Artificial Intelligence at Work: The Shifting Landscape of Future Skills and the Future of Work

Insights from the Survey of Employment and Skills

TED ROGERS SCHOOL OF MANAGEMENT | DIVERSITY INSTITUTE | Future Skills Centre | Centre des Compétences futures | Environics Institute For Survey Research

TED ROGERS SCHOOL OF MANAGEMENT | DIVERSITY INSTITUTE

The Diversity Institute conducts and coordinates multi-disciplinary, multi-stakeholder research to address the needs of diverse Canadians, the changing nature of skills and competencies and the policies, processes and tools that advance economic inclusion and success. Our action-oriented, evidence-based approach is advancing knowledge of the complex barriers faced by underrepresented groups, leading practices to effect change and producing concrete results. The Diversity Institute is a research lead for the Future Skills Centre.

Future Skills Centre | Centre des Compétences futures

The Future Skills Centre (FSC) is a forward-thinking centre for research and collaboration dedicated to driving innovation in skills development so that everyone in Canada can be prepared for the future of work. We partner with policy makers, researchers, practitioners, employers and labour and post-secondary institutions to solve pressing labour market challenges and ensure that everyone can benefit from relevant lifelong learning opportunities. We are founded by a consortium whose members are Toronto Metropolitan University, Blueprint and The Conference Board of Canada and are funded by the Government of Canada's Future Skills program.

Environics Institute For Survey Research

Environics Institute for Survey Research conducts relevant and original public opinion and social research related to issues of public policy and social change. It is through such research that organizations and individuals can better understand Canada today, how it has been changing and where it may be heading.

Artificial Intelligence at Work: The Shifting Landscape of Future Skills and the Future of Work is funded by the Government of Canada's Future Skills Program. The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

Authors

Dr. Wendy Cukier
Founder and academic director, Diversity Institute, Ted Rogers School of Management
Professor, entrepreneurship & strategy, Toronto Metropolitan University

Dr. Alyssa Saiphoo
Senior research associate, Diversity Institute

Dr. Andrew Parkin
Executive director, Environics Institute for Survey Research

Contributors

Dr. Guang Ying Mo
Director of research, Diversity Institute

Carter Man
Research assistant, Diversity Institute

Publication Date

October 2024

About the Survey on Employment and Skills

The Survey on Employment and Skills is conducted by the Environics Institute for Survey Research, in partnership with the Future Skills Centre and the Diversity Institute at Toronto Metropolitan University. In early 2020, the Survey on Employment and Skills began as a project designed to explore Canadians' experiences with the changing nature of work, including technology-driven disruptions, increasing insecurity and shifting skills requirements. Following the onset of the COVID-19 pandemic, the survey was expanded to investigate the impact of the crisis on Canadians' employment, earnings and work environments. A second wave of the survey was conducted in December 2020, a third wave in June 2021, a fourth wave in March–April 2022, a fifth wave in March 2023 and a sixth wave in October–November 2023. Each wave of the study consists of a survey of over 5,000 Canadians aged 18 years and over, conducted in all provinces and territories. A total of 34,740 Canadians were surveyed across the six waves. The survey includes oversamples of Canadians living in smaller provinces and territories, those under the age of 34 years, racialized Canadians and Canadians who identify as Indigenous, in order to provide a better portrait of the range of experiences across the country. Unless otherwise indicated, the survey results in this report are weighted by age, gender, region, education, racial identity and Indigenous identity to ensure that they are representative of the Canadian population as a whole.

Survey reports can be found online at:

www.environicsinstitute.org/projects/listing/-in-tags/type/survey-on-employment-and-skills

fsc-ccf.ca/research/2020-survey-on-employment-and-skills/

www.torontomu.ca/diversity/research/future-skills/survey-on-employment-and-skills/

Contents

Executive Summary

Introduction

Canada is a leading talent hub for artificial intelligence (AI). Despite this, Canada is falling behind globally in AI adoption. Barriers to AI adoption that Canadian experience include a lack of awareness of AI tools that can be used in the workplace, as well as ethical and privacy concerns with integrating AI into operations. However, the top barrier to AI adoption noted by Canadian businesses is a difficulty in finding employees with the necessary skills and expertise to support the integration of this technology into operations. However, if the data shows that there are plenty of AI professionals in Canada ready to work, why are employers experiencing this difficulty?

Research Design

In the seventh wave of the Survey on Employment and Skills, conducted by the Environics Institute in partnership with the Diversity Institute at Toronto Metropolitan University and the Future Skills Centre, this disconnect was further investigated. The survey was first administered in 2020 and as of the seventh wave in 2024, now has over 40,000 participants. In the most recent wave of the survey, questions about familiarity, use, perceptions and training on AI were added to investigate Canadians' perceptions of this emerging technology.

Findings

Survey findings showed that most respondents are somewhat familiar with AI tools to use in the workplace. Just over a third of those who were employed indicated that they have used AI at work to help with tasks with positive effects; the majority reported that using AI had made them more productive and more creative at work. Despite this, those who were the most familiar with AI tools in the workplace were those who were the most worried about their jobs becoming automated.

Perceptions of new technologies were mainly mixed or positive, with the exception of training at work: just over half of respondents felt that their employer was not providing enough training in new technologies. Consistent with this, most respondents who had used AI at work indicated that they had done so largely without any training or formal guidance from their employer. Instead, employees are taking it upon themselves to learn how to use these tools, either learning on the go while using the technology or seeking out and engaging in training themselves and governing use of these tools on their own.

Group differences were also identified. Younger age groups, men, Indigenous, racialized and immigrant respondents were more likely than their counterparts to be familiar and have received training on AI tools in the workplace.

Conclusions and Implications

The results from this wave of the survey highlight the urgency for employers to create policies and implement training on using AI tools in the workplace. Employees are already using these tools, with or without guidelines from employers and this is likely to increase as AI tools become more widespread. If employers do not put policies into place and provide training soon enough, adoption of AI into business operations down the line will be more difficult if employees already have their own informal rules about this. The relationship between familiarity and worry about automation suggests a need for AI literacy. Data suggests that AI adoption is associated with job creation rather than job loss, but a lack of understanding and fear mongering in the media about these tools might contribute to this worry. Increasing AI literacy in the general population could go a long way to reducing skepticism about these technologies and increasing AI adoption. These results also highlight an important shift to self-guided training. Employees are taking it upon themselves to keep up with these new technologies and are not waiting for their employer to offer training or guidance. Overall, employers need to catch up to employees and expand the talent pool if Canada is to keep its lead in the global AI race.

Context

Canada is positioned to become a global leader in artificial intelligence (AI). Already, Canada is a leader in AI talent, with over 140,000 AI professionals in 2023; this is a 29% increase from 2022.[1] Canada also leads in gender diversity in AI. Within most technology fields, there is a known gender gap when it comes to employment and wages. However, Canada saw a 67% growth in the number of women in AI from 2022 to 2023 — the largest year-over-year growth seen worldwide.[2]

Several Canadian companies are adopting AI in their operations. Drivers of AI adoption by Canadian businesses include making operations more accessible and reducing operating costs.[3] A report by IBM showed that AI adoption is being seen mainly in larger organizations,[4] and mostly in information and cultural industries.[5] The specific AI applications used by Canadian businesses varies across industries. Natural language processing is most commonly used in information and cultural industries, image and pattern recognition is used most commonly in professional, scientific and technical industries and virtual agents or chatbots are most commonly used by the finance and insurance industry.

AI adoption is most commonly seen in marketing, sales and business administration processes. However, its application varies significantly across industries. In goods-producing sectors, AI is primarily used for production and ICT security, whereas in service-based industries, its use in production is minimal. Instead, these industries focus on using AI for ICT security, sales, business administration and enterprise solutions.[6],[7] The adoption of AI tools into business operations requires changes within the business to accommodate the new technology. When businesses that used AI in the production of goods or delivery of services were asked about the adjustments made during implementation, the most common changes included retraining existing staff to use AI tools (39%), developing new workflows (35%), and modifying data collection or management practices (21%).[8]

Despite leading in AI talent, Canada lags behind other countries in terms of AI adoption. A survey by KPMG showed that 35% of Canadian businesses are using AI in their operations. While this is over one-third of businesses surveyed, this number pales in comparison to AI adoption in the U.S., where nearly three-quarters of businesses surveyed (72%) are using AI within their operations.[9] Similarly, while almost two-thirds of U.S. companies (65%) say they are using the generative AI platform ChatGPT to improve operations, only about one-third (37%) of Canadian businesses say they are looking into this.[10] Canada is not only behind in AI adoption within North America, but also globally. Globally, Canada falls far behind leading countries, with less than 4% (3.7%) of firms indicating that they have adopted AI into their operations. This is much lower than other countries that have AI adoption rates more than double those of Canada's, with Denmark having the highest at 24%.[11]

What barriers to AI adoption are Canadian businesses experiencing? Despite Canada leading globally in AI talent, the top barrier cited by Canadian companies to AI adoption is difficulty finding employees with AI expertise. About one in five (21%) of organizations surveyed said they do not currently have employees with the adequate skills to use AI tools they plan to integrate and just under one in five (17%) cannot find new employees to fill up this gap.[12] Two in five Canadian organizations (41%) in one survey said that limited AI skills and expertise was the top barrier to AI adoption.[13] Over one-half (54%) of Canadian businesses in another survey said they are concerned about the accuracy of the AI algorithms they are using and that they might be making decisions based on poorly designed algorithms. However, just under one-half (47%) in the same survey said they lack the expertise among their workforce to validate and verify the algorithms they have in place.[14]

Lack of awareness of the AI tools that are available is also a barrier often cited to adoption. This may make identifying the business case for AI a challenge; in fact, nearly three-quarters (69%) of Canadian businesses say they struggle to identify the business base for AI.[15]Another barrier to adoption cited by Canadian businesses is ethical concerns and trust of AI tools.[16] AI tools are often associated with a "black box," meaning that even if people are experienced users they might not understand how these tools work "behind the scenes."[17] The uncertainty about just exactly how these tools work can lead to skepticism and a lack of trust in these tools. In fact, Canada has one of the lowest levels of trust in AI technology.[18] This also highlights the need for governance policies for using these tools in the workplace.

Here, we see a disconnect. On one hand, the data shows that Canada is leading in AI expertise. We have a highly skilled workforce that is ready to meet the increasing demand for AI skills as AI adoption increases. On the other hand, Canadian businesses say they are struggling to find workers with the AI skills they need. What is the cause of this disconnect? In the most recent wave of our Survey on Employment and Skills, conducted in partnership with the Environics Institute and funded by the Future Skills Centre, we hoped to further understand this disconnect and determine how to bridge this gap.

Methods

To bridge the gap between employers and employees in regard to AI adoption and skills, we must first grasp a better understanding of this gap and the source of it. As such, the purpose of the analysis covered in this report was to further investigate the following research questions:

1. How often are Canadians using AI in the workplace?
2. How familiar are Canadians with AI tools that can be used in the workplace? Are there any group differences in familiarity?
3. How does familiarity relate to perceptions of AI in the workplace?
4. How much training and guidance do employees receive from their employer on how to use AI in the workplace?

To answer these questions, we use data from the Survey on Employment and Skills, a collaboration between the Environics Institute, the Diversity Institute at Toronto Metropolitan University and the Future Skills Centre. The survey began in early 2020 as a project designed to explore Canadians' experiences with the changing nature of work, including technology-driven disruptions, increasing insecurity and shifting skills requirements. Following the onset of the COVID-19 pandemic, the survey was expanded to investigate the impact of the crisis on Canadians' employment, earnings and work environments. A second wave of the survey was conducted in December 2020, a third wave in June 2021, a fourth wave in March to April 2022, a fifth wave in March 2023, a sixth wave in October to November 2023 and a seventh wave in May to July 2024.

Each wave of the study consists of a survey of more than 5,000 Canadians aged 18 and over, conducted in all provinces and territories. A total of 40,595 Canadians has been surveyed across the seven waves. The survey includes oversamples of Canadians living in smaller provinces and territories, those under the age of 34, racialized Canadians and Canadians who identify as Indigenous, to provide a better portrait of the range of experiences across the country.

Data presented in this report is based on the seventh and most recent wave of the survey (n=5,855). Given the increasing interest in AI, this wave included several questions about perceptions of AI in the workplace, the use of AI in the workplace, and training and guidance received on using AI in the workplace. Specific questions added for this wave can be found in Table 1.

Table 1. Questions about perceptions, usage and training on AI in the workplace added to Wave 7

Question	Options	Asked to
How familiar would you say you are with artificial intelligence programs that people can use in the workplace?	Not at all familiar Not very familiar Somewhat familiar Very familiar	Entire sample
Have you ever used any of these artificial intelligence programs for any of the following?	For your own personal use or enjoyment	Entire sample
	To help with assignments at school, college or university	Students only
	To help with tasks at work	Those who were employed
Which specific artificial intelligence program or programs did you use?	Open-ended	To those who said they used AI at work
Please think about the impact that using an artificial intelligence program has had on the way you do your job. Would you say that it has made you:	A lot less productive/creative A little less productive/creative Neither more nor less productive/creative A little more productive/creative Much more productive/creative	To those who said they used AI at work

Question	Options	Asked to
Did you receive any training to help you learn how to use artificial intelligence programs at work?	Yes, and this training was provided by my employer Yes, but this training was not provided by my employer No, I did not receive any of this kind of training	To those who said they used AI at work
More generally, how much guidance has your employer given you about using artificial intelligence programs at work?	A lot of guidance – my employer has written guidelines about using AI programs at work Some guidance – my employer has talked to me about using AI programs at work Not much guidance – I am figuring out how to use AI programs at work on my own	To those who said they used AI at work

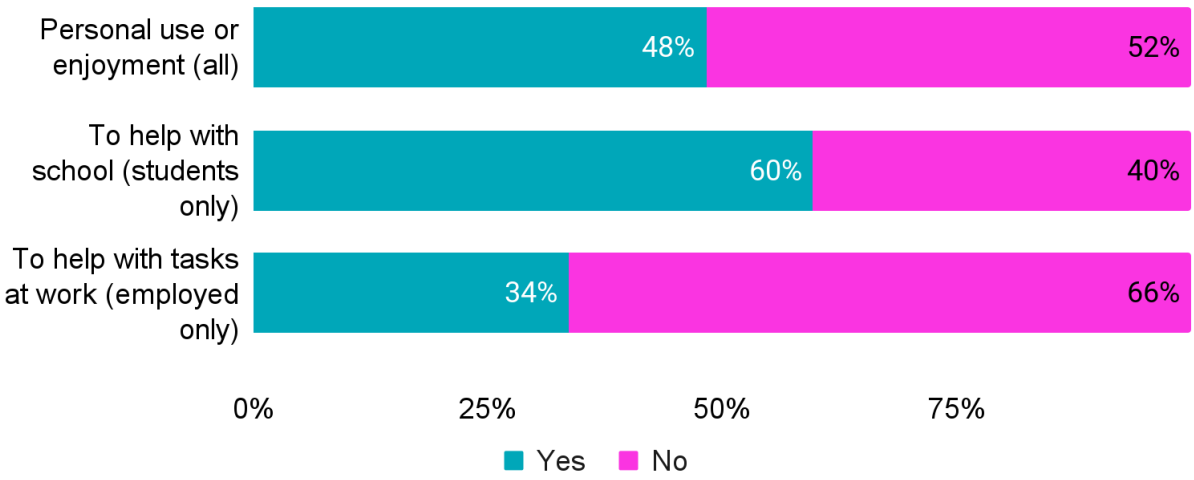
Question	Options	Asked to
Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree with each of the following statements about the impact of new information or computer technologies on your job: My workplace has been too slow to adapt to the opportunities offered by new information or computer technologies. I find it hard to keep up with the changes at work that have been caused by new information or computer technologies. I worry that I might lose my job in the coming years because the work I do will soon be automated (in other words, it will soon be done by computers or robots). I haven't received enough training at work enable me to take advantage of the opportunities offered by new information or computer technologies.	Strongly disagree Somewhat disagree Somewhat agree Strongly agree	To those who said they used AI at work

Results

AI tools are being used in the workplace in beneficial ways

All survey respondents in Wave 7 were asked if they have used AI for their own personal use or enjoyment. Just under one-half (48%) of respondents indicated that they have used AI for this purpose (see Figure 1). Results also show that students are more likely to use AI at school than employees are to use AI at work; 60% of students surveyed indicated that they have used AI at school, while only 34% of those who were employed said they have used AI at work to help with tasks (see Figure 1). For those who use AI at work, the impact is positive: most say it has made them more productive (81%) and more creative (71%).

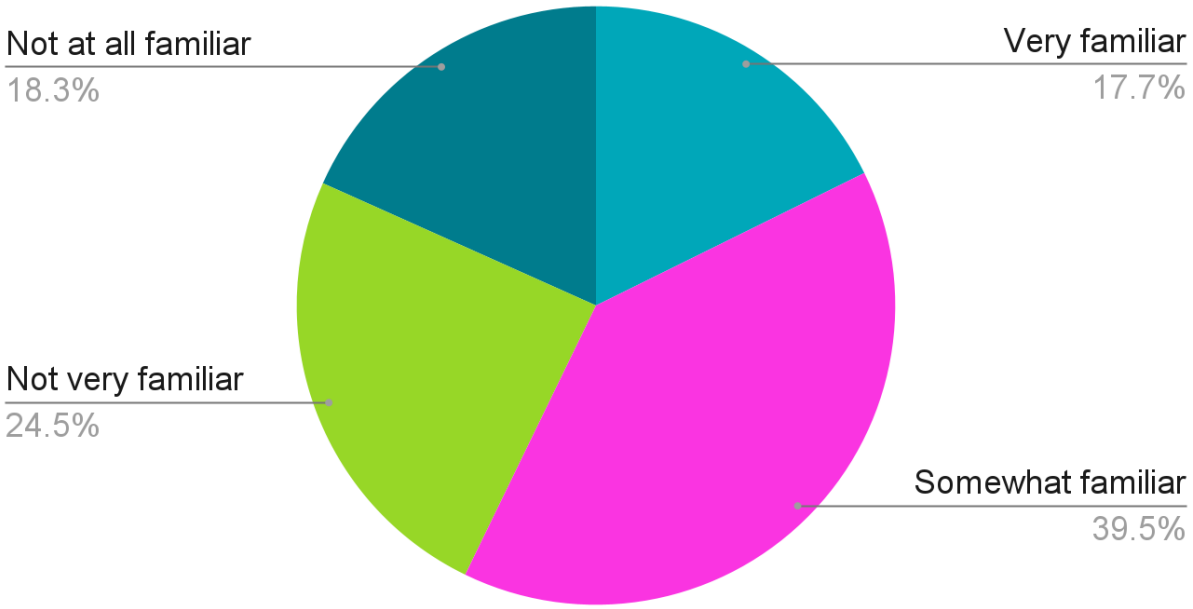
Figure 1. Use of artificial intelligence by respondents



Most respondents are somewhat familiar with AI tools

Nearly 3 in 5 survey respondents (57%) say they are familiar (very and somewhat combined) with AI programs to use in the workplace. Of this, most—about two in five (40%)—are only somewhat familiar with AI tools that can be used in the workplace. This leaves just under one in five (18%) who are highly confident in their familiarity with AI tools to use in the workplace (see Figure 2). This suggests that there is still work to be done to improve confidence in using AI tools at work.

Figure 2. Familiarity with artificial intelligence in the workplace



Perceptions of new technologies in the workplace

As seen in Table 2, overall perceptions of AI in the workplace are mainly mixed or positive. Perceptions of the speed at which their workplace is adapting to new technologies is mixed with 51% agreeing that their workplace is too slow in their adaptation. On the other hand, most respondents are not finding it difficult to keep up with changes at work caused by new technologies (61%) and most (61%) are not worried about automation. Perceptions about training provided by their employer are slightly negative, with 53% of respondents agreeing that they haven't received enough training on new technologies in the workplace.

Table 2 also shows the breakdown of perceptions by education level. Here, we can see a slight relationship between education level and worry about automation: as educational attainment increases, the gap between those who are and are not worried increases. Those with less than a high school education are mixed on the subject, with 49% indicating that they are worried about their role becoming automated. However, this decreases as you move up to those with a college degree, of which only 32% are worried about automation and those with a bachelor's degree, of which only 35% are worried about automation. This trend suggests that respondents may believe that further education may protect their jobs against automation.

Table 2. Perceptions of new technologies in the workplace; overall and by educational attainment

		Overall (%)	< High school (%)	High school (%)	Trades (%)	College (%)	Bach. (%)	Grad. Degree (%)
My workplace has been slow to adapt to new technologies	Agree	51	**60**	**51**	43	46	**53**	**53**
	Disagree	50	41	49	**57**	**55**	47	47
It's hard to keep up with changes at work caused by new technologies	Agree	39	41	44	40	31	37	43
	Disagree	**61**	**59**	**56**	**60**	**69**	**63**	**57**
I'm worried about my job becoming automated	Agree	39	49	46	36	32	35	39
	Disagree	**61**	**51**	**55**	**65**	**68**	**66**	**61**
I haven't received enough training on new technologies	Agree	**53**	**60**	**55**	43	49	**55**	**54**
	Disagree	47	40	46	**57**	**51**	45	46

*Bold indicates a higher proportion between agree and disagree

Familiarity with artificial intelligence and perceptions of new technologies

To investigate the relationship between perceptions of new technologies and familiarity with AI, we looked at the distribution between the two variables. We saw a slight trend between the two, where those who were most familiar with AI in the workplace also held the most negative perceptions of new technologies: they were most likely to strongly agree that their workplace was slow to adapt to new technologies, they found it hard to keep up with changes at work due to new technologies and did not feel that they were receiving enough training on new technologies. Most interesting was the relationship between familiarity with AI and worry about automation, where the more familiar respondents indicated they were, the more worried they were about their job becoming automated. (Table 3).

Nearly half (48%) of those were the most worried about their job becoming automated were those who said they very familiar with AI in the workplace, while just over half of those who were the least worried about automation (i.e., strongly disagreed) were not very (26%) or not at all familiar (25%) with AI in the workplace.

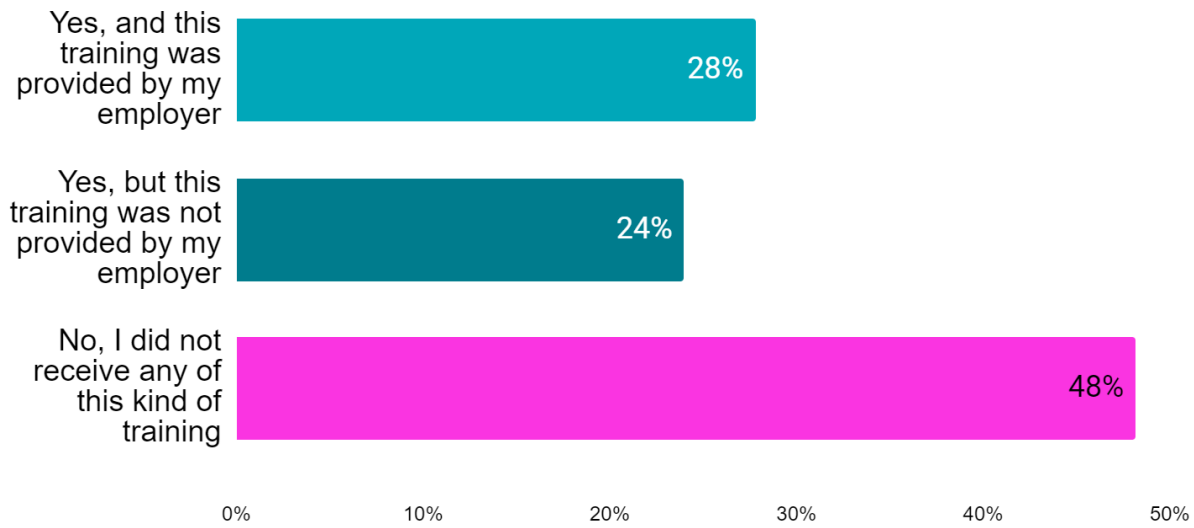
Table 3. Relationship between worry about automation and familiarity with AI as a proportion of those who are worried about automation to varying degrees

		Worried about automation			
		Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Familiarity with AI	Very familiar	**48%**	21%	14%	14%
	Somewhat familiar	31%	**53%**	47%	36%
	Not very familiar	12%	18%	25%	**26%**
	Not at all familiar	9%	8%	13%	**24%**

Artificial intelligence training and guidance from employers

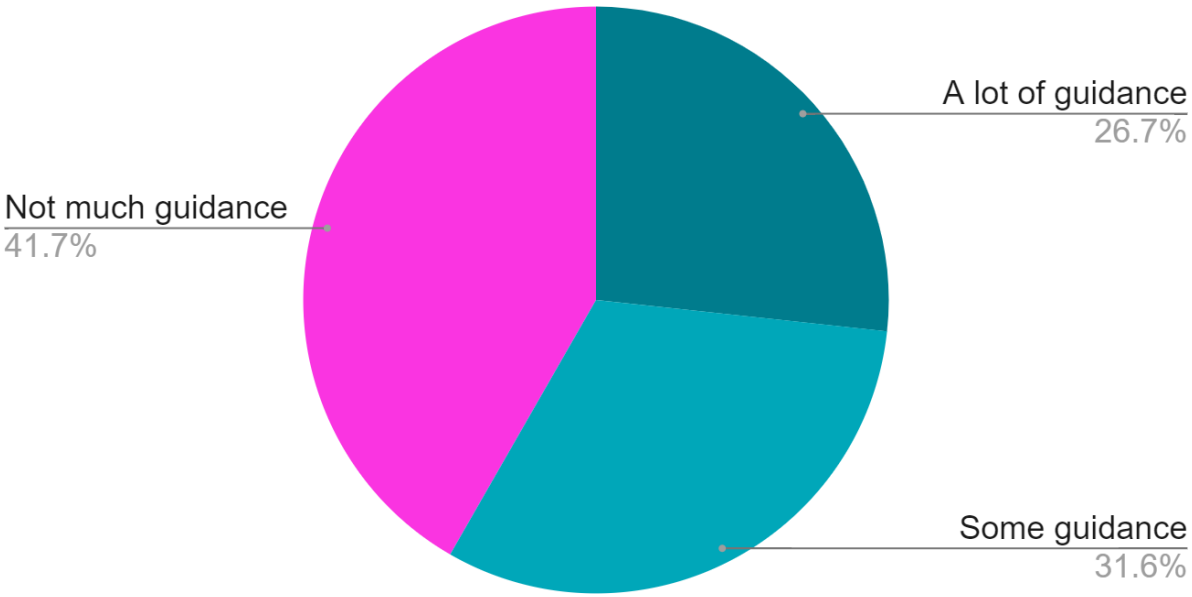
Of those who use AI at work, just under one-half (48%) have not received any kind of training in AI. The remaining 52% who have received training are roughly split on whether or not the training was or was not provided by their employer. Slightly more (28%) had training that was provided by their employer (see Figure 3). Overall, these results show that almost three quarters (72%) of those who used AI at work are doing so on their own—whether that means they are learning to use the tools without any training (48%) or they are using the tools with self-guided training (24%).

Figure 3. Training received on artificial intelligence by those who have used it at work



Of those who say they have used AI tools at work, just over 2 in 5 (42%) are doing so without any guidance from their employer. The remaining 3 in 5 have received guidance to some extent; 27% have formal, written guidelines about the use of AI at work and 32% have had conversations about using AI at work but no formal guidelines are in place (see Figure 4).

Figure 4. Employer guidance received for those who have used artificial intelligence tools at work



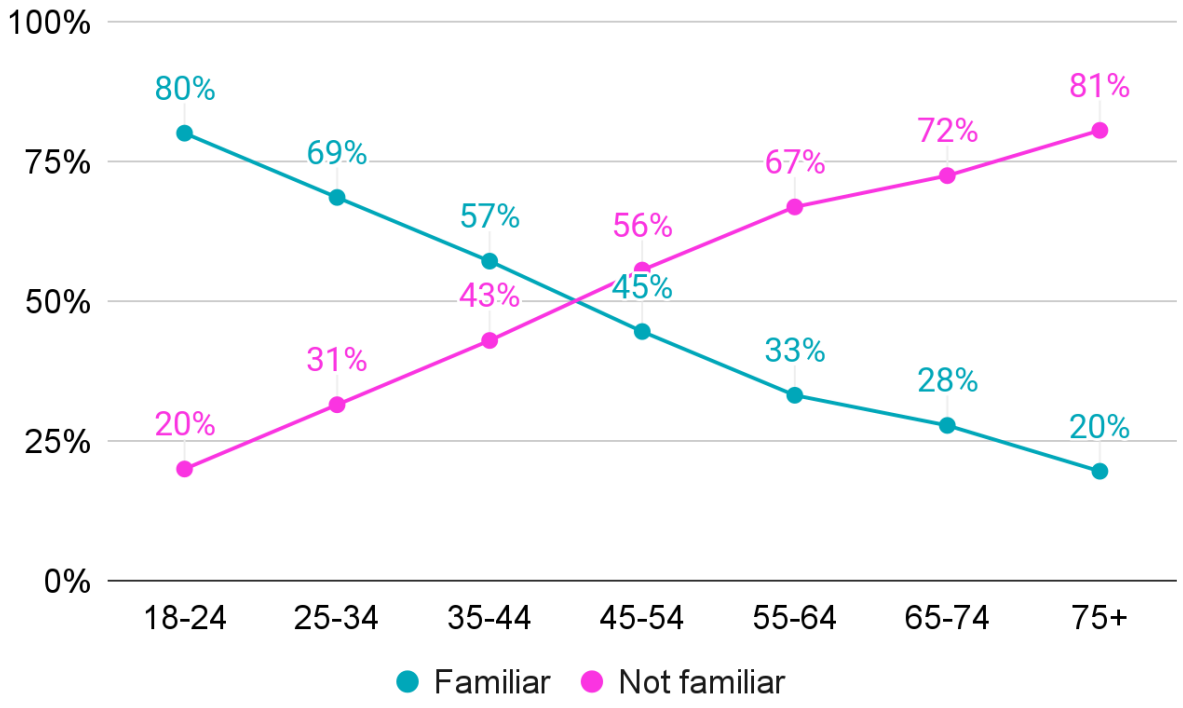
Group Differences

To further understand perceptions of AI in the workplace and the disconnect between employees and employers, we investigated group differences in responses for all AI-related survey questions for Wave 7.

Age

For familiarity, there is a consistent trend where likelihood of familiarity with AI tools in the workplace decreases with age (see Figure 5). AI tools are slowly but surely being integrated in secondary and post-secondary education in Canada. As such, younger age groups are more likely to have had some experience with AI tools as soon as they come out of secondary education, while older age groups are unlikely to have had this experience.

Figure 5. Familiarity with artificial intelligence tools in the workplace across age groups



A similar trend is seen for use of AI: younger age groups are more likely than older age groups to have used AI for personal enjoyment, school work and at work. For example, 47% of those 18 to 24 have used AI to help with tasks at work, while only 24% of those aged 44 to 54 have done the same (see Table 4).

Table 4. Percentage of respondents who use AI in different settings, by age group

	Personal use or enjoyment	To help with school	To help with tasks at work
18-24	71%	64%	47%
25-34	58%	46%	39%
35-44	47%	30%	31%
45-54	37%	0%	24%
55-64	26%	0%	20%
65-74	17%	0%	13%
75+	9%	0%	29%

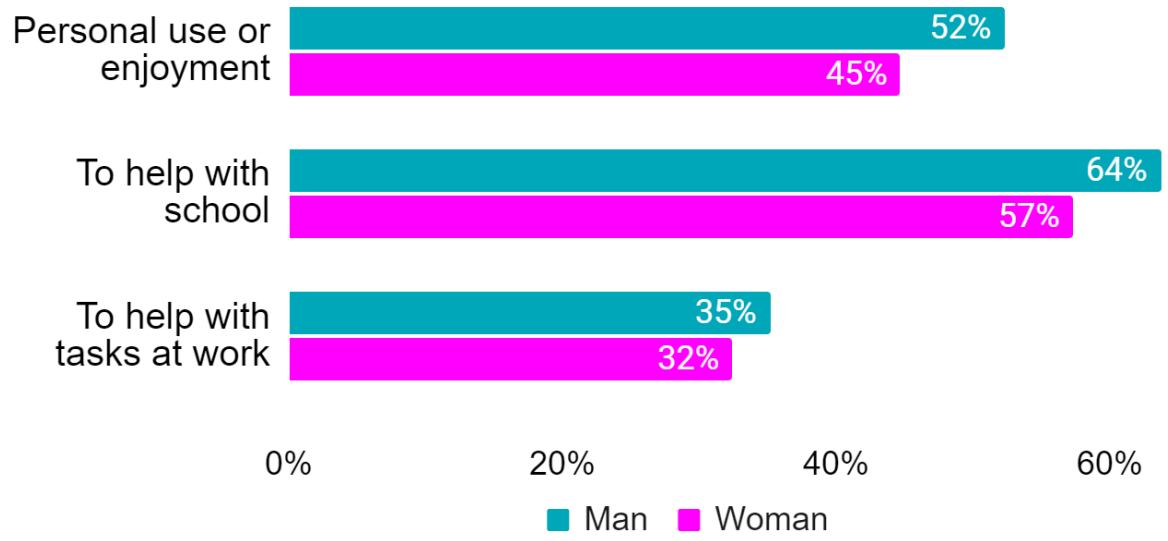
We also see interesting differences in training by age group. Those nearing retirement age (55 to 64) are more likely than other, younger age groups to not have received any training at all on AI tools they have used in the workplace; 67% of those aged 55 to 64 say they have not received any training on AI tools in the workplace—self-guided or employer-sponsored—while only less than half (46%) of those aged 25 to 34 say the same. The same trend is seen for guidance: 60% of those aged 55 to 64 have not received any guidance on using AI in the workplace from their employer, while only 40% of those ages 25 to 34 say the same.

For perceptions of new technologies, younger age groups are more likely to agree that their workplace has been slow to adapt to new technologies, while older age groups are more likely to disagree more than half (52% to 56%) of 18 to 44-year-olds believe that their workplace has been slow to adapt, but less than half of those 45 and older (33% to 46%) disagree with this statement. Overall, people are largely unbothered by automation and worry decreases as age increases. For example, slightly less than half (49%) of 18 to 24-year-olds agree that they are worried about their jobs becoming automated, while only about a third (33%) of 55- to 64-year-olds are worried.

Gender

There are some gender differences in familiarity with AI, with 63% men compared to 52% women indicating that they are familiar (somewhat and very combined) with AI programs to use in the workplace. However, this is significantly less than the gender gap in technology roles overall where despite representing half the workforce women hold only 30% of roles.[19]Gender differences are also seen for use of AI for personal enjoyment, at school and in the workplace. As seen in Figure 6, men are more likely than women to use AI in all settings. However, the difference between men and women is larger (about 7%) for personal use (52% vs. 45%) and use at school than it is between men and women (64% vs. 57%) for AI use in the workplace (35% vs. 32%; only about 3% difference).

Figure 6. Use of AI tools in different settings, by gender



When it comes to training on AI tools to use in the workplace, women are more likely than men to engage in self-guided training, while men are more likely than men to receive training from their employer. Three-quarters (75%) of women who have used AI at work have done so self-prompted, either by engaging in training they sought out themselves (23%) or without any training and learning as they go (51%), while the remaining quarter (26%) have received training from their employer. Comparatively, less than three quarters (70%) of men are using AI at work in a self-guided way, either seeking out training (25%) or learning as they go (45%), while 30% have received training from their employer. The trend is similar for employer-provided guidance on using AI in the workplace. Ten percent more men (63%) than women (53%) have received some sort of guidance from their employers on using AI in the workplace —whether that is formal (30% of men, 23% of women) or informal (33% of men, 30% of women) guidance.

For perceptions of new technologies, slightly more men than women have negative perceptions about AI in the workplace. For example, 54% of men agree that their workplace has been slow to adapt to new technologies, while only 47% of women agree with this statement.

Racialized and Indigenous Peoples

Survey results for Indigenous, racialized and white participants can be found in Table 5. More racialized and Indigenous respondents were familiar (very or somewhat) with AI tools in the workplace; three-quarters (75%) of racialized respondents and just under two thirds (63%) of Indigenous respondents were familiar with AI tools versus only 47% of white participants.

Racialized respondents were the most likely to use AI for personal use, to help with school work and at work compared to Indigenous and white participants.

For training, over one-half (56%) of white respondents have not received any training on using AI tools in the workplace, while this is far less common for racialized (46%) and Indigenous (36%) respondents. Fewer white participants have engaged in training on AI tools in the workplace—employer-provided (22%) or self-sought (21%)—compared to racialized (employer-provided: 28%; self-sought: 26%) and Indigenous (employer-provided: 39%; self-sought: 25%) respondents.

Despite this, white respondents are more likely to disagree that their employer has not provided enough training on new technologies (53%), while racialized and Indigenous respondents are more likely to agree (57% and 60% respectively).

Similarly, white respondents were most likely to not have received any guidance on AI in the workplace from their employer, followed by racialized respondents. On the other hand, Indigenous respondents were most likely to have received a lot of guidance from their employer.

Table 5. Survey results for white, Indigenous and racialized respondents

	Indigenous	*Racialized*	*White*
Familiar with AI tools in the workplace	63%	**75%**	47%
Used AI for personal use and enjoyment	54%	**64%**	39%
Used AI to help with school work	50%	**67%**	47%
Used AI at work	41%	**45%**	25%
AI at work made me more productive	**86%**	85%	74%
AI at work made me more creative	74%	**79%**	62%
Training			
No, I did not receive any of this kind of training	36%	**46%**	56%
Yes, and this training was provided by my employer	**39%**	28%	22%
Yes, but this training was not provided by my employer	25%	**26%**	21%
Guidance			
Not much guidance	28%	41%	**49%**
Some guidance	28%	**33%**	31%
A lot of guidance	**44%**	26%	20%
My workplace has been slow to adapt to new technologies			
Agree	54%	57%	46%

	Indigenous	*Racialized*	*White*
Disagree	47%	43%	54%
It's hard to keep up with changes at work caused by new technologies			
Agree	44%	47%	34%
Disagree	56%	53%	67%
I'm worried about my job becoming automated			
Agree	50%	49%	30%
Disagree	51%	51%	70%
I haven't received enough training on new technologies			
Agree	57%	60%	47%
Disagree	43%	40%	53%

Immigration

Survey results by immigration status can be found in Table 6. First- and second-generation immigrants are more likely to be familiar with AI tools in the workplace compared to the Canadian-born population. For training, first (25%) and second (31%) generation immigrants in the survey were more likely than Canadian-born respondents (20%) to have received training on AI tools from their employer. They are also more likely to agree that their workplace has been slow to adapt to new technologies than Canadian-born respondents.

Table 6. Survey results by immigration status

	First Generation	*Second Generation*	*Canadian-born*
Familiar with AI tools in the workplace	**73%**	61%	47%
Used AI for personal use and enjoyment	**62%**	49%	40%
Used AI to help with school work	**74%**	58%	47%
Used AI at work	**45%**	35%	28%
AI at work made me more productive	**86%**	75%	78%
AI at work made me more creative	**80%**	60%	67%
Training			
No, I did not receive any of this kind of training	49%	48%	**52%**
Yes, and this training was provided by my employer	26%	21%	**28%**
Yes, but this training was not provided by my employer	25%	**31%**	20%
Guidance			
Not much guidance	45%	39%	**46%**
Some guidance	**32%**	40%	28%
A lot of guidance	23%	21%	**26%**
My workplace has been slow to adapt to new technologies			
Agree	**56%**	**51%**	48%
Disagree	44%	49%	**52%**
It's hard to keep up with changes at work caused by new technologies			
Agree	47%	40%	36%
Disagree	**53%**	**60%**	**64%**
I'm worried about my job becoming automated			
Agree	48%	41%	34%
Disagree	**52%**	**59%**	**66%**
I haven't received enough training on new technologies			
Agree	**61%**	**51%**	**50%**
Disagree	39%	49%	50%

Discussion and Conclusion

Overall, the purpose of this analysis was to illuminate the gap between employers and employees when it comes to AI expertise in Canada. While these results are not a single solution, they certainly offer insights into the way forward. The key findings are discussed below.

People are using AI at work and are doing so mainly self-guided

Respondents in Wave 7 of the Survey on Employment and Skills indicated that they are indeed using AI at work, and they are doing so mostly without any training or guidance from their employer. So, while Canadian businesses are slow to adopt AI into their operations, some employees are using these tools on their own volition. This may suggest a shift to self-guided training for employees. Rather than receiving training from their employer, employees are left to independently identify learning, reskilling and upskilling opportunities; they are recognizing a need for additional training and are not waiting for their employer to provide this. This shift to self-guided training is important as data from Microsoft shows that 66% of leaders say they wouldn't hire someone without AI skills.[1]

Survey results also indicated that slightly over one-half of respondents believe their employer is not providing enough training in new technologies. While our results do show that employees are independently seeking out training for new technologies, this does not mean that employers do not need to provide training. If employees are using AI on their own in the workplace, the integration of AI in the workplace is likely to be disjointed and disorganized without any guidance from the employer. Instead, this highlights the importance of Canadian businesses to provide training to their employees. Indeed, in 2023, the top area of AI investment for nearly half (42%) of Canadian businesses surveyed by IBM is reskilling and workforce development,[2] suggesting that employers are aware of this need and are in the process of implementing it. However, because employees are going ahead on their own and using these tools in the workplace, these results highlight the urgency for employers to update their training programs and for them to develop guidance and policies for using AI in the workplace.

The results discussed above show that older respondents were less familiar and less likely to use AI tools in the workplace compared to younger respondents. Importantly, those

[1] Microsoft Source (2024, May 8). *Microsoft and LinkedIn release the 2024 Work Trend Index on the state of AI at work.* Microsoft. https://news.microsoft.com/2024/05/08/microsoft-and-linkedin-release-the-2024-work-trend-index-on-the-state-of-ai-at-work/

[2] IBM. (2024, January 10*). Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

approaching retirement age were less likely to have received employer-training on AI tools in the workplace than their younger counterparts. Other research shows that older workers are often stereotyped as unadaptable and resistant to change,[20] which may lead employers to overlook them when thinking about training programs. To fill the AI skills gap, employers must ensure they are reskilling and upskilling the entire workforce. Other group differences showed that men were slightly more familiar than women with AI tools in the workplace, but this gap was not as large as it is for technology roles overall. This is perhaps emerging evidence that certain forms of AI can narrow the gender gap both in terms of the use of tools as well as the development of systems using "low code, no code applications". This is an area that needs further exploration. While many of the "deep AI" and machine learning roles remain man dominated, there is evidence that generative AI applications require different skills and open up opportunities for graduates across disciplines as opposed to more traditional science, technology, engineering and math (STEM) disciplines. Given disciplinary and occupational segregation for women and other equity deserving groups, notably Indigenous Peoples and Black people, this is an important observation that warrants further exploration.

Further, these results have implications for post-secondary education. When employers are asked, they often say they are struggling to fill AI-related roles, but data shows that there are certainly workers in Canada with AI-related skills. Results from this survey also indicate that despite claims from employers, employees are using AI in the workplace but are doing so without training. Together, this suggests a misalignment between post-secondary curricula and employer needs: graduates may not be coming out of school with the AI skills that employers are looking for, which might be driving employees to seek out their own training.

The finding from other data that employers struggle with filling their AI-related roles combined with the finding here that employees are quite familiar with AI and are using it in the workplace on their own also suggests that employers might not be looking in the right places. In other words, it highlights the need to expand the talent pool. Women, racialized and Indigenous Peoples are historically underrepresented in technology roles and often experience barriers to entering these workforces. Regarding AI specifically, analysis of these survey results showed that immigrants, racialized and Indigenous participants were more familiar with AI tools in the workplace and more likely to have some training with these tools than white and Canadian-born respondents. If employers are having difficulty filling AI roles specifically, it could very likely be that they are not looking in the right places because their existing hiring processes are exclusionary to certain groups. Bridging the AI gap will most certainly require expanding the talent pool.

Most aren't worried about automation and they shouldn't be

Results from this wave of the Survey on Employment and Skills show that most respondents surveyed are not concerned about automation. This is consistent with data from the U.S. that also shows that most are not worried about automation, but worry has been steadily increasing since 2017.[21] While the overall trend in this survey was that most are not worried, nearly two in five are. Other evidence suggests that worry is unnecessary; AI may change jobs, but it is

unlikely to make them completely obsolete. In fact, it is likely that AI adoption will create jobs. Data from Statistics Canada shows that over three quarters of businesses (79%) reported no change in employment levels after AI implementation, while nearly one in 5 (18%) actually saw an increase in employment.[22] The threat to jobs is not AI, but rather, failing to support reskilling and upskilling of the workforce.

Further, this does not only impact direct AI positions. While those with expertise in AI will be needed, the widespread adoption of AI will also require people that can assist with the transformation of workplace operations. A case study to demonstrate this is from the mining corporation Rio Tinto. Rio Tinto Canada is exploring AI applications across various fields. In 2019, the company hired several data specialists, scientists and engineers with a mix of AI and data science expertise, advanced technical skills and knowledge of cloud-based AI platforms to support AI adoption. In addition to these roles, Rio Tinto Canada also sought a human resource (HR) data science lead and two HR data scientists to support this transformation. The company also provides AI upskilling opportunities for current employees and new recruits. Further, the company is expanding the talent pool by considering Indigenous communities and diversity in their hiring processes.[23]

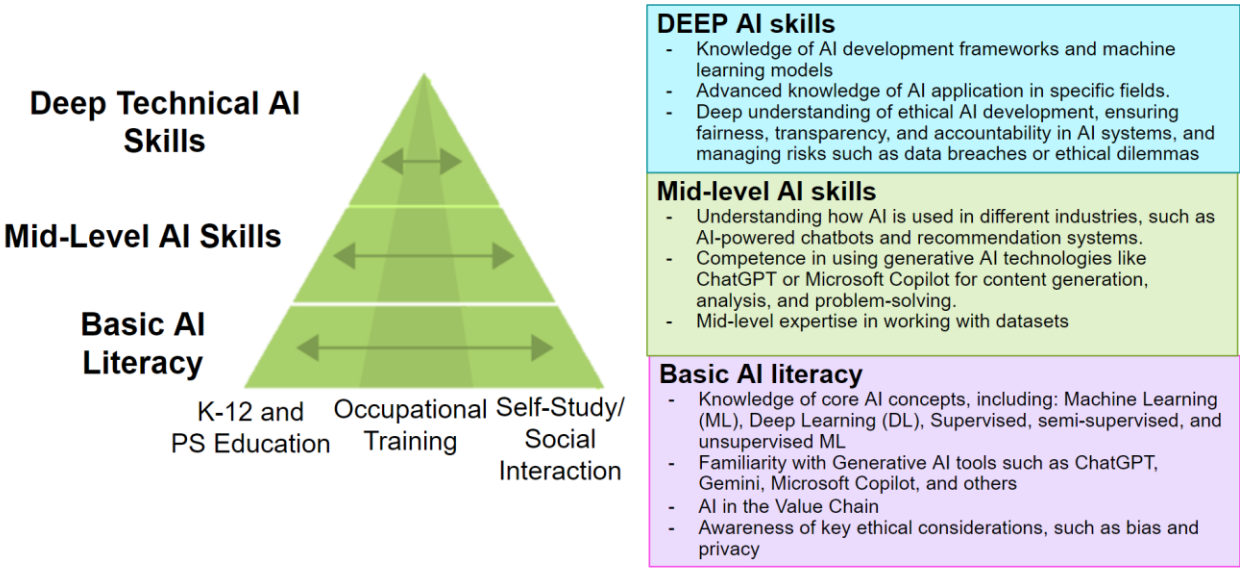
The need for AI Literacy

In this analysis, we observed a trend between familiarity with AI and fear of automation ,where the more familiar respondents were with AI tools in the workplace, the more worried they were about their jobs becoming automated. While this may seem counterintuitive, these results are consistent with data from the U.S.[24] Despite this, these results should be interpreted with caution. Future research should clarify what is meant by "familiar"; when respondents in the survey select "very familiar" or "somewhat familiar" with AI tools, what are they indicating? Are they skilled at using AI tools in the workplace and understand how the technology works, or have they just heard a lot about AI tools without using them? If the latter, what is it that they have heard? These questions are important to ask considering the skepticism and media coverage surrounding AI. Headlines often highlight negative aspects of AI, such as the role of AI in misinformation,[25] and how generative AI can disrupt creative industries.[26] Most importantly, several news stories have covered the predicted, significant job losses that will occur because of AI.[27, 28] These stories are based on models and predictions, however, this is not consistent with the data thus far. As noted above, companies that have adopted AI already have mostly experienced an increase in jobs.

These results highlight the importance and need for skills development at various levels . At the most fundamental level, AI literacy—the ability to understand how to use and critically evaluate AI technologies—is key.[29] The second level is AI innovation skills, which include the competencies needed to match AI solutions to organizational needs coupled with an understanding of the policies and processes organizations need to responsibly adopt and manage AI tools to achieve their goals. Building on foundational skills, AI adoption skills are for people in "bridging" or "hybrid" roles who focus on matching technology to needs. The third level—deep AI skills—are those skills needed to design and implement custom AI systems and

solutions to solve complex problems generally requiring extensive formal technology education (See Figure 5).

Figure 5. Employment-focused framework for developing AI across all skill levels



More work is needed to develop a competency framework that takes into account the different knowledge, skills and behaviours required at each level as well as wayfinding among the growing range of courses, micro credentials and certifications available

References

[1] Dobbs, G., & Hirsch-Allen, J. (2024, April 16). *Canada's plans to bridge the AI compute gap and how it can make industry policy inclusive and sustainable*. OECD AI https://oecd.ai/en/wonk/canadas-ai-compute-gap

[2] Dobbs, G., & Hirsch-Allen, J. (2024, April 16). *Canada's plans to bridge the AI compute gap and how it can make industry policy inclusive and sustainable*. OECD AI https://oecd.ai/en/wonk/canadas-ai-compute-gap

[3] IBM. (2024, January 10). *Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

[4] IBM. (2024, January 10). *Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

[5] Statistics Canada. (2024, June 20). *Analysis on artificial intelligence use by businesses in Canada, second quarter of 2024*. Canadian Survey on Business Conditions. https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2024008-eng.htm

[6] Lockhart, A. (September 2023). Automation nation? AI adoption in Canadian businesses. The Dais. https://dais.ca/reports/automation-nation-ai-adoption-in-canadian-businesses/

[7] Bryan, V., Sood, S., & Johnston, C. (2024, June 20). *Analysis on artificial intelligence use by businesses in Canada, second quarter of 2024*. Statistics Canada. https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2024008-eng.htm

[8] Bryan, V., Sood, S., & Johnston, C. (2024, June 20). *Analysis on artificial intelligence use by businesses in Canada, second quarter of 2024*. Statistics Canada. https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2024008-eng.htm

[9] KPMG. (2023, April 19). *More than one third of Canadian businesses experimenting with CHATGPT, KPMG Canada Survey finds*. https://kpmg.com/ca/en/home/media/press-releases/2023/04/us-outpacing-canada-in-business-adoption-of-ai.html

[10] KPMG. (2023, April 19). *More than one third of Canadian businesses experimenting with CHATGPT, KPMG Canada Survey finds*. https://kpmg.com/ca/en/home/media/press-releases/2023/04/us-outpacing-canada-in-business-adoption-of-ai.html

[11] Lowey, M. (2023, December 20). *Canadian businesses far behind those in other countries in adopting AI technology*. Research money inc. https://researchmoneyinc.com/article/canadian-businesses-far-behind-those-in-other-countries-in-adopting-ai-technology-

[12] IBM. (2024, January 10). *Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

[13] IBM. (2024, January 10). *Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

[14] KPMG. (2023, April 19). *More than one third of Canadian businesses experimenting with CHATGPT, KPMG Canada Survey finds*. https://kpmg.com/ca/en/home/media/press-releases/2023/04/us-outpacing-canada-in-business-adoption-of-ai.html

[15] Hunt, C. (2024, February 15). *AI Adoption by Canadian Businesses Slow Despite Stated Interest*. Goodmans LLP. https://www.goodmans.ca/insights/post/goodmans-tech-blog/ai-adoption-by-canadian-businesses-slow-despite-stated-interest#:~:text=The%20main%20obstacle%20to%20AI,of%20the%20available%20AI%20tools.

[16] IBM. (2024, January 10). *Canadian businesses saw uptick in AI Adoption in 2023 vs. global peers*. IBM newsroom. https://canada.newsroom.ibm.com/2024-01-10-Canadian-businesses-saw-uptick-in-AI-Adoption-in-2023-vs-global-peers

[17] Blouin, L. (2023, March 6). *AI's mysterious 'black box' problem, explained*. University of Michigan-Dearborn. https://umdearborn.edu/news/ais-mysterious-black-box-problem-explained

[18] Edelman Trust Institute. (2024). *2024 Edelman Trust Barometer Key Insights around A*I. https://www.edelman.com/sites/g/files/aatuss191/files/2024-03/2024%20Edelman%20Trust%20Barometer%20Key%20Insights%20Around%20AI.pdf

[19] ICTC-CTIC. (2024). ICTC Ambassador Program for Gender Equity in Canada's Tech Ecosystem. ICTC-CTIC https://ictc-ctic.ca/our-impact/case-studies/ictc-ambassador-program-for-gender-equity-in-canadas-tech-ecosystem

[20] Fancey, P., Knight, L., Keefe, J., & Syed, S. (2024). Older workers: Exploring and addressing the stereotypes. https://www.canada.ca/en/employment-social-development/corporate/seniors-forum-federal-provincial-territorial/reports/older-worker-exploring-addressing-stereotypes.html#h2.7

[21] Saad, L. (2023, September 11). *More U.S. Workers Fear Technology Making Their Jobs Obsolete*. Gallup.com. https://news.gallup.com/poll/510551/workers-fear-technology-making-jobs-obsolete.aspx

[22] Statistics Canada. (2024, June 20). *Analysis on artificial intelligence use by businesses in Canada, second quarter of 2024*. Canadian Survey on Business Conditions. https://www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2024008-eng.htm

[23] Ticoll, D. (2020). *Skilling Canadians for Leadership in the AI Economy*. Technation. https://technationcanada.ca/wp-content/uploads/2020/10/Skilling-Canadians-FINAL-online.pdf

[24] Caminiti, S. (2023, December 19). *The more workers use AI, the more they worry about their job security, survey finds*. CNBC. https://www.cnbc.com/2023/12/19/the-more-workers-use-ai-the-more-they-worry-about-their-job-security.html

[25] Pearson, J. (2024, May 28). *Google research shows the fast rise of AI-generated misinformation*. CBC. https://www.cbc.ca/news/science/artificial-intelligence-misinformation-google-1.7217275

[26] Souravsingh. (2023, May 13). *How AI Can Kill Creativity in Humans*. Medium. https://medium.com/aimonks/how-ai-can-kill-creativity-in-humans-dc722d95006f

[27] Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, L., Batra, P., Ko, R., & Sanghvi, S. (2017, November 28). *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*. McKinsey & Company. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages

[28] Kelly, J. (2023, March 31). *Goldman Sachs Predicts 300 Million Jobs Will Be Lost Or Degraded by Artificial Intelligence*. Forbes. https://www.forbes.com/sites/jackkelly/2023/03/31/goldman-sachs-predicts-300-million-jobs-will-be-lost-or-degraded-by-artificial-intelligence/

[29] Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, *2*, 100041. https://doi.org/10.1016/j.caeai.2021.100041