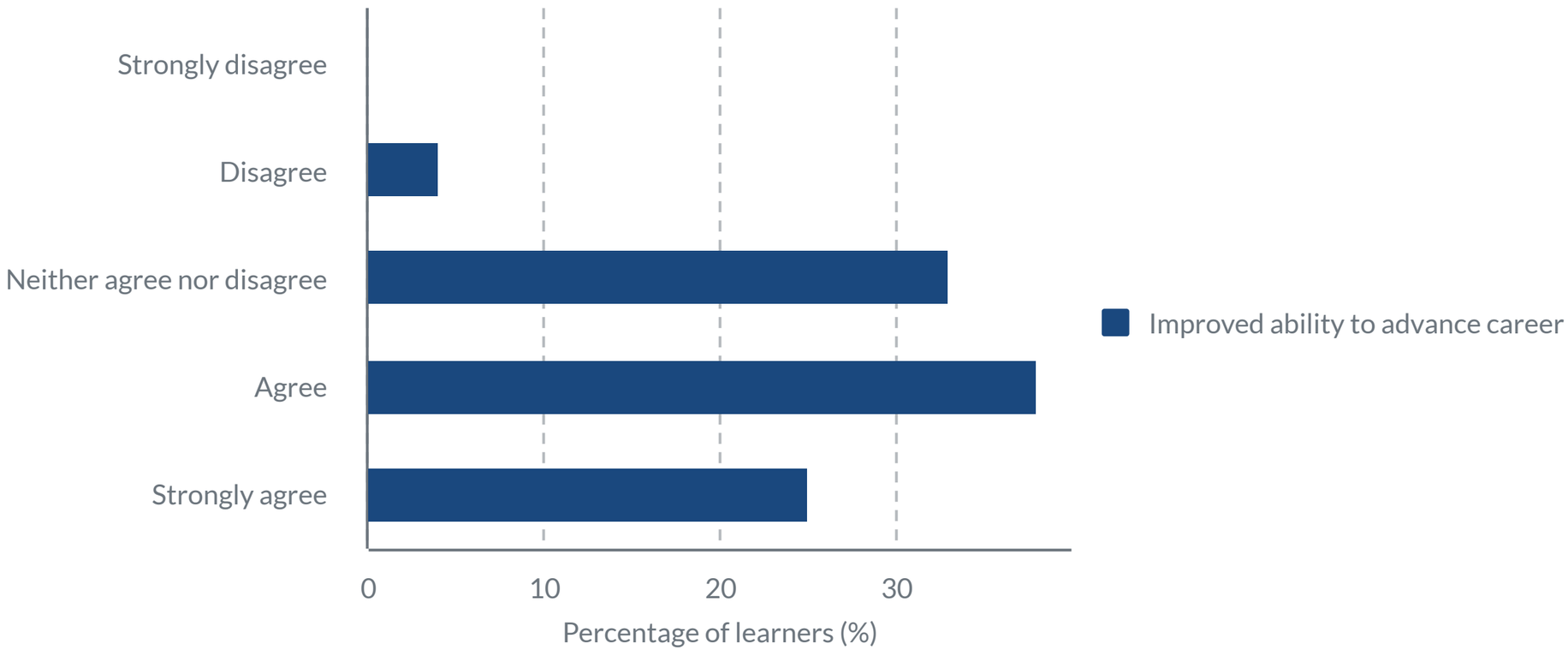


Impact on Learner Career Path

The post-survey included a series of questions about how the learners viewed the applicability of their micro-credential program in relation to their current and/or future jobs and careers. Given the professional nature of most micro-credential programs in Canada, it's critical that micro-credential providers understand how learners completing programs use micro-credentials in the workplace and during job searches.

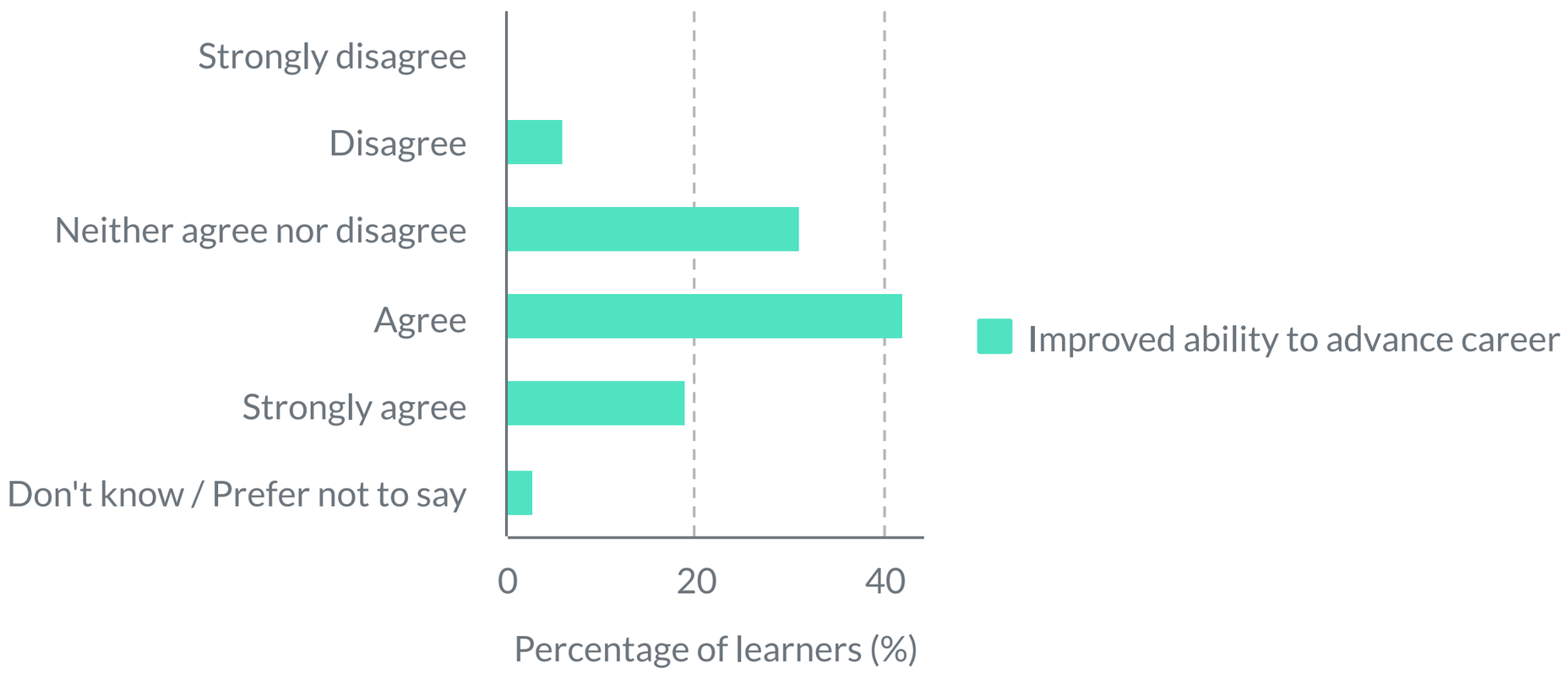
Almost two-thirds (63%) of learners completing the big data program reported that they felt better positioned to advance in their job/career after completing the big data program ("agree" or "strongly agree"). One-third of learners (33%) completing the big data program neither agreed nor disagreed that they were better positioned after completing the micro-credential, with 4% disagreeing. Most of these learners assessed the level of academic challenge of the micro-credential as relatively lower than other education programs they had participated in in the past.

Figure 24. Big Data Micro-Credential Pilot, Improved Positioning to Advance Career. Data source: ICTC and LabourX, 2023.



For learners completing the cloud computing program, nearly two-thirds (61%) reported that they felt better positioned to advance in their job/career after completing the cloud computing course (“agree” plus “strongly agree”). As one cloud computing learner reflected in an open-ended response, “I intend to transition to a cloud architect role from my current data analyst role, as this course provided a stepping stone toward my long-term goal.” Approximately one-third of cloud computing learners neither agreed nor disagreed that they were better positioned after completing the micro-credential. A small share (6%) of respondents disagreed that they felt better positioned after completing this course.

Figure 25. Cloud Computing Micro-Credential Pilot, Improved Positioning to Advance Career. Data source: ICTC and LabourX, 2023.



When asked about their intent to mention the completion of the micro-credential to a current or future employer, 83% of learners completing the big data program “agreed” or “strongly agreed” that they intend to mention to their current/future employer that they had completed a micro-credential in big data. Likewise, 89% of learners completing the cloud computing program “agreed” or “strongly agreed” that they intend to mention to their current/future employer that they had completed a micro-credential in cloud computing. See Figures 26 and 27 below.

Figure 26. Big Data Micro-Credential Pilot, Learner Intent to Mention Completion of Micro-Credential to Current/Future Employers. Data source: ICTC and LabourX, 2023.

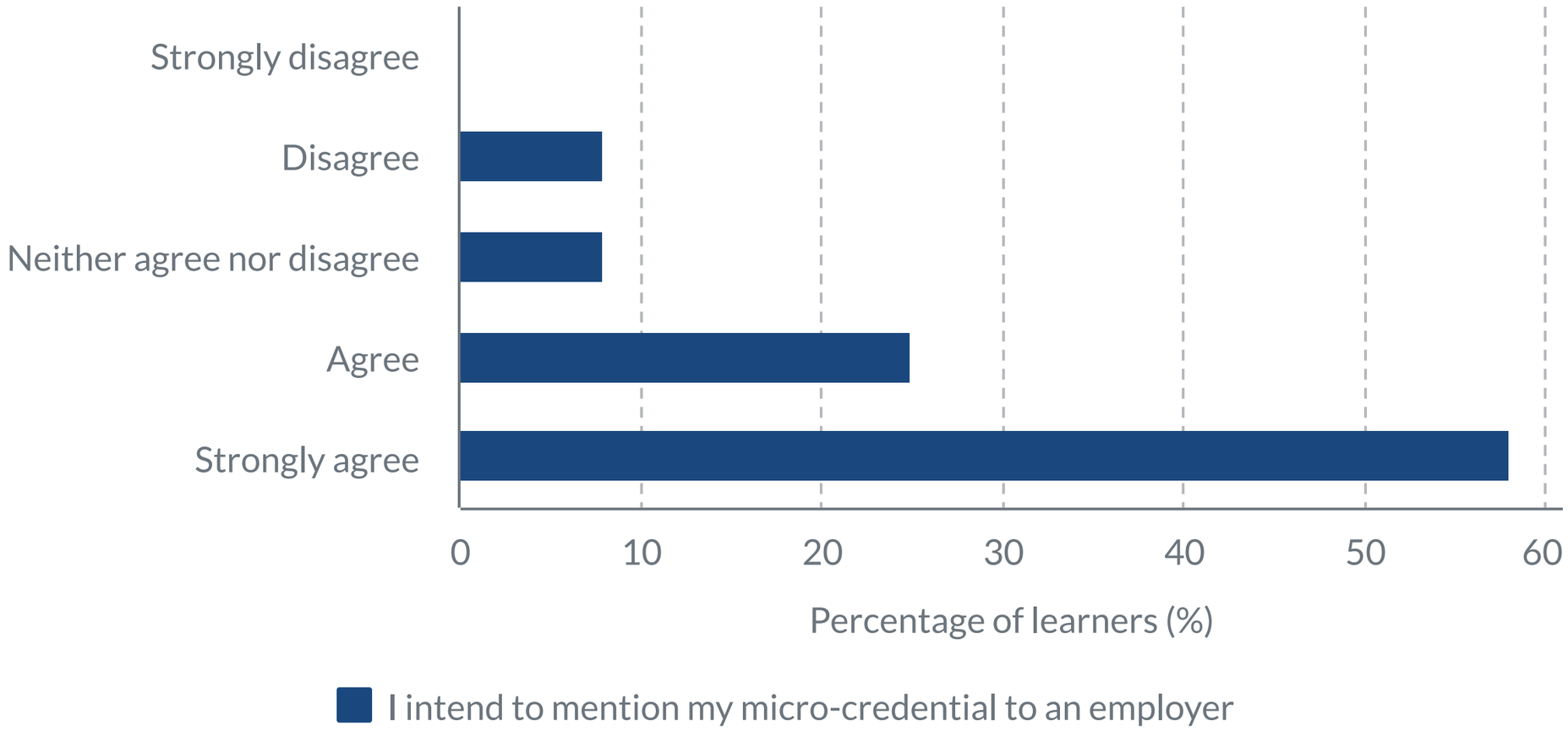
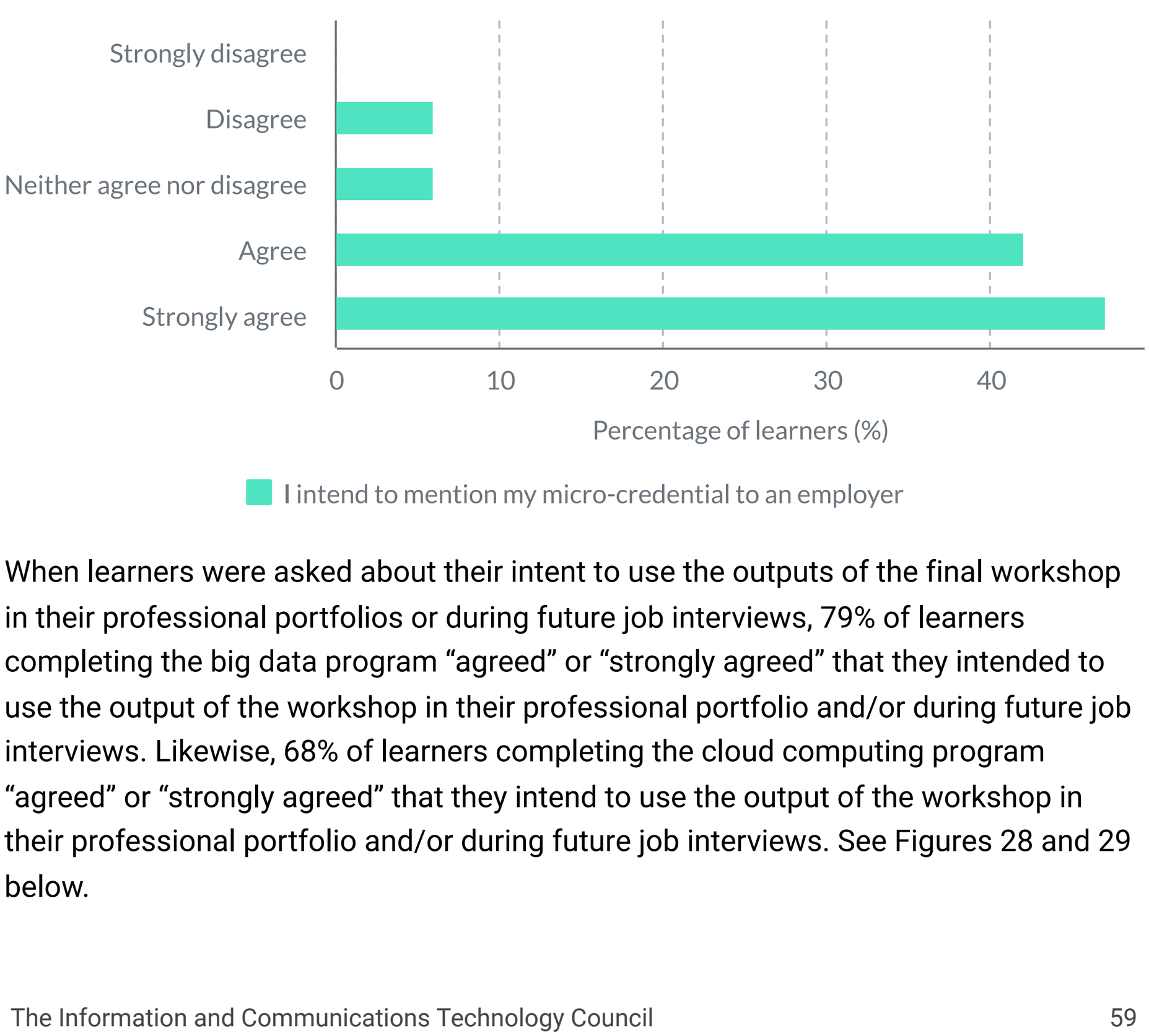


Figure 27. Cloud Computing Micro-Credential Pilot, Learner Intent to Mention Completion of Micro-Credential to Current/Future Employers. Data source: ICTC and LabourX, 2023.



When learners were asked about their intent to use the outputs of the final workshop in their professional portfolios or during future job interviews, 79% of learners completing the big data program “agreed” or “strongly agreed” that they intended to use the output of the workshop in their professional portfolio and/or during future job interviews. Likewise, 68% of learners completing the cloud computing program “agreed” or “strongly agreed” that they intend to use the output of the workshop in their professional portfolio and/or during future job interviews. See Figures 28 and 29 below.

Figure 28. Big Data Micro-Credential Pilot, Learner Intent to Display Workshop Output in Professional Portfolio or During Job Interview. Data source: ICTC and LabourX, 2023.

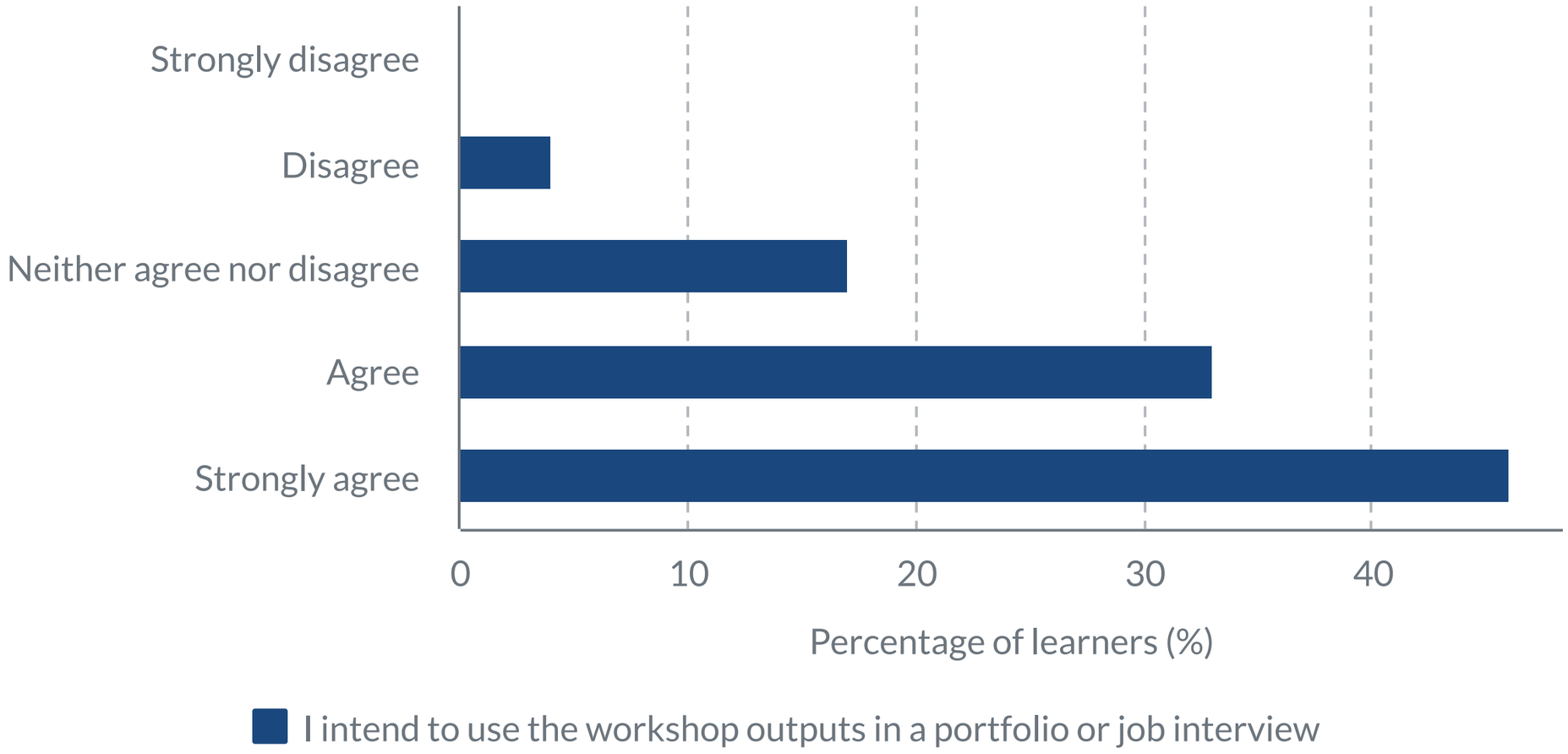
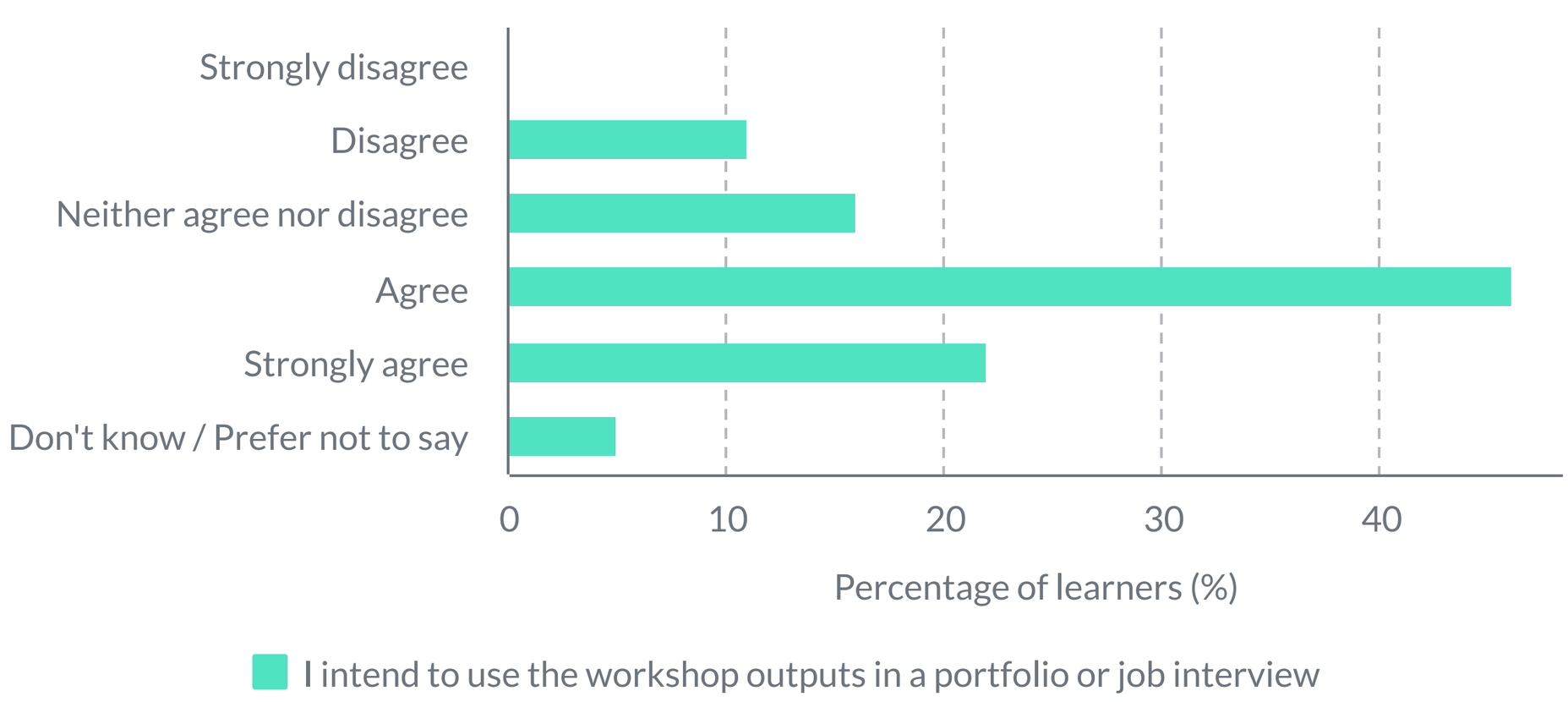


Figure 29. Cloud Computing Micro-Credential Pilot, Learner Intent to Display Workshop Output in Professional Portfolio or During Job Interviews. Data source: ICTC and LabourX, 2023.



Furthermore, 88% of learners completing the big data program and 78% of learners completing the cloud computing program intended to apply what they learned in the micro-credentials to their jobs or careers in the near future.

As one learner from the big data program said, “The course has set a foundation for me to build up my big data knowledge, so I can help support any big data project implemented in my organization.” Or, as a learner enrolled in cloud computing said, “The course introduced me to the direction I want to move forward in my career development.”

Moreover, after completing the two pilot micro-credentials, 83% of learners completing the big data program and 84% completing the cloud computing program expressed a desire to pursue additional micro-credentials in the future.

Discussion

By piloting micro-credentials in big data and cloud computing, ICTC derived valuable micro-credential design and management experience that it can use to improve future micro-credential offerings. The learner experience, as gathered by the learner surveys and presented in this report, offers significant insight into learner motivations and perceptions as they pursue micro-credential programs. The learner survey data also indicated both strengths and areas for improvement in big data and cloud computing programs.

By making data from the learner surveys publicly available, ICTC hopes to add to the discussion on designing and managing effective micro-credential programs in Canada. ICTC encourages other micro-credential providers, such as post-secondary institutions, to use the learner data presented here to benchmark their own micro-credential programs and inform the development of micro-credential programs in the future.

The better Canadian micro-credential providers become at offering relevant, timely, and effective micro-credentials that are optimized to meet both learner and employer needs, the more understood and accepted micro-credentials will become in Canada's higher education, training, and workforce development systems.

Conclusion

Addressing the persistent skills gap in Canada’s digital economy workforce is a pressing issue, and vocationally focused micro-credential programs offer a promising solution. This study reveals the potential of micro-credentials to meet employer and job seeker demand for competency-based learning and rapid, specialized skill development and highlights several key takeaways that underscore the imperative for strategic and intentional design and delivery of micro-credentials. The identified needs for standardization, industry-provider collaboration, closer linkage to student/learner career outcomes, and the design of accessible and inclusive program offerings emphasize critical areas for improvement.

Through piloting micro-credentials in big data and cloud computing to a cohort of motivated learners, ICTC gained valuable insight into the effective design and delivery of micro-credentials. These insights will be crucial to help ICTC improve its own micro-credential offerings in the future, and by making survey data on learner motivations, experience, and career applications publicly available, ICTC hopes to help other micro-credential providers benchmark and improve their programs in the future.

It is evident that adopting common definitions and standards, as well as linking micro-credential offerings to established skills and competency frameworks, would greatly enhance micro-credentials' utility for vocational training and career development. Standardization would enable the effective development and implementation of micro-credential programs in Canada and would help facilitate communication and understanding among institutions, employers, and students.

While employers still value formal education, the shift toward “skills first” hiring practices and increasing emphasis on relevant experience and demonstrable aptitude in competencies or skills provides ample opportunity for micro-credentials to play a key role in workforce reskilling and upskilling. Employers value hands-on experience and demonstrable competencies, making micro-credentials a valuable tool for imparting essential workplace skills quickly. However, the distinction between technical and soft skills becomes pronounced in micro-credential programs, necessitating that providers take a tailored approach to assessment and validation.

For the full potential of micro-credentials to be realized, institutions developing micro-credentials must ensure the focus is on creating programs that lead to meaningful employment outcomes. The avenue to achieving this is through developing credentials that address specific skill gaps identified by employers to ensure relevance and demand in the job market. It is also imperative that learners are afforded the flexibility to choose delivery modes that suit their needs, enhancing the accessibility and inclusivity of micro-credentials. However, this flexibility must be complemented by a robust validation process that incorporates rigorous assessments and effectively communicates the value of micro-credentials to stakeholders. Continuous evaluation based on feedback is key to meeting the evolving demands of education and industry.

To best serve employers and learners, micro-credential programs for the digital economy must be developed through direct connections to current labour market needs, with means of validation, proof of skill or competency mastery, and flexibility as key program elements, and based on providing learners with opportunities to add to their professional portfolio. If strategically aligned with these recommended best practices for standardization, micro-credential programs have the potential to become more relevant, timely, and effective, meeting current and future workforce needs and transforming the education and skilling landscape for the digital economy in Canada.

Research Methodology and Limitations

Research Methodology

This report relies on a mixture of primary and secondary research methods to support its conclusions.

Secondary Research

ICTC and LabourX undertook an environmental scan of Canadian and international definitions of micro-credentials and approaches to micro-credential program delivery, as well as Canadian and international examples of competency models and skill taxonomies. This environmental scan assisted ICTC researchers with identifying potential interviewees and roundtable participants, as well as designing and planning the two pilot micro-credential programs in big data and cloud computing. The environmental scan also helped ICTC to shape research questions and facilitate project interviews and roundtables.

Primary Research

ICTC carried out research to collect primary data on the contemporary design, delivery, and management of micro-credential programs in Canada; employer experience, perceptions, and needs for micro-credentials; and learner experiences with micro-credentials. These primary data were collected through key informant interviews with the post-secondary sector, employer roundtables with Canadian technology sector employers from across the country, a pilot program of two ICTC micro-credentials delivered to learners, and an associated learner survey.

Key Informant Interviews—ICTC carried out a series of 37 key informant interviews (KIIs) with representatives from post-secondary institutions, as well as with individual researchers, consultants, and education thought leaders. Representatives from 30 post-secondary institutions took part in the interviews, where they discussed their experiences designing, managing, and delivering micro-credential programs. All post-secondary institutions interviewed were either currently offering one or more micro-credential programs or were actively planning to do so in the near future.
Seven individual researchers, consultants, and private micro-credential training providers actively doing work on micro-credentials also participated in the interview process.

Thirteen of these institutions were colleges and polytechnics, while 17 were universities. Post-secondary institutions interviewed were based across eight of 10 Canadian provinces, as well as one institution located in the United States and one in New Zealand. Interviews were conducted virtually by ICTC researchers using a semi-structured approach from November 2022 to February 2023.

Region	Number of Interviews
British Columbia	4
Alberta	9
Saskatchewan	1
Manitoba	1
Ontario	9
Quebec	2
Nova Scotia	1
Newfoundland and Labrador	1
United States	1
New Zealand	1
Total	**30**

Table 5. Provincial Breakdown of Post-Secondary Institution Interviews

Employer Roundtables—ICTC hosted eight roundtables to better understand employer perceptions of micro-credentials. These roundtables took place between December 2022 and May 2023. One of the roundtables was held virtually with employers in Vancouver, while the other seven were held in person in Victoria, Calgary, Mississauga, Toronto, Ottawa, Montreal, and Halifax.

The number of participants ranged from seven to 19 individuals in each roundtable session, for a total of 91 participants attending the roundtable series. The participants represented a variety of companies, both large and small, in the Canadian technology sector and included founders and owners, hiring managers, human resources representatives, and company recruiters. The table below outlines the location, delivery format, and total participation for each of the employer roundtables.

City	Date	Format	Participants
Vancouver, BC	January 11, 2023	Virtual	10
Victoria, BC	January 25, 2023	In-person	7
Calgary, AB	December 8, 2022	In-person	19
Mississauga, ON	May 18, 2023	In-person	10
Toronto, ON	December 5, 2022	In-person	13
Ottawa, ON	February 24, 2023	In-person	11
Montreal, QC	May 24, 2023	In-person	8
Halifax, NS	May 26, 2023	In-person	13
Total	NA	NA	**91**

Table 6. Employer Roundtable Location, Date, Delivery Format, and Total Participation (December 2022 to May 2023)

As part of the roundtables, ICTC conducted two polls to better qualify employer's perceptions of micro-credentials and how micro-credentials are valued in the Canadian workplace. The data have been aggregated together to calculate total votes (see Tables 2 & 3 in the main body of this report).

Pilot Micro-Credential Programs, Learner Survey, and Instructor Interviews—In order to gain insight into the planning and operational nuances of developing and delivering micro-credentials in Canada, ICTC carried out a pilot program where it offered two micro-credentials free of charge to a cohort of motivated learners. These two micro-credentials, one covering big data and the other covering cloud computing, were delivered virtually by qualified ICTC instructors over nine weeks between May 1 and June 30, 2023. Intake and post-program surveys were administered to pilot micro-credential learners. ICTC researchers also interviewed the three micro-credential instructors on the teaching experience using a semi-structured interview format.

Research Limitations

Key Informant Interviews—Recognizing the different regional contexts of post-secondary institutions throughout the country, ICTC strived to collect geographically and institutionally representative data from its key informant interviews with Canadian universities and colleges. However, due to the heterogeneous and everchanging nature of micro-credential offerings throughout Canada's post-secondary sector, the data collected during ICTC key informant interviews may not fully reflect individual higher education institutions' individual journeys or experiences developing and delivering micro-credential programs.

One significant gap in institutional experience that ICTC was unable to cover in its current research was that of Indigenous higher education institutes throughout Canada.[31] More research is needed to better understand the experience, context, and journey of Indigenous higher education institutes developing and delivering micro-credentials in Canada.

Employer Roundtables—Employer roundtables were conducted entirely in large urban areas of Canada. The experiences and needs of employers in rural areas, smaller urban centres, and Northern communities may not be fully reflected in the data collected. More research is needed to understand employer experience with micro-credentials in rural, small-city, and Northern contexts. The Academica Group has produced an insightful 2021 study on micro-credential programs in Northern Alberta.[32]

Micro-Credential Pilot Programs—Insights offered by ICTC's two pilot micro-credentials should be understood within their own context as described in the section on ICTC pilot micro-credential programs of this report. Insights from the program learner survey may not be directly comparable nor generalizable to similar micro-credential programs offered at Canadian post-secondary institutions or other micro-credential providers.

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