ESTABLISHING A COMMON FRAMEWORK FOR DIGITAL SKILLS IN CANADA RECOMMENDATIONS REPORT

April 2023

Bow Valley College

ESTABLISHING A COMMON FRAMEWORK FOR DIGITAL SKILLS IN CANADA

Recommendations Report

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About Bow Valley College

Bow Valley College is a public postsecondary institution located in Calgary Alberta. Our vision is to open doors and open minds by creating opportunities for learners, employees, employers, and communities, and by shaping the future of college education.

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EXECUTIVE SUMMARY

Digital technologies are transforming how we work, learn, and live. The influences of technological innovation and advancement are being felt globally, particularly in highly industrialized countries like Canada. Virtually every aspect of Canadian life has been affected by what has been called, the Fourth Industrial Revolution (World Economic Forum, 2020).

Much research has been done regarding the skills workers need not only to participate but to excel in today's labour market. As workplaces have modernized and digitized, employers are seeking workers with a robust and sophisticated set of skills. Basic digital skills are now universally required. Along with this, technologies such as artificial intelligence, robotics, process automation, virtual reality, and the Internet of Things (IoT) have created demand for a package of 21st-century skills that include advanced levels of digital, cognitive, and social and emotional skills (UNESCO, 2022).

To ensure all Canadians can fully engage and benefit from societal digital transformation, the government and other stakeholders must promote a labour force that is highly skilled and efficient with digital acquisition. A shared understanding of digital skills is essential for this work. Currently, in Canada, "there is a pressing need for a modernized skills framework that is responsive to a changing world and provides consistent language and a common understanding of skills constructs" (Palameta, et al., 2021). If Canada is to remain an economic, educational, and social leader on the world stage, establishing new skills frameworks for digital skills is vital.

Skills for Success is a labour force initiative launched by the Government of Canada to affect program and policy transformation aligned with the evolving needs of the workforce. Digital – an expanded and modernized area of the Skills for Success framework – describes the skills required to thrive in an era of rapid technological advancements and digital adoption in all realms of life (Palameta, et al., 2021).

Research and development initiatives are underway to enhance the availability of tools and resources to support the implementation of Skills for Success. Included in this work is the Establishing a Common Framework for Digital Skills in Canada project led by Bow Valley College. The project expands on the Digital definition and skill components presented in the Research Report to Support the Launch of Skills for Success: Structure, Evidence, and Recommendations (Palameta et al., 2021) with the aim of understanding digital skills usage in the context of work.

This report highlights findings and recommendations from The Establishing a Common Framework for Digital Skills Project.

About the Project

Establishing a Common Framework for Digital Skills in Canada is a national project that builds upon past digital skills research conducted by the Social Research and Demonstration Corporation (Palameta, et al., 2021). The aim of this project is to generate a set of methodologies and standards (competencies) for digital skills, which will facilitate upskilling and assessment and accounts for present-day needs and forthcoming advancements. The project draws on examples and evidence from crucial labour market stakeholders, with the objective of creating recommendations or a common framework that can adapt to the evolving digital landscape.

The project was carried out during the late months of 2022 and the early months of 2023, encompassing three key phases. Initially, an environmental scan and literature review were conducted as part of the first phase. In the next phase, consultations were held with employers and industry representatives, utilizing interviews as the primary means of gathering information. Finally, the collected data underwent an analysis and mapping to identify prominent themes and establish a foundational set of digital competencies. The outcomes of the project have been disseminated through a publicly accessible recommendations report as well as a comprehensive digital skills toolkit.

Phase 01 | Environmental Scan & Skills Mapping

- Review reports & literature on digital skills to understand context.
- Analyze international digital skills frameworks to identify commonalities & differences in their structure and contents.
- Map digital skills into the existing Skills for Success Digital categories.

Phase 02 | Employer & Industry Validation

- Interview employers and industry representitives to understand digital skills in the context of the Canadian labour market.
- Verify and validate the contents of the digital skills mapping activity from Phase 1.
- Incorporate examples, provided by stakeholders into the digital skills mapping.

Phase 03 | Resource Development

- Produce a finding report to inform further resarch and development in the field.
- Create a digital skills toolkit for employers and other statkeholders.

Summary of Findings

ENVIRONMENTAL SCAN AND LITERATURE REVIEW

- In the modern economy, digital skills have become indispensable, as a functional level of proficiency in commonly performed digital tasks is now universally expected in the workplace.
- The impact of digitization is not evenly distributed, leading to disparities across various sectors and industries.
- The need for advanced digital thinking is on the rise, encompassing the integration of communication, problem-solving, adaptability, creativity, and other crucial skills within digital contexts.
- The upskilling and training of individuals in digital skills can yield benefits for workers, employers, and the overall economy. To effectively address the digital transformation, a collaborative approach involving government entities, educational providers, industry representatives, and other stakeholders is essential.
- Several internationally established and validated digital skills frameworks could serve as prototypes for expanding digital skills work in Canada. However, diverse national definitions of digital skills present challenges to achieving a universally agreed-upon understanding of the domain.
- Common features among digital skills competency frameworks include the delineation of digital sub-domains (competency areas and descriptors), contextual information regarding skills utilization, proficiency levels, performance variables, and descriptors of specific skill tasks.
- The Digital domain of the Skills for Success framework further development is needed in three key areas: defining competencies for sub-domains, providing more comprehensive descriptions of proficiency levels, and establishing clear performance variables.

EMPLOYER AND INDUSTRY CONSULTATION

- The persistent challenge of worker shortages significantly hinders organizations' ability to adopt digital technologies and provide training in digital skills.
- Next generation employees and recent graduates may be familiar with digital technology, but they often have significant gaps in their understanding and effective utilization of digital skills for employment tasks and functions.
- A digital divide exists between large employers and small to medium-sized enterprises (SMEs), with the latter requiring financial support and other forms of assistance to fully unlock their digital potential. Business owners and industry leaders need a compelling argument to spur SMEs to invest in digital transformation.
- Artificial intelligence (AI) and automation have become prevalent in many sectors and are not perceived as a threat. Instead, they are reshaping the organization of work requiring workers to focus more on cognitively complex tasks and deeper work.
- The most identified challenges faced by industries with digital technology include a lack of financial resources to support digital transformation, a dearth of guidance or expertise to provide digital skills training, and the absence of a cohesive strategy to facilitate a coordinated approach.
- Conversely, the most identified opportunities for industries lie in improving productivity and efficiency through digital technology, accessing new markets and labour pools through digital channels, and leveraging digital technology to support training and development beyond digital skills.

IMPLICATIONS FOR POLICY AND PRACTICE

Extensive research and development efforts have laid the foundation for Skills for Success in the realm of digital skills. However, there is a pressing need to prioritize the development and validation of a comprehensive digital competency framework that aligns with international standards. This framework should contain digital sub-domains with corresponding competency statements, domain constructs and complexity rubrics for each proficiency level, performance variables, contextual information regarding skill utilization, and skill task descriptors with illustrative examples.

Policy measures, programs, and training initiatives must explicitly address the labour market and proactively advance employee development in the skills needed for success in the era of digitization. This work should be undertaken strategically and collaboratively, with policy makers and industry leaders effectively communicating the benefits of investing in digital technology and employee training. Additionally, they should provide the necessary tools and training resources to achieve productivity gains and enhance competitiveness through digital transformation.

It is important to note that digital skills are not standalone competencies; they develop alongside literacy, communication, collaboration, problem-solving, adaptability, and innovation and creativity. Educational institutions and workforce development practitioners must foster well-designed and thoughtful integration of technology, which involves hands-on experiences through partnerships with industry stakeholders.

Future research endeavors should focus on further refining the digital framework, expanding it to address sector-specific digital skills demands. Additionally, investigating the barriers and challenges to acquiring job-specific digital skills and determining effective training approaches for upskilling workers are crucial areas for exploration. Understanding the role of employers in fostering continuous learning and facilitating digital skill acquisition is also of paramount importance.

INTRODUCTION

The Skills for Success Program within Employment and Social Development Canada (ESDC) works to improve the standard of living and quality of life for all Canadians by promoting a highly skilled labour force and an inclusive labour market. Skills for Success is a strategic component of this work, launched in 2021 to drive program and policy transformation that aligns with the evolving needs of the workforce.

While many aspects of the SFS model are well-researched and understood from a theoretical and practical lens, newer areas such as digital skills require further research to support their implementation in workforce development programs. “Digital skills are expanded and modernized to encompass the requirements that will arise from not only rapid technological advancements but also increasing digital adoption in all realms of work, learning, and life” (Palameta et al., 2021). It is also worth noting that the model was created to be adapted as needed (for instance, due to stakeholder concerns, relevant research findings, etc.).

To address the need for further information on digital skills, Bow Valley College completed a national project called Establishing a Common Framework for Digital Skills in Canada, which leveraged national and international research to understand how digital skills are used in the workplace. Employers and industry stakeholders were also engaged to validate the preliminary findings.

The result of this project is a Digital Skills Toolkit and a recommendations report that presents the findings from Phase 1 and 2 of the project. The hope is this work will contribute to the ongoing body of SFS research across the country and support the development of effective workforce development policies and programs that respond to the evolving needs of the Canadian workforce.

About this Report

This comprehensive final report presents detailed information about the project and resulting findings and recommendations. The report is presented in four main sections.

SECTION 1:

SKILLS & COMPETENCIES FOR WORK AND LIFE

This section contains an overview of the nine Skills for Success. It delves into the Digital area of the framework to provide context for the research.

SECTION 2:

BACKGROUND

This section provides a rationale for the project and outlines its objectives, methodologies, and planned research activities and outcomes.

SECTION 3:

FINDINGS

This section presents an analysis of the labour market context and international digital skills frameworks that informed the project. It also presents the major themes uncovered during data analysis.

SECTION 4:

CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the key findings of the research project, provides potential policy and program implications, and offers recommendations for future research.

Section 01

SKILLS & COMPETENCIES FOR WORK AND LIFE

Introducing Skills for Success

The Skills for Success framework is a modernized version of the Essential Skills model that incorporates the everyday skills Canadians require for work, learning, and life. The framework has been expanded to reflect a broader range of skills in response to the evolving needs of the workforce. Introduced in 2021, Skills for Success is continually being refined through ongoing research and development.

Skills for Success represents a set of transferrable skills vital for participation in the labour market and society, including literacy, technical skills, and social-emotional skills. Six overarching criteria apply to Skills for Success, as per Palameta et al. (2022). The framework is designed to be:

01

Work-focused & Transferable

The skills are applicable to most occupations and can be used in work and life contexts.

02

Durable & Enduring

The skills are responsive to emerging labour market needs and technological advancements.

03

Assessable

The skills are measurable and demonstratable through various assessment formats.

04

Teachable & Learnable

The skills affiliate with learning objectives in employment training contexts, facilitating the development of training materials and progression in skills development.

05

Broadly recognized

The skills are reflective of Canadian and international skills frameworks for adults.

06

Flexible & Inclusive

The skills are reflective the diversity of lived experiences.

SKILLS FOR SUCCESS

Adaptability: Your ability to achieve or adjust goals and behaviours when expected or unexpected change occurs, by planning, staying focused, persisting, and overcoming setbacks.

Collaboration: Your ability to contribute and support others to achieve a common goal.

Communication: Your ability to receive, understand, consider, and share information and ideas through speaking, listening, and interacting with others.

Creativity and innovation: Your ability to imagine, develop, express, encourage, and apply ideas in ways that are novel, unexpected, or challenge existing methods and norms.

Digital: Your ability to use digital technology and tools to find, manage, apply, create and share information and content.

Numeracy: Your ability to find, understand, use, and report mathematical information presented through words, numbers, symbols, and graphics.

Problem solving: Your ability to identify, analyze, propose solutions, and make decisions.

Reading: Your ability to find, understand, and use information presented through words, symbols, and images.

Writing: Your ability to share information using written words, symbols, and images.

Skills for Success – Digital

A closer look at digital skills demonstrates how the Skills for Success framework is structured. Each skill, whether it is reading, communication, or problem solving, etc. follows the same format. They have a primary definition of the skill, along with component skills. Components are main groupings that explain how the skill is used. There are also sub-components that further break down and describe specific applications of the skills.

DIGITAL

Definition

Digital is your ability to use digital technology and tools to find, manage, apply, create, and share information and content.

Why is this skill important?

Digital technology has changed the way you find and share information, solve problems, and communicate with others. Most jobs now use digital skills, and you need them when you apply other skills such as reading, writing or numeracy. Digital skills help you keep up with changing demands in the modern workplace. In daily life, you need digital skills to connect safely socially and to make use of online resources and services.

Digital components

1. Use digital devices including computers, tablets, smart phones, and other handheld devices

- Identify the goals and purposes of the digital task
- Identify and use the basic functions common to most devices
- Know the basic terminology common to most digital devices

2. Use common digital tools to complete tasks

- Use software, mobile applications, and other digital tools for a purpose (e.g., Word, Excel, PowerPoint, data analysis software)
- Select appropriate digital tools based on your goals and purposes of tasks
- Keep digital tools up to date (e.g., download updates)
- Use digital tools to enhance accessibility for yourself and others when needed (e.g., screen magnifier and other assistive technologies.)

3. Use digital information

- Navigate digital content (e.g., know which part of the website to click, know when to click the "Back" and "Next" buttons, know how to scroll through documents)
- Carry out digital searches to find information and content (e.g., know how to use the 'Search' function in a PDF document, know how to use search engines such as Google)
- Evaluate the relevance and reliability of digital information (e.g., recognize which websites are credible from a list of Google search results)
- Store and organize digital information in a logical order (e.g., download online files in a local folder on a computer using files, folders, tags, etc.)

4. Use online tools and platform

- Use online communication and social media platforms (e.g., Zoom, Twitter, emails)
- Use online information-sharing platforms (e.g., Dropbox)
- Use online forms (e.g., for purchases, opening accounts, job applications)

5. Use digital information

- Understand best practices in data storage and sharing (e.g., know how to create a password to protect data)
- Protect personal information and privacy of yourself and others (e.g., know what personal information can and cannot be shared online)
- Protect data and devices from online risks and threats (e.g., use virus protection software, know how to avoid phishing emails)
- Make secure online transactions (e.g., know how to encrypt a data file with a password before making an online transfer, know where and how to enter payment details to safely make online purchases)
- Use appropriate language and behaviour online
- Recognize and minimize the effect of physical and mental stresses of being online

6. Update and upgrade digital skills

- Use your existing digital skills and knowledge to learn and apply new and advanced digital skills as needed (e.g., learning basic coding, learning about block chain, virtual reality, specialized electronic equipment at work)

Image adapted from Research report to support the launch of skills for success: Structure, evidence, and recommendations: Final report. Palameta, B., Nguyen, C., Lee, W., Que, H., & Gyarmati, D. (2021). Retrieved from https://www.srdc.org/publications/Research-report-to-support-the-launch-of-Skills-for-Success-Structure-evidence-and-recommendations-Final-report-details.aspx

IMPORTANCE OF A SKILLS FRAMEWORK

Skills for Success provide a common structure and language for understanding the knowledge, skills, and abilities necessary for individuals to succeed in the labour market. It reflects the current and future labour market needs and supports Canadians who need to improve their foundational and transferable skills (ESDC, May 18, 2021).

A national framework is essential for :

Standardization

Skills frameworks form the basis for a standardized approach to measuring, evaluating, and training skills. They ensure program and policy transformation is aligned with evolving needs of the workforce.

Quality Assurance

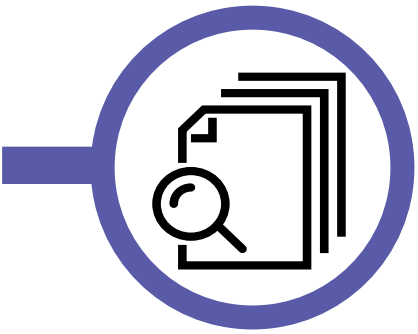
Skills frameworks contribute to improved system-wide training and development outcomes. Skills for Success aims to be responsive to the modern labour market and provides a foundation to address future upskilling and reskilling demands across all sectors of Canada (Palameta et al., 2022).

Efficiency

Skills frameworks help employers target and evaluate the abilities of current and prospective employees. Employers can take advantage of skill sets within their existing workforce, even though workers may lack formal credentials. They can also recruit and train in response to changing skill demands faster and at a reduced cost.

Mobility

Skills frameworks facilitate labour market mobility, which is crucial in an increasingly dynamic and unpredictable economic landscape. Skills for Success helps define standards for performance and can be used to assess and measure an indvidual's competence against emerging occupational requirements. Labour can also be quickly deployed into high-demand areas of the workforce.



Section 02
Project Background

Digital is a new area in the Skills for Success framework created to reflect evolving technologies and the proliferation of digital usage in all aspects of work and life. Demand for digital skills will continue to grow as technology advances and the labour market is impacted by new jobs and new industries that emerge.

Initial development work for Skills for Success established the definitions, constructs, and proficiency indicators for the Digital area. "However, the range of actions, processes, and descriptors built into the constructs at this stage represent a provisional, not definitive, structure for each skill" (Palameta et al., 2022). The absence of refined constructs and measurement criteria for digital skills impedes the development of assessment and training solutions. Digital skills are considered a core foundational skill, but unlike literacy and numeracy, digital skills definitions and measurements differ by organizations, employers, practitioners, and employees.

A shared understanding of digital skills – what they are and their complexity - is necessary to foster assessment and training development in the Digital domain. This begins with understanding the knowledge, skills, and abilities needed in different contexts and clarifying the constructs and competencies to perform effectively. Stakeholder consultations undertaken when Skills for Success was established indicated the need for "a more detailed manual on how to appropriately transition from Essential Skills to Skills for Success" (Palameta et al., 2022). A Canadian digital skills standard, informed by examples from key sectors, will facilitate this work.

Expanding the Research – Project Objectives

This project sought to address two recommendations put forth in the Report to Support the Launch Skills for Success: Structure, Evidence, and Recommendations (Palameta et al., 2021). First, it aimed to further expand on the provisional digital skills constructs to create recommendations for a more definitive and structured digital skills domain. Next, it sought to create information and resources to support stakeholders with transitioning from Essential Skills to the Skills for Success model.

Project Activities

The Establishing a Common Framework for Digital Skills in Canada project commenced in October 2022 and was completed in Spring 2023. The project involved several activities delineated into project phases, beginning with an environmental scan, and concluding with a report and toolkit development.

Phase 01 | Environmental Scan & Skills Mapping

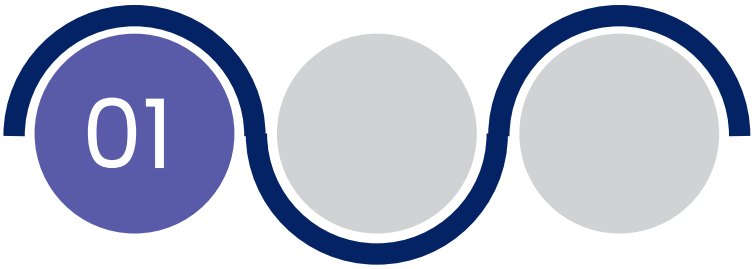
- Review reports & literature on digital skills to understand context.
- Analyze international digital skills frameworks to identify commonalities & differences in their structure and contents.
- Map digital skills into the existing Skills for Success Digital categories.

Phase 02 | Employer & Industry Validation

- Interview employers and industry representitives to understand digital skills in the context of the Canadian labour market.
- Verify and validate the contents of the digital skills mapping activity from Phase 1.
- Incorporate examples, provided by stakeholders into the digital skills mapping.

Phase 03 | Resource Development

- Produce a finding report to inform further resarch and development in the field.
- Create a digital skills toolkit for employers and other statkeholders.



Phase 01 | Environmental Scan & Skills Mapping

Digital skills frameworks are utilized worldwide to support economic growth, inform policy development, and equip workers with the necessary skills to respond to volatile and unpredictable labour market conditions. These competency frameworks provide a systematic approach to defining, measuring, and improving skills. Examples include the UK National Standards for Digital Skills and the EU Digital Competence Framework for Citizens.

This project audited international competency frameworks and research reports to achieve the following objectives:

- Explore how digital skills are organized and categorized into overarching competency frameworks.
- Identify common descriptors used to explain digital skills tasks.
- Uncover main themes within the frameworks and research pertaining to digital skills differentiation, complexity, and labour market application.
- Understand the ways in which digital frameworks are assessed and developed through training.
- Provide background details and examples to inform the discussion with key industry stakeholders (Phase 2 of the research).

The findings from the environmental scan were compared with the definition and digital components presented in the Digital section of the Report to Launch Skills for Success: Structure, Evidence, and Recommendations (Palameta et al., 2021). The Skills for Success definition and digital components were used as the base organizing structure to map out and align findings from the environmental scan and to inform the development of a taxonomy and underlying constructs for digital skills in Canada. They are presented in the form of tables in the findings section of this report.

Phase 02 | Employer & Industry Validation

Phase 2 involved conducting key informant interviews with organizational leaders from in-demand sectors from the Canadian economy.

Stakeholder consultations were used to:

- Verify and validate information produced during the skills mapping process (phase 1).
- Gather various examples of how digital skills are used in the workplace.
- Gain an understanding of the challenges facing employers regarding digital skills to make recommendations for further development of digital skills resources.

Sectors such as manufacturing, health and human services, construction, logistics, hospitality, resource production, etc., were targeted for this project, and twenty individuals participated. Stakeholders were invited via email to participate in a 90-minute virtual interview. Interested participants received a copy of the project overview document along with a consent form to review and sign. Participants had the option to withdraw up to the point of data analysis. Interviews were digitally transcribed using transcription features in the virtual meeting software and saved for post-interview analysis.

Interviews consisted of structured questions using a set interview guide, along with unstructured discussion. This approach facilitated the gathering of comparable data while allowing stakeholders to contribute their knowledge and perspectives that they felt were most important to the work.

Transcription files were coded to identify main themes from the interviews. Main themes and findings were summarized and analyzed against results from the international digital skills competency framework review (Phase 1). The main themes and findings presented were de-identified to ensure confidentiality and protect the privacy of participants.

Phase 03 | Resource Development

Phase 3 of the project involved creating tools and resources to support further development and implementation of the Skills for Success model. Resource development was guided by the need for a deeper understanding of the constructs and skills that make up the digital skills domain and information to support the transition from Essential Skills to Skills for Success.

Two project outputs were created:

- A recommendations report outlining the project's findings, outcomes, and recommendations. The report provides details on the resources created and suggestions for implementing them. Additionally, it recommends future activities and research to expand on existing digital skills information and tools.
- A publicly accessible Skills for Success Digital Skills Toolkit. The Digital Skills Toolkit is an open-access resource designed to help stakeholders implement digital skills initiatives related to assessment, training, and workforce development within their organizations.

The final report and Digital Skills Toolkit are publicly available at: https://bowvalleycollege.ca/schools/extended-education/digital-skills-toolkit

Section 03

FINDINGS

The findings section of this report summarizes the results of Phase 1 and Phase 2 of the Establishing a Common Framework for Digital Skills in Canada project.

It begins with an overview of digital skills frameworks, examining the diversity and differences among digital skills definitions and comparing them with the Skills for Success definition. It then delves deeper into the structure and components of four digital skills frameworks, namely the Australian Digital Literacy Skills Framework, the Essential Digital Skills Framework and National Standards for Essential Digital Skills (UK), DigComp2.2 Digital Competence Framework for Citizens (European Commission), and the Canadian Skills for Success. This section also shares the results of the digital skills mapping activity, which resulted in six major categories and nineteen sub-categories for digital skills. The mapping includes industry-informed examples of how digital skills are used.

Next, the findings section presents major themes from interviews conducted with industry stakeholders. These themes are discussed alongside examples from literature that support the insights shared by employers regarding the perceived hurdles and opportunities to meeting demands for digital skills and leveraging digital technologies to their maximum potential.

Overview of Digital Skills Frameworks Phase 1

IMPORTANCE OF DIGITAL SKILLS IN THE MODERN WORKFORCE

Technological innovation and advancement have had a significant impact globally, particularly in highly industrialized countries like Canada. The Fourth Industrial Revolution, as referred to by the World Economic Forum (2020), has affected virtually every aspect of Canadian life.

The relationship between technological developments and societal paradigm shifts is not limited to present times. Historically, the pace of automation has usually increased during economic downturns and crises. Businesses and institutions aim to reorganize and tighten their organizational models by combining technology and better-skilled personnel instead of employees carrying out routine tasks. Although the COVID-19 pandemic has undoubtedly played a substantial role, the trend toward automation and AI had already been underway for some time before the pandemic began. According to research from the Brookings Institute, in 2002, just over 50 percent of occupations had only low digital requirements; by 2016, that proportion had dropped to 30 percent (Muro et al., 2017). Both nationally and globally, rapid and widespread digitalization has altered the nature of work, making digital skills and the need for agile skill adaptation by workers necessary for the modern workforce (OECD, 2020; Feijao et al., 2021).

Considerable research has been conducted regarding the skills that workers require to participate and thrive in today's labour market. With Canadian workplaces becoming increasingly modernized and digitized, employers are seeking workers with a more robust and sophisticated skillset. While basic digital skills are almost universally required, most workplaces are seeking more. As companies search for abilities that robots cannot adequately perform, a package of 21st-century skills has emerged as the most in-demand, including advanced levels of digital, cognitive, and social-emotional skills (UNESCO, 2022).

To ensure all Canadians can actively engage in and benefit from the ongoing digital transformation, the government and other stakeholders should look to existing digital competence resources while developing new ones to meet specific needs. In Canada, "there is a pressing need for a modernized skills framework that is responsive to a changing world and provides consistent language and a common understanding of skills constructs" (Palameta et al., 2021, p.1). To remain a leader in the global economic, educational, and social landscape, Canada must create new skills frameworks for digital skills, along with related assessment and training tools.

The following section of this report explores how digital skills are defined and expressed worldwide. It compares and examines four frameworks, including the Australian Digital Literacy Skills Framework, the Essential Digital Skills Framework and National Standards for Essential Digital Skills (United Kingdom), DigComp2.2 Digital Competence Framework for Citizens (European Commission), and the Canadian Skills for Success.

Defining Digital Skills

It is crucial to establish a clear definition for the term digital skills. While this term is frequently used, there is a lack of consensus on what it encompasses. This issue has been noted in the literature by researchers exploring the link between technology and skills development (Jara et al., 2015; Iordache et al., 2017; Broadband Commission for Sustainable Development, 2017).

What follows are brief descriptions of the conceptual definitions and approaches towards frameworks from the United Kingdom, European Commission, Australia, and Canada to aid in understanding the objectives of these frameworks.

Mattar, Santos, and Cuque (2022) discuss the semantic field of digital competence, highlighting the overlap and potential conflict between concepts such as digital literacy, computer literacy, 21st-century skills, and digital skills (p. 3). The terms digital skills, digital competency/competence, and digital literacy are the most used concepts in recent literature.

United Kingdom Definition

The Essential Digital Skills Framework of the UK Government's Department of Education is designed to provide a comprehensive set of digital skills required for individuals to engage with the digital world. The framework does not employ a singular definition of digital skills; rather they are explained as the skills needed to safely benefit from, participate in, and contribute to the digital world, both now and in the future (2018, p. 2). The framework groups skills into five categories: communicating (communicating, collaborating, and sharing), handling information and content (finding, managing, and storing digital information and content securely), transacting (registering and applying for services, buying and selling goods and services, and administering and managing transactions online), problem-solving (finding solutions to problems using digital tools and online services), and being safe and legal online (staying safe, legal, and confident online) (pp. 3-9). The framework's primary goal is to provide a common and clear understanding of digital skills across the UK's population, identifying essential digital skills needed for life and work in a digitally driven economy and society.

European Commission Definition

DigComp 2.2: The Digital Competence Framework for Citizens uses the term digital competence and embeds it within its larger framework of Key Competencies for Lifelong Learning (2022, p. 3). Their most recent definition of digital competence is "the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society" (European Commission, 2019, p. 10).

Australia Definition

The Australian Government's Department of Education, Skills, and Employment (2021) does not specifically define digital skills in its Digital Literacy Skills Framework Draft. The Framework draws from the UNESCO definition of digital literacy as encompassing both the physical operations of digital devices and the software operations within those devices. It also includes the ability to search, navigate, create, communicate, collaborate, think critically, analyze information, and address safety and well-being using various digital technologies (p. 4).

The Australian Government's Department of Employment and Workplace Relations, however, defines digital skills as "a combination of a digital mindset (hardware, software, information systems, security, and innovation), knowledge (theoretical comprehension and understanding), competence (cognitive and practical know-how) and attitude (value and beliefs) (2022, p. 7).

Canada Definition

The Canadian government has transitioned from the Essential Skills framework to the more recent Skills for Success model. This change has been made to accurately reflect the evolving skill needs of workplaces as they become more modernized. The SFS model aims to be more adaptive and sustainable to meet the ongoing demands of the Canadian labour market (Palameta et al., 2021, p.1).

The Essential Skills Framework covered the nine essential skills that are most necessary for success in the workplace, helping individuals prepare for, obtain, and retain employment. Additionally, the framework recognized these skills as foundational to acquiring other skills needed for work, learning, and life (Gyarmati et al., 2020, p.10).
In the Essential Skills Framework, computer use was broadly defined as "handling the variety and complexity of computer use required in the workplace" (p. 10). In the new SFS model, computer use skills are called digital skills, and the definition has been expanded. Digital skills now encompass the ability to use different types of devices and platforms and include an individual's ability to "find, manage, apply, create, and share information and content using digital technology and tools" (Palameta et al., 2021, p. 21).

In the Research Report to Support the Launch of Skills for Success: Structure, Evidence, and Recommendations: Final Report (2021), Palameta et al. note that the comprehensive purposes and aims in updating the definitions and constructs of Digital skills in the Skills for Success model were to "integrate new contexts and applications in the labour market, and ensure inclusivity, to reflect a wide range of basic and advanced digital skill needs in today's world of work" (p. 10).

INTERNATIONAL DIGITAL SKILLS FRAMEWORKS: A COMPARISON

With the massive increase in digitalization in all spheres of life across the globe, many countries have recognized the importance of equipping their citizens with the necessary skills to function and thrive in this modern era. To facilitate this, several nations have gone beyond basic definitions of digital skills and created digital frameworks that include competencies, proficiency levels, and examples of tasks.

Digital literacy frameworks serve as a bridge between the definitions of digital literacy and the objectives that shape instruction, as they provide detailed descriptions of what learners can do as they engage with digital technologies. These classifications, drawn from prior research or included in information published by federal agencies, can help researchers and practitioners understand what frameworks should do (Vanek, n.d.). Moreover, frameworks provide guidance to policymakers, educators, employers, and other organizations in areas of employment, education, social inclusion, and lifelong learning.

A key objective of this project was to understand how digital skills have been organized and articulated worldwide. A comparative analysis of international frameworks from Australia, the United Kingdom, and the European Commission, along with Canada's Skills for Success model, was conducted to:

- Examine the underlying organizing structure and level of specificity within and between frameworks.
- Identify common competencies and competency descriptors between frameworks.
- Uncover digital skills categories that may be absent from the Canadian model.

Findings from the analysis of these frameworks are presented below.

Australia's Digital Literacy Skills Framework

In 2020, the Australian government's Department of Education, Skills and Employment developed the Draft Digital Literacy Skills Framework (DLSF) as part of the Foundation Skills for Your Future Program (p. 4). This program offers subsidized training and emphasizes the importance of digital literacy as a core skill for individuals in both society and work. The DLSF was designed to work with the Australian Core Skills Framework (ACSF) as part of a unified national strategy to identify and improve core skills encompassing various personal, community, work, and educational contexts (p. 4).

The DLSF uses the UNESCO definition of digital literacy, which includes physical and software operations of digital devices, search and navigation, communication, collaboration, critical thinking, and safety and well-being using digital technologies (p. 4). The framework has three dimensions: performance variables, performance levels, and communication domains.

The four performance variables include support, context familiarity, text complexity, and task complexity, which interact to affect digital literacy (p. 6).

The DLSF has three performance levels (PL1, 1, and 2) in the DLSF, each with decimal-level performance indicators. The indicators are based on the Australian Core Skills Framework (ACSF), which uses a decimal numbering system to signal performance at each level of core skills. The ACSF and DLSF use the same digital literacy indicator decimal levels and descriptors. This numbering system enables the DLSF to integrate with the ACSF, providing greater detail within each level while indicating a proficiency progression (p. 9).

Australia's Digital Literacy Skills Framework

The DLSF also considers three Domains of Communication, or broad areas of life in which skills may be performed, including personal and community, workplace and employment, and education and training. The framework includes sample activities to illustrate and contextualize skill use in each domain (p. 10). The image below gives a visual overview of the framework and its parts.

Illustration of the strucutre and components of the core skill of digital literacy.

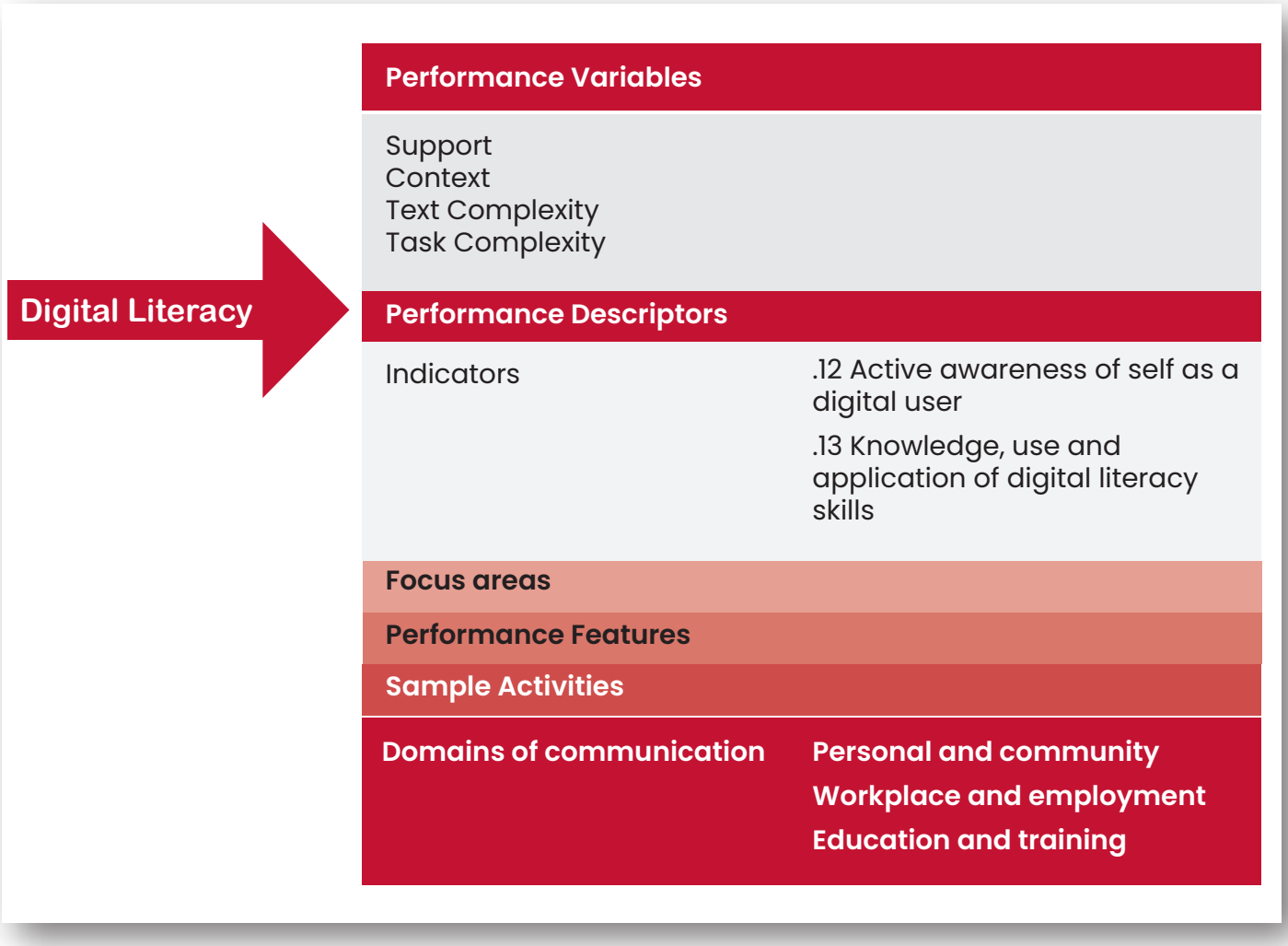


Image adapted from "Overview of the Digital Literacy Skills Framework" by Department of Education, Skills and Employment, 2020, Foundation Skills for Your Future DRADT Digital Literacy Skills Framework - April 2020, p.12 (https://www.dewr/gov.au/download/7490/digital-literacy-skills-framework/24101/document/pdf/en). CC license 2020 by commonwealth of Australia.

United Kingdom Essential Digital Skills Framework & National Standards for Essential Digital Skills

In 2018, the government of the United Kingdom created the Essential Digital Skills Framework (EDSF) to support organizations and employers providing digital skills training to adults. It was updated in 2019 to include specific skill statements for life and work and foundational skills for citizens who use digital technology minimally or not at all (Department for Education, 2019). The framework is divided into five categories of digital skills, including communicating, handling information, and being safe online. It focuses on life and work contexts. Although the framework does not identify specific proficiency levels, the separate skill statements for life and work are intended to show learner progression.

A complementary document to the EDSF, the National Standards for Essential Digital Skills (NSEDS), was released in 2020 (UK Government, 2020). The Standards were created to help organizations develop new essential digital skills qualifications and subject content for digital functional skills qualifications. The NSEDS covers five skill areas, differing slightly from the EDSF areas, with area skill statements representing distinct, independent skills. Unlike the EDSF, the NSEDS identifies two skill levels, Entry Level and Level 1, to measure progression. The standards also emphasize that foundational digital skills are considered a prerequisite to doing Entry Level skills and include a list of foundational level skills along with an amplification section to provide more context and detail for interpreting skills statements.

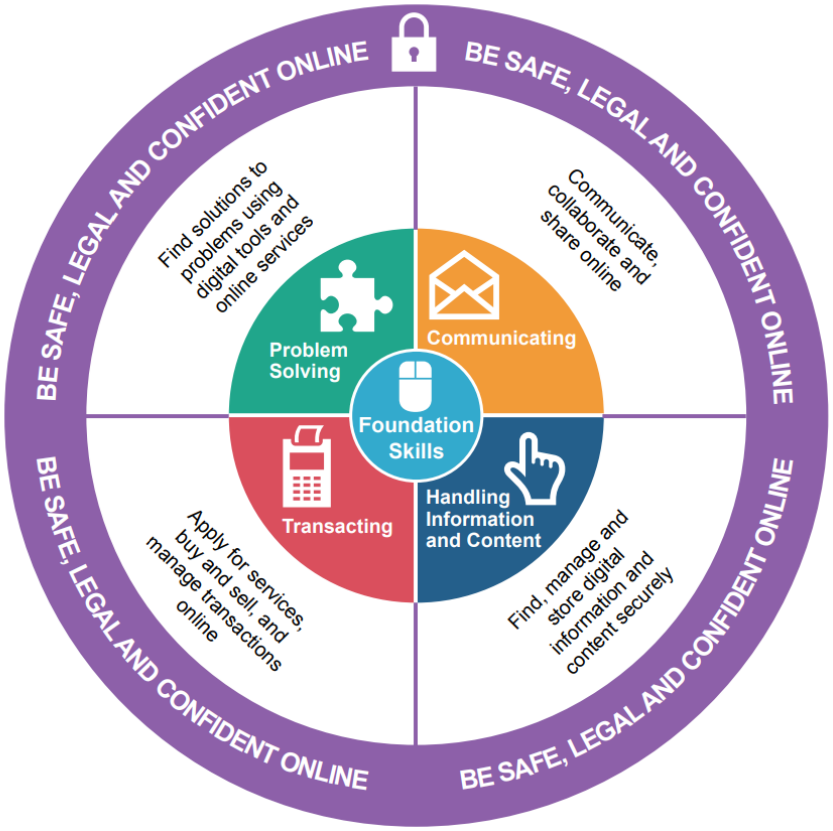


Image from "Essential Digital Skills – Framework Diagram," by Department for Education,2018, Essential Digital Skills Framework, p. 2. (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/738922/Essential_digital_skills_framework.pdf). Open Government License 2018 by Crown copyright

European Commission DigComp 2.2 Digital Competence Framework for Citizens

In 2022, the European Commission's Joint Research Centre (JRC) released an updated fourth iteration of their digital competency framework called DigComp 2.2: The Digital Competence Framework for Citizens (European Commission et al., 2022). DigComp focuses on assisting policymakers in creating policies that support digital proficiency development and designing educational and training programs to enhance the digital competence of targeted populations in the areas of employment, education, training, and lifelong learning. The 2.2 version updates examples of knowledge, skills, and attitudes that assist individuals in using digital technologies confidently, critically, and securely, including emerging technologies such as artificial intelligence (AI). It also compiles existing reference materials on DigComp to aid in its implementation (p. 3).

DigComp 2.2 is organized into 21 competencies across five dimensions. The term dimensions refers to the structure and organization of the framework's underlying data model, defines the relationships among all the elements, and determines how the elements are displayed within the framework (p. 68).
Described in more detail:

- **Dimension 1** outlines five areas of expertise for overall digital competence information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving.
- **Dimension 2** provides titles and descriptors for each of the 21 competencies.
- **Dimension 3** defines the eight levels of proficiency, which range from foundational to highly specialized.
- **Dimension 4** gives examples of the knowledge, skills, and attitudes related to each area of competence.
- **Dimension 5** offers specific use cases of competencies in learning and employment contexts (p. 68).

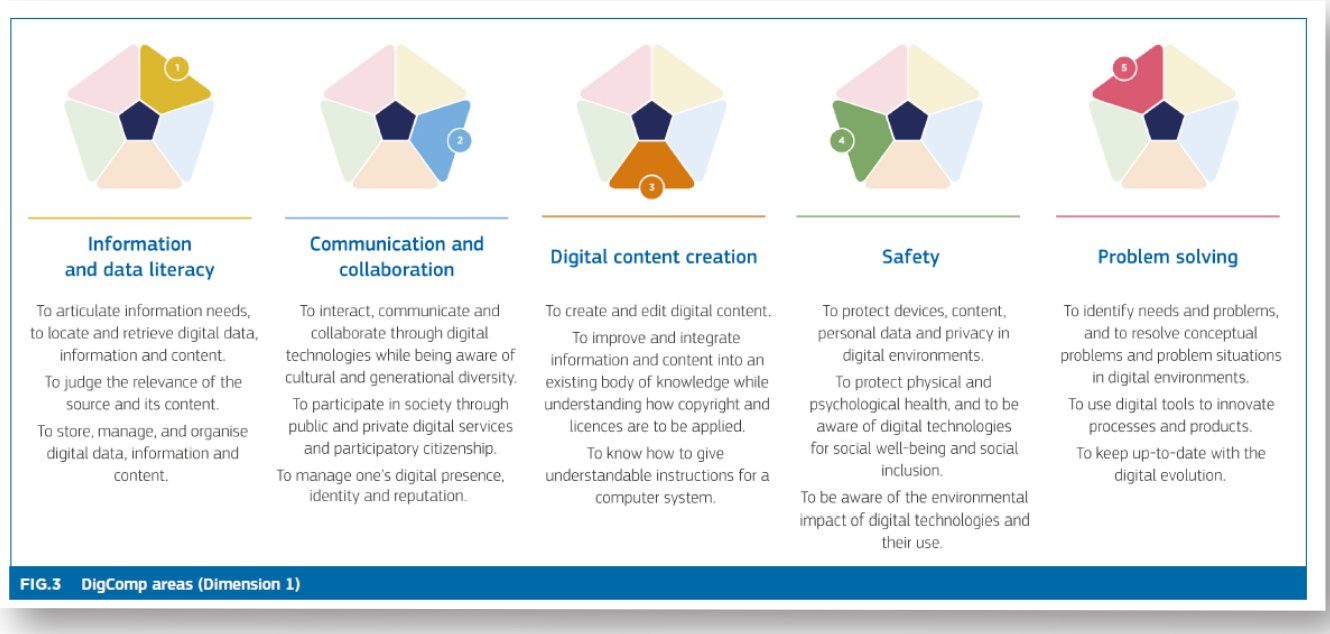


FIG.3 DigComp areas (Dimension 1)

Graphical layout of the integrated DigComp 2.2 Framework from "The Integrated DigComp 2.2 Framework", by R. Vuorikari, S. Kluzer, and Y. Punie, DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes, 2022, pg. 7, 9-10. (http://dx.doi.org/10.2760/115376). Copyright 1995-2023 by European Union

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DIMENSION 1 • **COMPETENCE AREA**

1. INFORMATION AND DATA LITERACY

DIMENSION 2 • **COMPETENCE**

1.3 MANAGING DATA, INFORMATION AND DIGITAL CONTENT

To organise, store and retrieve data, information, and content in digital environments. To organise and process them in a structured environment.

DIMENSION 3 • **PROFICIENCY LEVEL**

FOUNDATION	1	At basic level and with guidance, I can:	• **identify** how to organise, store and retrieve data, information and content in a **simple way** in digital environments. • **recognise** where to organise them in a **simple way** in a structured environment.
	2	At basic level and with autonomy and appropriate guidance where needed, I can:	• **identify** how to organise, store and retrieve data, information and content in a **simple way** in digital environments. • **recognise** where to organise them in a **simple way** in a structured environment.
INTERMEDIATE	3	On my own and solving straightforward problems, I can:	• **select** data, information and content in order to organise, store and retrieve them in a **routine way** in digital environments. • **organise** them in a **routine way** in a structured environment.
	4	Independently, according to my own needs, and solving well-defined and non-routine problems, I can:	• **organise** information, data and content to be easily stored and retrieved. • **organise** information, data and content in a structured environment.
ADVANCED	5	As well as guiding others, I can:	• **manipulate** information, data and content for their easier organisation, storage and retrieval. • **carry out** their organisation and processing in a structured environment.
	6	At advanced level, according to my own needs and those of others, and in complex contexts, I can:	• **adapt** the management of information, data and content for **the most appropriate** easy retrieval and storage. • **adapt** them to be organised and processed in **the most appropriate** structured environment.
HIGHLY SPECIALISED	7	At highly specialised level, I can:	• **create solutions to complex problems with limited definition** that are related to managing data, information, and content for their organisation, storage and retrieval in a structured digital environment. • **integrate** my knowledge **to contribute to professional practices and knowledge and to guide others** in managing data, information and digital content in a structured digital environment.
	8	At the most advanced and specialised level, I can:	• **create solutions to solve complex problems with many interacting factors** that are related to managing data, information, and content for their organisation, storage and retrieval in a structured digital environment. • **propose new** ideas and processes to the field.

DIMENSION 4 • **EXAMPLES OF KNOWLEDGE, SKILLS AND ATTITUDES**

NEW IN 2.2

KNOWLEDGE	31. Aware that many applications on the internet and mobile phones collect and process data (personal data, behavioural data and contextual data) that the user can access or retrieve, for example, to monitor their activities online (e.g. clicks in social media, searches on Google) and offline (e.g. daily steps, bus rides on public transport). 32. Aware that for data (e.g. numbers, text, images, sounds) to be processed by a program, they have to be first properly digitised (i.e. digitally encoded). 33. Knows that data collected and processed, for example by online systems, can be used to recognise patterns (e.g. repetitions) in new data (i.e. other images, sounds, mouse clicks, online behaviours) to further optimise and personalise online services (e.g. advertisements). 34. Aware that sensors used in many digital technologies and applications (e.g. facial tracking cameras, virtual assistants, wearable technologies, mobile phones, smart devices) generate large amounts of data, including personal data, that can be used to train an AI system. (AI) 35. Knows that open data repositories exist where anyone can get data to support some problem solving activities (e.g. citizens can use open data to generate thematic maps or other digital content).
SKILLS	36. Knows how to collect digital data using basic tools such as online forms, and present them in an accessible way (e.g. using headers in tables). 37. Can apply basic statistical procedures to data in a structured environment (e.g. spreadsheet) to produce graphs and other visualisations (e.g. histograms, bar charts, pie charts). 38. Knows how to interact with dynamic data visualisation and can manipulate dynamic graphs of interest (e.g. as provided by Eurostat, government websites). 39. Can differentiate between different types of storage locations (local devices, local network, cloud) that are the most appropriate to use (e.g. data on the cloud is available anytime and from anywhere, but has implications for access time). 40. Can use data tools (e.g. databases, data mining, analysis software) designed to manage and organise complex information, to support decision-making and solving problems.
ATTITUDES	41. Considers transparency when manipulating and presenting data to ensure reliability, and spots data that are expressed with underlying motives (e.g. unethical, profit, manipulation) or in misleading ways. 42. Watchful of accuracy when evaluating sophisticated representations of data (e.g. tables or visualisations as they could be used to mislead one's judgement by trying to give a false sense of objectivity.

DIMENSION 5 • **USE CASES**

FOUNDATION 2

EMPLOYMENT SCENARIO: job seeking process

At home with my sister who I ask whenever I need

- I can identify how and where to organise and keep track of job ads in a job app (e.g. www.indeed.com) of my smartphone in order to retrieve them when I need them along my job seeking.

LEARNING SCENARIO: prepare group work with my classmates

In the classroom with my teacher who I can consult whenever I need

- I can identify an app in my tablet to organise and store links to those websites, blogs and digital databases related with a specific topic of literature and use it to retrieve them when needed for my report.

Canada Skills for Success

The Skills for Success model was released by the Government of Canada's Skills for Success Program, formerly the Office of Literacy and Essential Skills, in May 2021. Skills for Success replaces the Essential Skills Framework in response to workplace modernization and Canada's rapidly evolving labour market. The Skills for Success model is designed to be sustainable over time and reflect changing skill needs. A framework based on the Skills for Success model is currently being developed.

The updated model contains nine skills that are essential for success both now and in the future. The Office of Skills for Success explains that:

- **Skills for Success** are the skills needed to participate and thrive in learning, work, and life.
- **Skills for Success** include skills that are foundational for building other skills and knowledge and important for effective social interaction. These skills overlap and interact with each other and with other technical and life skills. They are inclusive and can be adapted to different contexts.
- **Skills for Success** are for everyone – employers, workers, training providers, governments, and communities. (2021)

The skills are divided into subcomponents of the overall skill and include task descriptors. Proficiency levels represent the level at which a person consistently demonstrates a particular skill. Though every skill contains components and task descriptors, the number of proficiency levels among skills varies, with newer skills having fewer proficiency levels which are considered provisional.

The model's Digital domain has six components, 21 provisional task descriptors, and three provisional proficiency levels. As a digital skills framework is being developed, definitions and constructs connected to the digital skill are subject to change and refinement.

Essential Skills		
Reading	Document Use	Oral Communication
Numeracy	Computer Use	Working with Others
Writing	Thinking	Continuous Learning

Skills for Success		
Reading	Creativity & Innovation	Communication
Numeracy	Digital	Collaboration
Writing	Problem Solving	Adaptability

Adapted from the "Skills for Success Model" and "What's Changed", by Employment and Social Development Canada, Skills for Success, 2021. (https://www.canada.ca/en/services/jobs/training/initiatives/skills-success.html). Copyright 2021 Canada.ca

COMPARISON OF FRAMEWORK AREAS

Each of the international digital skills frameworks takes a unique approach to organizing and categorizing skills and competencies. The overarching structure of the frameworks is grounded in how digital skills are conceptualized. For example, some frameworks focus more on digital literacy and citizenship, while others are more firmly grounded in labour market applications.

Despite these differences, there are many commonalities among the frameworks. Commonalities are worth noting as they represent an internationally accepted digital skill model standard. It will be helpful to follow suit with the Canadian framework. Some advantages of this approach include the ability to enable cross-country comparisons and articulating skills in a manner consistent with global markets.

Table 1: Comparison of Framework Areas

FRAMEWORK AREA	FRAMEWORK			
	UK EDSF & NSEDS	EU DIGCOMP 2.2	AUSTRALIA DLSF	SFS
Skill Areas	YES	YES	YES	NO
Context for Skills Use	YES	YES	YES	YES
Proficiency Levels	YES (in NSEDS)	YES	YES	YES (Provisional)
Performance Variables	YES	YES	YES	YES
Skill Task Descriptors	YES	YES	YES	YES

Skill Areas

To clarify their purpose and objectives, frameworks classify competencies and skills into larger categories. The European Commission's DigComp 2.2 Framework, the Australian Digital Literacy Skills Framework, and the UK's Essential Digital Skills Framework contain five skill areas. Common areas include problem-solving, communication, and safety. Their terminology and areas of focus do, however, vary slightly. The Canadian Skills for Success model divides digital skills into six components, including applying safe and responsible practices online, with 21 skill task descriptors. However, it is not yet a comprehensive framework. Future SFS framework development can look to common skill areas within the other frameworks for guidance on how the existing skill components could be organized to align with what others from similar places are already doing.

Contexts for Skill Use

Different frameworks and models consider various contexts for the use of digital skills. While employment or work is the primary focus of most frameworks, other, such as the DigComp 2.2 and the Australian Digital Literacy Skills Framework, also include instruction, training, or learning contexts. Skills for Success emphasizes teachable and learnable skills within the context of employment training, as well as work-focused and transferable skills.

The Australian framework is the most comprehensive, with six distinct contexts. This level of detail can have both benefits and drawbacks. While the Australian framework's detailed categorization of contexts may assist in creating specific task descriptors and examples for skills, it also poses a risk of becoming burdensome and unwieldy due to the significant effort required to create skill task examples, evaluations, and other related tasks for each of the six contexts. To use each framework and model effectively to develop skills, it is essential to understand the context in which they are to be applied.

Performance Variables

Both internal and external factors have an impact on skill acquisition and performance. These factors are commonly referred to as "performance variables" and are recognized by many frameworks. However, not all frameworks use this terminology or address these variables explicitly.

The UK Essential Digital Skills Framework presupposes that, as people gain foundational digital skills, they become motivated and confident in using technology. However, this framework does not mention performance variables (2018, p. 2). It does address proficiency levels, but does not directly or indirectly refer to any factors that may influence performance.

The ALSF, on the other hand, explicitly includes performance variables and identifies four factors that can affect performance: nature and degree of support, familiarity with context, complexity of text, and complexity of the task. This framework also emphasizes the importance of how these factors interact (2020, p. 6).
Although DigComp 2.2 does not use the term performance variables, it does consider task complexity, learner autonomy, and cognitive domains when assessing proficiency levels (2022, p. 12).

The SRDC Final Report does not provide specific performance variables but recognizes the impact of context and complexity on performance. It suggests an evidence-based approach to understanding how skills are acquired and measured (2021, p. 5).

While performance variables exist in all frameworks, the direct recognition and level of detail vary. Although frameworks differ in terminology and approach, most recognize that skill acquisition and performance do not occur in isolation; they are influenced by a range of internal and external factors. Further research is needed to determine how to integrate these variables into the Skills for Success framework to ensure they are effectively addressed.

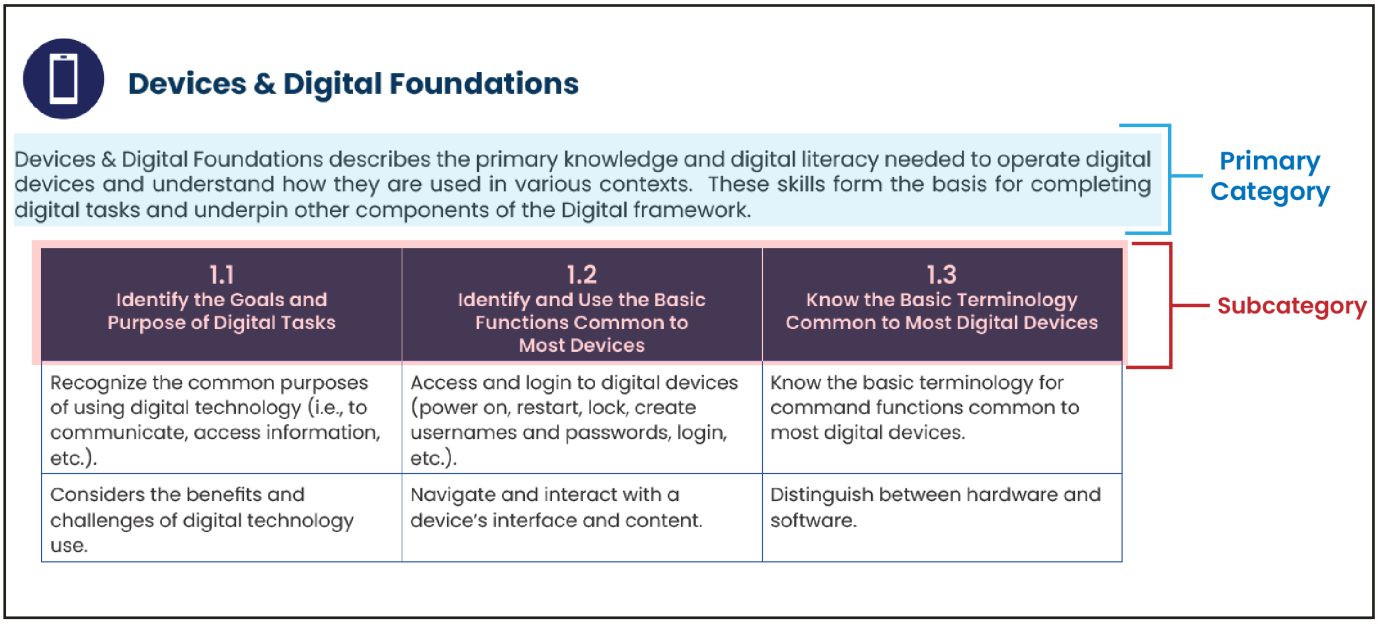
Digital Skills Mapping – Phase 1

The Skills for Success definition and digital components were used as the base organizing structure to map out and align findings from the environmental scan and to inform the development of a taxonomy and underlying constructs for digital skills in Canada. The project team at Bow Valley College completed a mapping activity to better understand the overlap in the competencies defined in each of the frameworks. The competencies were mapped into the existing categories of the SFS framework. Specifically,

1. SFS Digital components were used as primary categories.
2. Details/descriptors from the SFS categories were used as subcategories.
3. Finally, the competencies derived from each of the international frameworks were summarized and plotted into the SFS categories.

The following section provides an example of a mapped skills table, descriptions of the digital categories, and each of the skill competency tables.

Example of Mapped Skills Table



1.1 Identify the Goals and Purpose of Digital Tasks	1.2 Identify and Use the Basic Functions Common to Most Devices	1.3 Know the Basic Terminology Common to Most Digital Devices
Recognize the common purposes of using digital technology (i.e., to communicate, access information, etc.).	Access and login to digital devices (power on, restart, lock, create usernames and passwords, login, etc.).	Know the basic terminology for command functions common to most digital devices.
Considers the benefits and challenges of digital technology use.	Navigate and interact with a device's interface and content.	Distinguish between hardware and software.

DIGITAL CATEGORIES:

Devices & Digital Foundations

Operate digital devices including computers, tablets, phones, and other handheld devices and technology. Apply foundational digital knowledge to identify the goals & purpose of digital tasks, use the basic functions common to most digital devices, and understand basic terminology.

Digital Tools

Utilize digital tools such as software, applications, Artificial Intelligence (AI), etc. Select and use digital tools aligned with the goals and purposes of tasks. Understand how to keep tools updated and enhance accessibility for self and others.

Information & Data

Navigate, search, evaluate, and organize digital content and data. Find information using digital searches and analyze the relevance and reliability of the information. Store and organize digital content logically and efficiently.

Collaboration

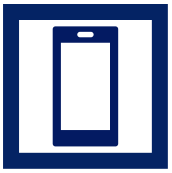
Use tools and platforms to communicate, collaborate, and share information. Share information online through forms, online transactions, applications, etc.

Safe Practices

Apply safe and responsible practices in digital environments.

Learning

update and upgrade digital skills and knowledge. Build on existing digital skills to advance digital competence and engage in training, professional development, and personal growth.



Devices & Digital Foundations

Devices & Digital Foundations describes the primary knowledge and digital literacy needed to operate digital devices and understand how they are used in various contexts. These skills form the basis for completing digital tasks and underpin other components of the Digital framework.

1.1 Identify the Goals and Purpose of Digital Tasks	1.2 Identify and Use the Basic Functions Common to Most Devices	1.3 Know the Basic Terminology Common to Most Digital Devices
Recognize the common purposes of using digital technology (i.e., to communicate, access information, etc.).	Access and login to digital devices (power on, restart, lock, create usernames and passwords, login, etc.).	Know the basic terminology for command functions common to most digital devices.
Considers the benefits and challenges of digital technology use.	Navigate and interact with a device's interface and content.	Distinguish between hardware and software.
Appreciate that technology improves efficiency and productivity.	Connect to a network (wireless, local area, virtual private, etc.).	Recognize basic digital symbols and icons.
Perceive how technology aids in problem-solving.	Apply basic settings, adjust preferences, and utilize accessibility tools.	Understand the differences between public, private, and personal information.
Comprehend the importance of digital access.	Access the internet through a web browser and conduct basic searches.	Grasp basic concepts of privacy, safety, and security in digital environments.
Identify information needs and where to access content and data.	Select relevant applications and software to complete tasks (i.e., select an email application to communicate).	Realize what a digital identity is.
Recognize the physical impacts of digital technology use (i.e., eye strain, back pain, etc.) and take steps to prevent them.	Identify and solve basic technical problems (i.e., restart a device).	Understand that artificial intelligence is being used in many areas of our lives.
	Keep devices up to date.	

Examples:

- Install an app on a mobile device.
- Complete software updates in response to push notifications.
- Complete keyword searches to find information online.
- Review terms of use to identify hidden fees or in-app purchases.
- Use voice to text to send a text message.
- Create separate email accounts for personal and work use.
- Pair a Bluetooth speaker or headphones with a mobile device.
- Operate digital devices when it is safe to do so.
- Take frequent breaks to limit the strain of digital device usage.
- Change the font settings on a document to improve readability.
- Keep login and password information private and secure.

Digital Tools

Digital Tools defines the skills needed to complete digital tasks using software, applications, AI, and other digital tools. This involves understanding the purpose and goals of a task and selecting the tools and applications that will best achieve the intended outcomes. It also requires keeping tools updated and enhancing accessibility for self and others.

2.1 Use Software, Mobile Applications, and Other Digital Tools for a Purpose	2.2 Select Appropriate Digital Tools Based on Goals and Purpose of Tasks	2.3 Keep Digital Tools Up to Date
Create, format, and edit documents including text, tables, graphics, and charts.	Differentiate between the purpose and intended use of different software and applications.	Run updates to hardware and software improve performance and enhance security.
Download, upload, and share digital content.	Select appropriate software and applications that will effectively achieve the intended outcome of a task.	Backup and archive information and content using cloud or local storage.
Enter, manipulate, and analyze data in spreadsheets.	Compare features and functions of different digital tools to select an appropriate digital solution.	Setup authentication for applications and software.
Edit and enhance images and graphics.	Use assistive technology to enhance access to devices and software.	Uninstall applications and software from digital devices.
Present information using digital presentation tools (i.e., PowerPoint).		Permanently delete digital content.
Troubleshoot technical problems.		
Enter, search, and extract data from databases.		

Examples:

- Track project expenditures in a spreadsheet and generate totals for different cost categories.
- Find, update, and create information in digital drawings and schematics.
- Investigate digital solutions to solve problems or improve efficiency at work.
- Extract and analyze business information, such as sales, inventory, and client information from a database.
- Schedule, plan, and track meetings and tasks using a digital calendar and task list.
- Plan a delivery route using GPS software or maps.
- Deliver a presentation at a meeting using PowerPoint.
- Use remotely controlled devices (i.e., drones) to survey, collect measurements, obtain images, or assess hazards.
- Monitor equipment, operate machinery, or gather field information using a mobile phone.
- Process client information, orders, and payments using point-of-sale devices, hotel management systems, or QR codes.
- Perform inventory controls using logistics software.
- Enter and retrieve data from electronic payroll systems.
- Create and format MS Word documents using advanced formatting functions.
- Update system and accounts passwords routinely as needed.
- Use AI tools to edit and refine a report.

Information & Data

Information & Data depicts the skills required to navigate, search, evaluate, and organize digital content, information, and data. This includes finding and using digital searches and analyzing information for relevance and reliability. It also involves storing and organizing digital content logically and efficiently.

3.1 Navigate Digital Content	3.2 Carry out Digital Searches to Find Information and Content	3.3 Evaluate the Relevance and Reliability of Digital Information	3.4 Store and Organize Digital Information
Navigate online content using hyperlinks, menus, and other navigation elements.	Select keywords and key phrases to search for digital content.	Understand the criteria used to evaluate the reliability and relevance of digital content.	Organize, store, and retrieve files using folders and menus.
Recognize the common layout and format features of websites.	Understand how online search results are presented and ranked.	Assess information sources to distinguish between credible and non-credible information.	Apply naming conventions to documents and files.
Create bookmarks and shortcuts to efficiently retrieve information.	Apply advanced search features to refine and filter results.	Make use of URL details to determine sources of online information (i.e., .org, .com).	Download, upload, and archive digital files.
	Utilize search tools to locate information quickly (i.e., search in PDF document).	Understand how copyright applies to the use of digital content.	Distinguish between file types/formats and file extensions.

Examples:

- Download open-source images for a presentation and use appropriate attribution.
- Evaluate information from online searches to determine if it has been influenced by commercial or government interests.
- Recognize the intent behind online content (i.e., inform, entertain, persuade, sell).
- Evaluate the reliability of information generated by AI by using other sources.
- Identify characteristics of fake news or misinformation.
- Copy and move files, images, and documents between folders, devices, and cloud storage.
- Create a nested folder structure to organize digital files.
- Utilize advanced settings to auto archive and file digital content.
- Comprehend possible legal implications for downloading or sharing digital content such as music or films.
- Recover content or files from a backup.
- Evaluate a website to ensure personal data is secure (i.e., https, safety logo or certificate).
- Detect whether media like images, video, or audio has been created or altered using AI or other applications.
- Assess information to determine if it is current, relevant, and accurate, and cross-reference information from multiple sources to ensure its quality.
- Effectively search for and locate specific information from websites or online documents.
- Transfer and log information obtained from one source into another (i.e., the product number of a part needing replacement into a company database/online ordering system).
- Track online reviews to determine the most useful and appropriate product needed.
- Use AI to translate text or summarize documents or meeting notes.

Collaboration

Collaboration outlines the skills necessary to communicate, collaborate, and share information in digital environments. It includes using digital communication tools and platforms ethically and responsibly and transacting online.

4.1 Use Communication Tools and Social Media Platforms	4.2 Use Information-Sharing Platforms	4.3 Transact Online	4.4 Apply Ethical Practices Online
Communicate using emails and other messaging apps.	Use online meeting tools (i.e., Zoom, MS Teams) to meet, share information, and collaborate.	Complete online forms such as applications or reports.	Protect the digital identity and personal information of self and others online.
Employ appropriate style, tone, and writing conventions associated with communication platforms.	Share documents and files using online sharing platforms (i.e., Google Drive).	Create accounts and subscribe to online services (i.e., icloud, government accounts, etc.).	Recognize the potential impacts on others when posting comments or images.
Choose appropriate communication platforms for specific audiences and purposes.	Set permissions and give access to shared documents.	Use online financial services and purchasing platforms.	Report concerns and inappropriate online behaviour using appropriate channels.
Understand difference between public and private messages.		Interact with online support services (i.e., virtual assistant, chatbot).	Appreciate the psychological risks to mental health and wellness associated with online activities.

Examples:

- Share information and updates with colleagues using email.
- Set up email signatures, out of office notifications, and other settings in email.
- Send quick, informal messages to a supervisor to notify them of a change in work schedule.
- Moderate an online meeting (recording, screen sharing, etc.) using video conferencing platforms (e.g., Teams, Zoom).
- Communicate rules and expectations regarding work boundaries, such as deadlines, task priorities, weekend availability, and other related parameters.
- Alter the sharing preferences for social media content to specify the intended audience (i.e., friends only).
- Order office supplies using an online purchasing platform.
- Create a professional profile and network in a digital format (i.e., LinkedIn).
- Understand what website cookies and cookie preferences are.
- Use cloud-based platforms and tools to create and collaborate on shared documents and communicate with colleagues (e.g., Teams, Google Suite).
- Use project management tools like Jira to enter progress reports and communicate updates to team members.
- Send bug reports and ITS requests.
- Create and apply boundaries around the usage of digital devices to avoid burnout (e.g., turning off notifications, setting emails to autoreply out of office).
- Identify and report types of behaviours that constitute online harassment or bullying (e.g., repeat messaging, inappropriate content).

Safe Practices

Safe Practices references the skills required to protect information, devices, and networks from threats. It involves recognizing the sources of threats in digital environments and taking preventative action to manage risks to self and others.

5.1 Understand safe practices for data storage and sharing	5.2 IProtect personal information and privacy for yourself and others	5.3 Protect data and devices from online risks and threats	5.4 Make secure online transactions
Comply with organizational policies for security, remote access, and data storage.	Understand personal rights and options for the collection and use of personal data.	Create secure usernames and passwords.	Manage traceable online activities and take steps to safeguard identity.
Keep software and systems up to date to minimize security risks.	Recognize that personal information must be securely stored.	Keep passwords confidential and secure.	Access online services securely (i.e., multifactor authentication).
Shield against information loss by backing up data.	Adjust privacy and other settings on devices and applications to ensure personal information is protected.	Differentiate the common types of viruses and understand how to recognize them.	Understand the security risks associated with public Wi-Fi.
Prevent access to sensitive and confidential information.	Know where consent is required to collect and use personal information.	Identify and avoid cyber threats (i.e., phishing emails, password attacks).	Locate secure websites by looking for padlock and https in address bar.

Examples:

- Review data-sharing policies for applications to determine how personal data will be used.
- Browse incognito or clear browsing history to maintain privacy and confidentiality, especially if using a shared device or network.
- Distinguish between sponsored and unsponsored content.
- Ask permission before sharing photos or other personal information about others.
- Distinguish what types of personal data should not be shared online.
- Use a virtual private network to protect data and content while working remotely.
- Know the different forms of security breaches.
- Recognize and proactively implement measures to safeguard against common cyber threats and scams.
- Report phishing emails and other cyber threats to Information Technology Services.
- Assess potential privacy concerns when screen sharing.

Learning

Learning characterizes the skills necessary to update and upgrade digital skills and knowledge. It involves building on existing digital skills to advance digital competence and engage in training, professional development, and personal growth.

6.1 Use existing skills and knowledge to learn and apply new advanced digital skills
Access online tutorials and forums to solve problems and improve digital skills.
Choose appropriate online learning resources to maintain digital skills.
Adjust and customize digital environments to reflect personal needs.
Recognize where improvements to digital skills are required.
Support others to acquire digital skills.

Examples:

- Use virtual reality to learn how to operate specialized equipment.
- Sign up for industry newsletters.
- Complete cyber security training.
- Use online resources to learn a new skill (e.g., YouTube, LinkedIn, blogs).
- Troubleshoot technical problems.
- Access targeted tutorials on how to use specific functions or features of software.
- Complete certifications online.
- Complete onboarding using digital tools and platforms.
- Engage in continuous learning/lifelong learning.
- Recognize that digital skills need to be continuously updated.
- Track professional learning through digital documentation (e.g., online portfolios).
- Engage in online safety training.
- Assess the credibility of information presented in online learning (i.e., is an authority on the subject).
- Utilize health apps to research conditions and treatments.

MAPPING SUMMARY

The mapping activity revealed the need to further examine and refine the categories and competencies within the SFS Digital domain. Redesigning or reorganizing the SFS overarching organizational structure to better align with international models would be beneficial to consider. Additional consultation with industry and other stakeholders will support a broader understanding of the details underlying the categories and subcategories.

Key Themes from Stakeholder Interviews and Literature – Phase 2

The preceding section of this report explored how digital skills are defined, conceptualized, and expressed in various frameworks. It is also crucial to investigate the environmental factors that influence current and future digital skills requirements for work and life.

To obtain this perspective, this project analyzed research and governmental reports that highlight the effects of digital technology on economic, social, and labour market factors. Additionally, the project consulted with industry stakeholders from across Canada to gain their insights on digitization and digital skills trends in the Canadian labour market. These stakeholders identified primary challenges and opportunities associated with digital skills.

This section of the report highlights the cross-sector themes uncovered from literature review and key informant interviews with stakeholders. First, the themes derived from literature review are discussed, followed by themes from the stakeholder interviews. Although there are many overlaps between the literature and the stakeholder perspectives, some distinct themes emerged specific to the Canadian context, which are worth noting.

LITERATURE & REPORTS KEY THEMES

A comprehensive analysis of research from both national and international sources elucidated major themes regarding the impact of digitalization across the workforce. Key themes include: the ongoing digital divide, the need for digital equity, and the recognition of and positive outlook of using a multi-pronged approach towards digital upskilling through government, industry, educational institutions, and other stakeholders.

+ Workplaces are going digital

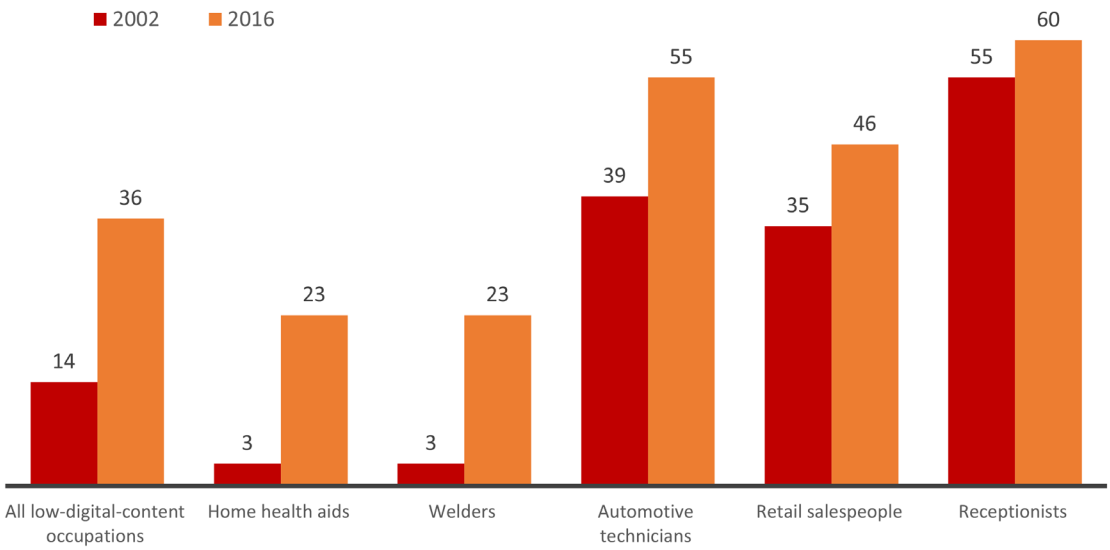
Nearly all labour markets and the workforce are changing to incorporate technology and adjust to a digital world on a national and international level (Hutchison, 2022, p. 6). This shift had already started before the COVID-19 pandemic but was accelerated when constraints associated with the pandemic compelled a sizeable portion of the population to work remotely, making them dependent on technology and their digital skills (Hutchison, 2022, p.4). In fact, this tendency is only getting stronger as more firms and workers take advantage of the benefits that flexible work schedules and the rise of on-demand services offer.

+ Digital skills for workers are becoming a requirement

The increasing demand for digital skills from workers, regardless of sector or job type, is a natural byproduct of work digitization. In fact, most vocations require a basic level of computer abilities. Workers in jobs that have previously required few to no digital skills are being obliged to acquire and apply them; for example, janitors must now use technology to do simple duties such as filling out timecards and checking room assignments (Heckler & Loprest, 2019, p.5; Abuallail & Viet, 2022, p. 8).

Business has mirrored what academics have said about the crucial importance of digital skills. According to the 2020 WEF Future of Jobs Study, which asked firms about Perceived Skills and Skill Groups with Growing Demand by 2025, nearly 50% of respondents anticipate technology use and development as increasing in prominence from 2020-2025, placing it among the top 15 skills for 2025 (p. 5).

Evidence of professions requiring digital skills predates the pandemic. The beginning of the twenty-first century represented a turning point in the digitization of the workplace, which has only accelerated. According to a Brookings Institution report, there was considerable growth in career opportunities requiring digital skills between 2002 and 2016. The study assigned each occupation a digital score ranging from 0 to 100 based on data from the US Department of Labor, which represented the importance of digital skills, frequency of technology use, and the level of digital competence required for the employment. Based on their digital score, jobs were classed as high (scoring over 60), moderate (33 to 60), or low (below 33). The share of occupations with strong digital content increased fourfold, from 4.8 to 23.0 percent, demonstrating a growth in digital features in current jobs as well as the introduction of new digital jobs. The proportion of occupations having middle digital content increased as well, rising from 39.5 to 47.5 percent. Conversely, the percentage of employment with little or no digital content fell from 55.7 percent to 29.5 percent, showing a reduced requirement for basic computer skills in those jobs (Heckler and Loprest, 2018, p.5).



+ Higher level digital thinking is in demand

While the demand for digital skills in the labour market is growing, research shows another set of skills, "soft skills," is also needed. Indeed, having a sophisticated level of digital skills in isolation is not enough to ensure success in the workplace. Hutchison (2022) stipulates, "to continue to adapt, innovate, and grow, Canadian companies need more workers who can use their advanced digital knowledge to solve problems and inform decision-making" (p. 7). In fact, ample evidence indicates the importance of digital skills has increased significantly from being an optional skill to an essential one. In addition to digital skills, it is now equally important to possess transferable soft skills across different fields, such as effective communication in both online and offline platforms (UNESCO, 2022). According to Kispeter (2018), soft skills are social-emotional abilities like flexibility, problem-solving, teamwork, communication, and abstract thought (p. 6). What is referred to as 21st century skills frequently combines digital and soft abilities. The need for 21st-century skills, especially interpersonal, cognitive, and learning strategies skills, is reportedly increasing. Jobs that involve routine tasks and basic cognitive skills will likely continue to diminish since they are considerably more vulnerable to automation while occupations requiring 21st century skills will become much more common (Bughin et al., 2018, p. 6).

+ The impacts of digitalization are uneven

Discussion of a digital divide dates to the mid-1990s. The term first appeared over 25 years ago in a 1995 report issued by the US Department of Commerce's National Telecommunications and Information Administration and discussed how particular groups like minorities, rural poor, young households, and female-led households were the least connected to the internet and lacked access to digital technologies (NTIA, 1995).

As digital skills become even more crucial to accessing opportunities in today's labour market, it is important to acknowledge the existence of the current digital divide and its potentially profound ramifications. While there is robust research literature to document society's awareness of this gap and who can access these emerging opportunities (Heckler & Loprest, 2019, p.8), societal values and mobilization of action toward solutions to redress/remedy/resolve inequitable access was limited prior to 2020. However, the seismic shifts brought about by a global health threat pressed governments and businesses to examine and address pressing societal issues with more immediacy. Today, shifting social landscapes have created new values reflected in workplace expectations and standards. This movement toward diversity, equity, and inclusion has laid the foundation for a sustaining critical dialogue addressing the inherent inequities in systems and organizations.

Both government and industry perceive gaps and challenges that certain groups in society face as the push to digitalize in all areas continues. Certain demographic groups (i.e., BIPOC, elderly, immigrant, lower socioeconomic status) face multiple barriers that lower their chances of being able to access opportunities like training and upskilling while increasing the likelihood of being left behind and increasing the gap between where they are at and where they have the right to be (Robinson et al., 2020). To address this disparity, there has been a movement by governments and multi-national organizations towards creating social equity. The concept of digital equity is embedded within this greater notion.

As one part of overall social equity, digital equity is "a state where all people and organizations can fully benefit from the digital technology necessary to succeed in the digital economy" (Deloitte, 2023).

+ Upskilling/training/improving digital skills will positively impact workers and the overall economy

As the social equity movement has gained traction, global leaders from all sectors and governments have recognized that one of the most effective strategies for combating inequality and social unrest while also stimulating the economy is to help citizens improve their digital and higher-level cognitive skills through training and upskilling. In a 2017 paper addressing the future of work and skills, the Organization for Economic Cooperation and Development (OECD) emphasized the need to develop digital skills opportunities for the current workforce, arguing that the rapid pace of technological change risks making the current workforce obsolete if opportunities for upscaling digital skills are not provided (p.19).

+ Moving forward, a multi-faceted approach is required and provides the best opportunity to achieve positive outcomes for all citizens

Muro et al. (2017) posit that the expansion of the economy through digitalization is creating numerous opportunities. However, ensuring an inclusive labour market during this process requires intentional effort, as it will not just happen alone.

Others have expressed a similar viewpoint that the potential benefits of digitalization can only be fully realized through collaborative efforts by governments and other stakeholders to provide training opportunities for all members of society. According to the 2018 WEF Future of Jobs report, technology-related and non-cognitive soft skills are becoming increasingly important. Governments, industry employers, education providers, and other stakeholders have significant opportunities to collaborate on innovative and creative partnerships to experiment and invest in new forms of education and training that will be most beneficial to individuals in this new labour market context (p. 23).

As technological breakthroughs rapidly shift the frontier between the work tasks performed by humans and those performed by machines and algorithms, global labour markets are undergoing major transformations. These transformations, if managed wisely, could lead to a new age of good work, good jobs and improved quality of life for all, but if managed poorly, pose the risk of widening skills gaps, greater inequality, and broader polarization. (WEF, 2018, vii)

The themes discussed in the literature and government reports emphasize the urgent need to address the persistent digital divide and digital inequities. The analysis indicates that a comprehensive, multi-pronged approach is necessary, involving government, industry, education, and other stakeholders, to effectively address the scale of labour market changes resulting from digitization. Next, this report turns to findings from informational interviews undertaken with stakeholders in key Canadian sectors to gain a deeper understanding of issues surrounding digital technology in Canadian workplaces today.

INDUSTRY STAKEHOLDER CONSULTATION KEY THEMES

Over a span of two months, a total of twenty-one interview sessions were conducted, each lasting between 60 to 90 minutes. These interviews followed a semi-structured format, allowing participants the freedom to discuss ideas beyond the scope of the prepared questions.

Through a qualitative analysis of the interview data, several recurring themes emerged, reflecting issues that align with previous research and studies conducted over the past two decades. While sector-specific matters were also brought up, this section focuses on overarching themes that appeared. Emphasizing these dominant themes is crucial as it guides the development of a comprehensive digital framework that can be widely adopted, along with effective measurement and supporting tools. However, it is vital to acknowledge that the digital landscape is continuously evolving. Therefore, any future framework must incorporate flexibility and adaptability to cater to specific contexts within its design.

+ Skilled and Unskilled Worker Shortages: An Ongoing Challenge

One consistent issue highlighted by participants was the scarcity of skilled and unskilled workers to fill various positions. Difficulties were encountered in recruiting both frontline staff and individuals for more technical or managerial roles. While the problem of staff shortages predates the onset of the Covid-19 pandemic in March 2020, it was further exacerbated by health restrictions and the subsequent adjustments made to work practices. Many businesses, particularly those in service-related industries like hospitality and retail, faced significant obstacles as they were unable to operate at full capacity, compelling them to reconsider their strategies for remaining viable. Interviewees from various sectors emphasized the need to reevaluate traditional methods of recruitment and employee retention to adapt to changing conditions.

The urgent need to fill positions and retain employees has also impacted the extent of training and upskilling efforts by employers, especially among small and medium-sized enterprises (SMEs). In many cases, companies have had to settle for individuals with minimal qualifications, and any training provided has been limited to immediate needs or just-in-time requirements. Participants acknowledged that this reactive and survival-driven approach was far from ideal for both employers and employees, expressing frustration and a desire for stability in the labour force. While interviewees recognized the importance of basic digital skills for employees, SMEs primarily focused on ensuring they had enough personnel to effectively operate their businesses.

+ The War for Talent: Competing for Next Generation Employees

In addition to the general labour shortage, another recurring theme among participants was the increasing competition faced by employers within and between industries in attracting, hiring, and retaining younger employees and recent graduates. Many interviewees noted the challenges employers encountered in finding and retaining new, particularly younger, talent in the current job market.

Participants from various industries provided similar explanations for this shift. They discussed how the attitudes and expectations of younger workers differed from previous generations. When asked to elaborate, participants explained that unlike older generations who placed greater emphasis on work and career advancement, younger workers today prioritize achieving a healthy work-life balance and value their personal lives as much as their work. Another key priority for younger workers is the expectation of an inclusive and flexible workplace. Interviewees observed that the next generation of employees seeks supportive and diverse work environments that align with their own values. Additionally, they actively seek employers that offer flexible work arrangements, allowing them freedom in terms of where and how they work. Interestingly, participants also noted that many established older workers have embraced a more flexible work environment, which they attributed to workplace adjustments made in response to the shift to remote work brought about by the pandemic.

Moreover, younger workers are perceived to prefer employers who invest in lifelong learning and foster the growth of their employees. Companies that provide training, development opportunities, and clear paths for career progression are more appealing to the next generation of workers and hold an advantage over those that do not.

Several interviewees suggested that employers need to adapt their offerings to align more closely with the priorities of younger workers. Addressing the values prioritized by the younger generation would not only benefit employees of all ages but also the organizations they work for.

+ Bridging the skills gap: Preparing the younger generation for the future workplace

Across the board, participants acknowledged that today's youth enter the workforce with a level of digital skills that previous generations did not possess. While this was generally seen as an advantage, many interviewees also pointed out a deficiency in important soft skills accompanying digital tasks, such as communication, problem-solving, and teamwork, among younger hires. A recurring concern expressed by interviewees was that younger workers were accustomed to communicating digitally in specific ways and either were unaware of or did not recognize the value of adapting their communication modes and styles to different work situations.

Furthermore, participants from various sectors noted that while video-conferencing and digital communication platforms were highly valuable and frequently used, younger workers often lacked strong interpersonal skills despite possessing the necessary digital skills to navigate such platforms. Many interviewees suggested the explicit establishment and nurturing of mentorship programs that involve more experienced employees mentoring inexperienced, younger employees. They argued that such programs would yield numerous benefits for both the employees and the organization.

By facilitating mentorship, organizations can bridge the gap between the digital skills of younger workers and the development of essential soft skills necessary for effective communication and collaboration in various work contexts. This approach allows experienced employees to share their knowledge and guide younger workers in navigating different communication styles and modes, fostering professional growth and enhancing overall workplace dynamics.

+ The digital divide between small and large enterprises

Participants unanimously stressed that larger companies are well aware of the advantages and significance of integrating digital technology and training and have already taken steps in that direction. However, in contrast, small and medium-sized enterprises (SMEs) express willingness and desire to adopt more digital technology and provide additional training to their employees, but face challenges due to limited resources, lack of support, and insufficient knowledge in this area. Many participants highlighted the unevenness of digital implementation and the scarcity of financial, training, and mentoring resources within their industries as obstacles to the growth of SMEs. Simultaneously, participants touched on the need for a comprehensive strategy that involves collaboration between the government, industry, and educational stakeholders to provide support and ensure coherence in digital transformation efforts. Small business owners who expressed the desire to integrate more digital technology and training expressed frustration at often being unaware of potential opportunities to access financial, technical, or organizational resources. Furthermore, they encountered barriers such as excessive bureaucracy, user-unfriendly web portals, and lengthy processing times when attempting to access these opportunities. They pointed out that resolving these issues would greatly motivate and enable SMEs to be more proactive and determined in their efforts to digitize their workplaces.

+ Making the case for digital transformation: Developing a compelling approach to convince businesses of the advantages

Another prominent recurring theme was the significance of presenting a compelling argument to business owners and industry leaders showing the benefits of investing in digital technology and employee training and upskilling. Several participants expressed that many businesses lacked a clear understanding of how digital technologies and training could contribute to increased profitability and long-term viability.

A notable suggestion to address this challenge was to construct a persuasive "business case" that highlights the advantages of implementing digital technology and training in a manner that resonates with decision-makers. Participants recommended approaches such as outlining how a digital strategy could improve operational efficiency, reduce costs, enhance the customer experience, drive innovation, increase potential return on investment, and foster long-term sustainability for an organization.

By presenting a comprehensive business case that highlights the specific benefits and potential outcomes of digital integration and employee training, stakeholders can gain a better understanding of the tangible advantages and long-term value these initiatives can bring. Such an approach can help overcome skepticism and uncertainty, enabling business owners and industry leaders to make informed decisions regarding the adoption of digital technologies and investment in employee development.

+ Balancing Automation and Human Skills: The Future of Work in the Digital Age

Interestingly, most participants did not perceive automation as a threat to their respective industries. Instead, they shared a common viewpoint on how automation would impact the nature of tasks performed by workers. Many acknowledged that some degree of automation was already being implemented within their sectors, and they predicted that its prevalence would continue to increase.

Across various industries, participants observed that AI and automation were already being employed to perform tasks that either posed risks to humans or were repetitive in nature. They stressed that the use of technology in such tasks did not eliminate the need for human workers but rather altered the type of work they engaged in. By leveraging automation to handle less mentally demanding tasks (even if physically hazardous), workers were able to dedicate more time to complex and intellectually stimulating work. Participants emphasized the growing importance of possessing advanced digital skills, alongside socio-emotional skills such as critical thinking, complex problem-solving, and creativity, irrespective of one's occupation or level.

The integration of automation in the workplace was viewed as an opportunity for workers to shift their focus towards more cognitively demanding and strategic work. Thus, participants highlighted the need for individuals to cultivate a broad skill set that combines digital proficiency with essential socio-emotional competencies to thrive in the evolving landscape of work.

+ Challenges

The participants' perspectives on the challenges and opportunities related to digital technology were intertwined, with the identified barriers also holding potential for transformative change if addressed effectively. The key challenges raised by the participants were a lack of financial resources, guidance, and a cohesive strategy.

Financial constraints were a significant hurdle for businesses, especially SMEs, in terms of investing in the necessary infrastructure for digital technology adoption and implementation. The participants noted that limited financial capability, exacerbated by the impact of the pandemic and lack of government support, hindered their ability to upgrade technology and provide digital training to their employees. Moreover, the challenge of finding qualified workers and high employee turnover rates further strained organizations' resources, making it difficult to prioritize training initiatives beyond immediate job responsibilities.

A lack of guidance and understanding regarding digital planning and implementation was another common challenge. Both SME owners and industry leaders were often unaware of available resources and lacked the knowledge to develop a digital strategy. Participants emphasized the need for proactive efforts from policymakers to provide accessible and well-advertised resources and support for businesses seeking to embrace digitization and relevant training.

Participants also highlighted the absence of a comprehensive and collaborative strategy involving stakeholders from government, industry, and educational institutions. While piecemeal initiatives existed, the lack of a deliberate and coordinated plan was seen as a hindrance to industry progress. Concerns were raised about Canada's competitiveness in comparison to international counterparts, as initiatives were fragmented rather than cooperative and cohesive.

+ Opportunities

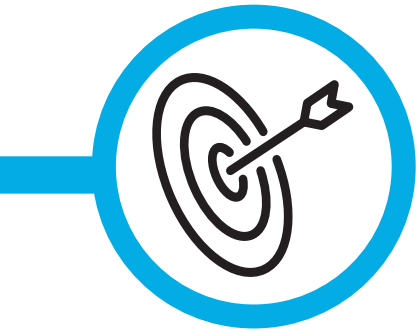
Despite these challenges, participants recognized exciting growth opportunities presented by digital technology. They spoke of the potential for increased productivity, expanded market access domestically and internationally, and improved skills for workers. Implementing streamlined systems and technology was seen as a means to free up time from routine tasks and enable workers to engage in more complex work. Digital technology was also seen as a mechanism for leveling the playing field between SMEs and larger organizations by providing equal market access.

All the interviewees agreed that digital technology offered industry and educational institutions a huge opportunity to improve productivity and efficiency. They noted that implementing systems and technology that could help streamline their operations would remove the time workers had to spend on routine tasks, freeing them to do more complex work while also removing tasks from humans that involved health and safety risks.

Furthermore, participants viewed digital technology as a powerful tool for enhancing workers' digital skills and offering lifelong learning opportunities. They noted the accessibility of self-guided online learning modules, training programs, and digital resources, which could offer cost-effective and flexible options for training. The use of technology was seen as incentivizing workers to become self-directed and motivated learners.

Overall, participants recognized the challenges faced by businesses and industries regarding digital technology adoption and training, but they also saw significant potential for growth and improvement through targeted investments, collaborative strategies, and the utilization of digital tools and resources.

The industry stakeholder consultation process conducted in this project has provided valuable insights into the key themes surrounding the current state of the workforce in the digital age. The recurring themes, as discussed earlier, shed light on the challenges faced by industries and businesses, while also revealing opportunities for growth and improvement.



Section 04
Conclusion

The rapid advancement of technology and the lingering effects of the pandemic have brought about significant shifts in the workforce and labour markets. Skilled and unskilled worker shortages have become a prevalent issue, particularly affecting small and medium-sized enterprises. As businesses adapt their approaches to hiring and retaining employees, the integration of digital technology has become crucial for success.

This project yielded several key findings related to digital skills and their implications for policy and practice. The concluding section of this report summarizes project findings and provides recommendations for further research and development into digital skills. It also highlights the need for comprehensive digital competency frameworks, collaboration among stakeholders, and policies that address the unique needs of the labour market.

Summary of key findings

- Skilled and unskilled worker shortages are impacting businesses across all sectors, with small and medium-sized enterprises feeling the effects most acutely. Organizations have had to adapt their approaches to hiring and retaining employees due to the pandemic and its lingering effects.
- Across the board, virtually all workforce and labour markets are shifting to integrate technology and adapt to a digital environment. This change had been happening for some time, but the onset of the pandemic sped up this change.
- Larger companies are integrating digital technology and training, but smaller businesses lack the resources and support to do so, requiring collaboration between stakeholders.
- Convincing businesses of the advantages of investing in digital technology and employee training is crucial
- The increasingly universal demand for digital skills from workers regardless of sector or type of job, is a natural result of the digitization of work. Today, workers in jobs with traditionally few to no digital skills are frequently required to acquire and use them.
- While the demand for digital skills in the labour market is growing, research shows another set of skills, "soft skills," is also needed in tandem. Digital skills alone are not enough to ensure success in the workplace as they are applied and used in concert with literacy, problem-solving, communication, etc. Mentorship programs can help address the lack of soft skills in younger generations.
- Most countries have recognized the need to ensure their citizens are equipped with digital skills, leading to the development of competency frameworks that provide guidance to policymakers, educators, employers, and other organizations in areas like employment, education, social inclusion, and lifelong learning.
- International frameworks emphasize the importance of communication, safety, problem-solving, and information skills, although there are slight variations in the way these skills are grouped.
- The contexts for skill use components are an important aspect of every framework, and each framework has specific contexts for skill use. The most common context for skills use relates to employment or work.

Implications for policy and practice

There is an urgent need for governments to prioritize the development of a comprehensive digital competency framework. Such frameworks are essential for equipping citizens with the necessary skills for the digital era and guiding policies, programs, and training initiatives.

Prioritizing the development of communication, safety, problem-solving, and information skills, while considering specific contexts for skill use, is crucial. Tailoring policies, programs, and training initiatives based on these frameworks provides guidance, criteria, and measurements for policymakers, educators, employers, and organizations in areas like employment, education, social inclusion, and lifelong learning.

Given that employment or work is the most common context for skill use, it is vital to structure policies, programs, and training initiatives to address the unique needs of the labour market and provide workers with the skills required to succeed in the era of digitization. Policymakers, industry leaders, and educational stakeholders should collaborate to develop and implement a comprehensive strategy that tackles the skills gap in the workforce. This strategy may involve the creation of training programs, mentorship opportunities, and apprenticeships.

To enhance productivity and competitiveness, employers should develop a strategic plan for implementing digital technology and providing employee training. Creating a culture of ongoing learning and investing in training programs for staff are essential to keep up with the rapidly changing digital environment.

To support small and medium-sized enterprises (SMEs) in integrating digital technology and training, policymakers should focus on providing necessary resources. This can be achieved through policies that offer funding and training opportunities specifically tailored for these businesses.

Policymakers and industry leaders must effectively communicate the benefits of investing in digital technology and employee training to convince businesses of the advantages. Targeted marketing campaigns, case studies, and testimonials from businesses that have successfully implemented digital strategies can be utilized for this purpose.

Educational institutions should integrate digital skills training into their course curriculum to prepare students with the necessary skills for the modern labour market. This can be achieved by thoughtfully integrating technology, providing students with hands-on experience, and establishing strong industry partnerships.

Policymakers and educators should also recognize the importance of soft skills such as communication, problem-solving, critical thinking, and collaboration in conjunction with digital skills training. Prioritizing training and upskilling that encompasses a 21st-century skillset is crucial. This can be achieved by implementing policies that promote digital literacy and designing programs that encourage the development of these skills within the workforce.

Recommendations for Future Research and Next Steps

Recommendations for possible future research include:

- Continuation of efforts to create an agile and sustainable digital skills framework for Canada based on existing models and recommendations, such as the Skills for Success model and SRDC's final research report. Further research should be conducted to refine and enhance the framework.
- Further exploration of the specific digital skills and soft skills that are most in-demand across different sectors and job types, as well as identifying skills that are likely to gain importance in the future. This research can inform the development of education and training programs that integrate both digital and soft skills required for present and future job market demands.
- Continued research on the specific contexts for skill use identified in competency frameworks, analyzing how these contexts vary across countries and sectors. This research can provide insights into customizing policies, programs, and training initiatives to effectively address the unique demands of each context.
- Research focusing on identifying barriers and challenges related to the development and acquisition of digital and soft skills. This can include factors such as limited access to technology, educational and training opportunities, and the evolving nature of work. The research should propose strategies and policies to overcome these barriers and facilitate skill development.
  Future research can focus on effective training and upskilling programs for workers, including both digital and soft skills. This could include examining the effectiveness of different types of training programs, the best methods for delivering training, and the impact of training on worker productivity and job satisfaction.
- Investigation into effective training and upskilling programs for workers, encompassing both digital and soft skills. This research can evaluate different program types, delivery methods, and assess the impact of training on worker productivity and job satisfaction.
- Research exploring the role of employers in upskilling their workforce, including identifying barriers they face in providing training and the benefits they can expect from investing in employee development. This research can inform policy decisions aimed at incentivizing employers to prioritize training and upskilling initiatives.
- Examination of the impact of mentorship programs on the development of soft skills among younger workers, identifying best practices for program design and implementation. This research can contribute to the development of more effective mentorship programs tailored to the needs of younger workers.
- Further research on collaborative initiatives involving government, industry, and educational stakeholders to promote the adoption of digital technology and workforce development. This research can provide insights into the effectiveness of such initiatives and guide policy decisions related to economic development, education, and workforce training.

NEXT STEPS:

In closing, the findings of this report emphasize the urgent need for governments, policymakers, educators, employers, and organizations to prioritize the development and implementation of comprehensive digital competency frameworks. These frameworks serve as a guide for equipping individuals with the necessary skills for the digital era and shaping policies, programs, and training initiatives. Recognizing the importance of digital skills in conjunction with soft skills, policymakers and educators should promote a 21st-century skillset through integrated curriculum and training programs. Collaboration between industry leaders and educational institutions is essential to bridge the skills gap and prepare individuals for the evolving job market. Additionally, supporting small and medium-sized enterprises in integrating digital technology and providing necessary resources should be a focus area for policymakers. By investing in digital technology, training, and ongoing learning, businesses can enhance productivity and competitiveness in the digital environment. With concerted efforts and a comprehensive strategy, we can pave the way for a skilled and adaptable workforce that thrives in the era of digitization.

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