



OmniaAI

The upskilling imperative

Building a future-ready workforce
for the AI age

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Schulich
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Introduction



For businesses in all industries, AI, digitization, and automation are opening the door to tremendous opportunities for innovation and growth—and creating new challenges and complexities for employers. Organizations in every sector are struggling to attract, recruit and retain people with the skills needed to help them succeed in a digitized, automated, AI-driven world.

There is a clear solution to this challenge: It's time for companies to embrace the upskilling imperative and build their own future-ready workforce. Now is the time for organizations to make deliberate, significant investments in learning to equip their people with the knowledge, skills, and capabilities needed to work effectively in a digitized, automated world—and to build and consume AI-powered insights.

In the following pages, we will explore how digitization, automation, and AI are rapidly disrupting industries worldwide and what that means to work and leadership; why organizations need to invest in upskilling now; and how organizations should approach upskilling for the age of AI.

The age of AI

AI is at the forefront of a wave of technology-driven disruption that is remaking industries, the competitive landscape, and the nature of work. Technology is truly ubiquitous: for example, it's estimated that there are more than six billion smartphones in the world.¹ In the past two years, the amount of data in the world has grown 900 percent,² providing the critical fuel needed for powerful machine-learning tools. And the cost of AI, cognitive computing, and robotics has plummeted over the past decade: what cost \$500,000 in 2008 now costs a "mere" \$22,000.³

AI-enabled analytics, prediction, and automation are unlocking an incredible array of technological, business, and economic opportunity. AI can make virtually any business more efficient and create durable advantages for companies—and countries—alike. Nimble startups across the globe have harnessed AI's power to disrupt legacy industries and overthrow conventional wisdom, and traditional players have raced to stay competitive and avoid being left behind. AI's overall economic impact is undeniable: in 2019 alone, it is estimated to have added \$2 trillion to global GDP. By 2030—in just 10 years—AI is projected to contribute nearly \$16 trillion to the world's economy.⁴

AI's impact on work is significant—and ultimately positive

AI adoption has enabled organizations to automate a wide array of business processes, improving speed and efficiency and allowing employees to focus their attention on higher-value work. However, there are rising fears that AI and other technologies will displace many human workers. By some estimates, 37 percent of UK jobs, 47 percent of US jobs, and 77 percent of Chinese jobs are vulnerable to displacement through automation.⁵

Defining AI

Artificial intelligence (AI) is a term that's often used, but not always clearly defined. AI refers to a broad range of technologies that can mimic or extend human functions such as reasoning or interaction. Most AI applications are powered by machine learning, algorithms that improve over time through exposure to more data.

In reality, the impact of AI, automation, and other technologies on the labour market is more nuanced. The World Economic Forum expects AI to create more jobs than it destroys, asserting that, while automation may displace 75 million jobs by 2020, 133 million *new* jobs will emerge.⁶ The WEF's positive view of AI's job-creation potential is shared by many business executives: 52 percent of those surveyed by the Pew Research Center on the future of the internet said technology will create more jobs than it displaces by 2025, though they also acknowledge that many of the current jobs humans perform will change.⁷

How will those jobs change? We can expect to see a significant increase in demand for roles focused on building AI solutions; demand for data scientists, for example, has shot up 344 percent since 2013.⁸ However, we can also expect to see a similar rise in demand for roles skilled in *consuming* AI—such as staff with the knowledge and skills needed to procure and interact with AI vendors to facilitate effective AI implementations. In many cases, AI's capacity to enhance the way we work will depend on leaders knowing how to capitalize on AI and workers knowing how to use it.

¹ IHS Markit, "More than Six Billion Smartphones by 2020, IHS Markit Says." January 18, 2017. <http://news.ihsmarkit.com/press-release/technology/more-six-billion-smartphones-2020-ihs-markit-says>. Retrieved May 7, 2020.

² J Steven Perry, "What is big data? More than volume, velocity and variety..." March 22, 2017. <https://developer.ibm.com/dwblog/2017/what-is-big-data-insight/>. Retrieved May 7, 2020.

³ J Steven Perry, "What is big data? More than volume, velocity and variety..." March 22, 2017. <https://developer.ibm.com/dwblog/2017/what-is-big-data-insight/>. Retrieved May 7, 2020.

⁴ Frank Holmes, "AI Will Add \$15 Trillion to the World Economy by 2030." Forbes.com, February 15, 2019. <https://www.forbes.com/sites/greatspeculations/2019/02/25/ai-will-add-15-trillion-to-the-world-economy-by-2030/#5c5ce171852d>. Retrieved May 7, 2020.

⁵ Citigroup, *Technology at Work v2.0: The Future Is Not What It Used to Be*. January 2016. http://www.oxfordmartin.ox.ac.uk/downloads/reports/Citi_GPS_Technology_Work_2.pdf. Retrieved May 7, 2020.

⁶ World Economic Forum, *The Future of Jobs Report 2018*. http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf. Retrieved May 7, 2020.

⁷ Aaron Smith and Janna Anderson, "AI, Robotics, and the Future of Jobs." Pew Research Center, August 6, 2014. <http://www.fusbp.com/wp-content/uploads/2010/07/AI-and-Robotics-Impact-on-Future-Pew-Survey.pdf>. Retrieved May 7, 2020.

⁸ Brian Holak, "Demand for data scientists is booming and will only increase." TechTarget.com, January 31, 2019. <https://searchbusinessanalytics.techtarget.com/feature/Demand-for-data-scientists-is-booming-and-will-increase>. Retrieved May 7, 2020.

Unfortunately, neither leaders nor workers appear especially ready to do so. Deloitte's Global Human Capital Trends report found that while 81 percent of respondents expect the use of AI to increase or increase significantly over the next three years, only 26 percent feel their organizations are ready or very ready to handle the impact of AI. More than half (54 percent) say they don't have the skills to build the skills needed in the future—and 86 percent believe they have to reinvent their organizations' ability to learn.⁹

According to LinkedIn, artificial intelligence and analytical reasoning were two of the top three skills that companies need most in 2019.¹⁰

This change is already underway: executive development firm Future Workplace found that the number of new workers using AI in some way rose 18 percent in 2019. Its research also suggested by 2031, 80 percent of new jobs will require AI-literate workers—and companies will face a shortage of such workers.¹¹ Facing enormous challenges in recruiting and retaining talented people with the skills needed to thrive in an AI world, many organizations understand they need to build the talent they'll need by retraining and upskilling their existing workforce to harness AI's potential. This upskilling benefits workers as well: in a world where a skill's "lifespan" has on average decreased from 30 to a mere five years, upskilling has become crucial to enable workers to stay current, relevant, employable, and in demand in a fast-changing labour market.

Leadership must also change

Human managers and senior leaders will also see their roles significantly changed by AI, automation, and other digital technologies. In the near term, assisted AI—solutions that require humans in the loop—will be prevalent, and the role of managers could evolve to provide continuous input to monitor and train these machine-learning models. This will require managers to be trained in how the technologies work and to understand their own role in supporting and overseeing them.

It will also require managers to become not only a champion of AI but a champion, sponsor, and role model for lifelong learning—a continuous commitment to acquiring and improving one's knowledge, skills, and competencies through formal and informal learning opportunities.

In a world characterized by an accelerating pace of technological change, the concept of lifelong learning refers to the active investment of organizations in the future-ready skills and enduring capabilities of their workforce to allow for the more effective intersection of humans and technology.

Leaders will themselves need to upskill, developing and deepening their AI understanding and literacy in order to be effective consumers and users of AI insights. They will need to help their employees understand AI's potential and identify when its use is appropriate—as well as when it isn't. Leaders will need to anticipate and plan for the skills employees will need to capitalize on the organization's use of AI, and ensure employees have the tools and other enablers required to develop those skills.



⁹ Deloitte, *Leading the social enterprise: Reinvent with a human focus – 2019 Deloitte Global Human Capital Trends*. <https://www2.deloitte.com/content/dam/Deloitte/cz/Documents/human-capital/cz-hc-trends-reinvent-with-human-focus.pdf>. Retrieved May 7, 2020.

¹⁰ Paul Petrone, "The Skills Companies Need Most in 2019 – And How to Learn Them." LinkedIn.com, January 1, 2019. <https://learning.linkedin.com/blog/top-skills/the-skills-companies-need-most-in-2019--and-how-to-learn-them>. Retrieved May 7, 2020.

¹¹ Caroline Monahan, "The problem with AI: When hard skills are automated and soft skills are needed, the next generation is in big trouble." Nationalpost.com, October 25, 2019. <https://nationalpost.com/news/world/artificial-intelligence-will-demand-soft-skills-from-future-generations-they-wont-have-them-though>. Retrieved May 7, 2020.



To transform attitude into action and reach the full potential of AI and an AI-enabled workforce, leaders will need to approach AI and its impact at the organization-wide level. Incremental thinking won't be enough.

At the same time, leaders will need to avoid pushing for too much too soon in implementing AI; instead, they should strive to introduce it in targeted ways, focusing on specific business problems, and then learn

and scale from there. Finally, leaders should focus on AI's key enabling factors, such as data quality, skilled talent, budget and resources, infrastructure, and a process to scale analytics execution.

Manulife uses experiential learning to train executives about AI and analytics

On its journey to becoming more customer-centric, Manulife, a leading global life insurer and wealth and asset management firm, realized that it needed to upskill executives at a global level on using data, analytics, and AI as enablers to better understand their customers and improve services.

The chief analytics officer collaborated with her learning and development team and with Deloitte to build a one-day AI and analytics academy designed to strengthen the data, analytics, and AI literacy of executives who typically weren't involved in this field. The curriculum was designed around actual business opportunities and challenges that can be solved through data. Through a case study and several use cases, Manulife executives learned how different types of data and analytics methodologies could help solve their business challenges. They identified their own key business problem, worked on it as the curriculum progressed, and completed a "canvas" that was ready for further engagement with the analytics team. By the program's end, participants were able to describe the analytics lifecycle, articulate their role as key decision-makers in that life cycle, and formulate business problems as analytical questions.

Why companies need to upskill now

As AI, analytics, automation, and digitization disrupt industries and transform businesses, they're reshaping existing jobs, giving rise to completely new roles—and opening up a yawning skills gap in the process. Upskilling today's workforces is critical if companies are to harness the power of AI, capitalize on their talent, stay competitive, and ensure Canada is ready for the future.

The growing AI skills gap is hindering companies' ability to harness AI

The need for AI talent is growing fast. In 2019, AI-related job postings rose by 29 percent,¹² while the Canadian data analytics market was expected to create 43,000 new jobs that same year.¹³ Data scientists remain in high demand, along with engineers in machine learning, deep learning, and computer vision.¹⁴

But, there simply aren't enough people to fill those roles. In 2015, Canada faced a shortage of 150,000 people with the data analytics skills required by the market.¹⁵ By 2031, that gap is forecast to widen to an astonishing two million people.¹⁶ Canadian leaders are well aware of the challenge they face; 63 percent of executives feel their organizations will face a skills gap in the next two years.¹⁷

The lack of AI talent and data literacy skills is creating a significant obstacle to organizations' efforts to adopt and capitalize on AI and related technologies. Deloitte research has found that only 16 percent of organizations have adopted AI as of 2019.¹⁸ *Harvard Business Review* found that a mere 8 percent of organizations engage in core practices that could even support the widespread adoption of AI and analytics, and that the majority of firms' AI efforts involve ad hoc pilot programs or are confined to a single business process.¹⁹ Upskilling these organizations' workforces—from executives to managers to employees—can help organizations embed both a broad understanding of what AI and related technologies can do, and the skills and capabilities to make it happen.

Schulich Executive Education Centre (SEEC) leads in AI and analytics knowledge-transfer to individuals and organizations

The velocity with which data is being captured and technology is evolving makes this a revolutionary time for business. Research in the fields of AI and machine learning is supporting breakthrough innovations. The transfer of knowledge, expertise, and skills between academia and the business community is paramount for taking advantage of the emerging opportunities. One of the leading sites of this transfer in Canada is the Centre of Excellence in AI and Analytics Leadership at the Schulich Executive Education Centre (SEEC) within the Schulich School of Business at York University, Toronto.

Led by Professor Murat Kristal, who is also program director for Schulich's specialized master's programs in analytics and AI, SEEC's Centre of Excellence fosters engagement among researchers, practitioners, and business leaders in order to refine understanding of the complete range of skills required by executives to successfully and sustainably lead data analytics and AI initiatives in today's organizational environments. This includes not only the hard technical skills and soft leadership and communication skills, but also the more creative skills necessary to think through data in order to identify, envision, and express business insights.

¹² Terry Brown, "The AI Skills Shortage." ITChronicles.com, October 2019. <https://itchronicles.com/artificial-intelligence/the-ai-skills-shortage/>. Retrieved May 7, 2020.

¹³ BrainStation.io, "Toronto's Tech Boom Increasing Demand for Data Skills." August 23, 2018. <https://blog.brainstation.io/torontos-tech-boom-increasing-demand-for-data-skills/>. Retrieved May 7, 2020.

¹⁴ Indeed.com, "Here Are the Top 10 AI Jobs, Salaries and Cities." June 28, 2019. <http://blog.indeed.com/2019/06/28/top-10-ai-jobs-salaries-cities/>. Retrieved May 7, 2020.

¹⁵ Canada's Big Data Consortium, *Closing Canada's Big Data Talent Gap*. Ryerson University, October 2015. https://www.ryerson.ca/content/dam/provost/PDFs/Big_Data_Talent_Gap.pdf. Retrieved May 7, 2020.

¹⁶ Rick Miner, "The Great Canadian Skills Mismatch: People Without Jobs, Jobs Without People and More." Miner Management Consultants, March 2014. [http://www.minerandminer.ca/data/Miner_March_2014_final\(2\).pdf](http://www.minerandminer.ca/data/Miner_March_2014_final(2).pdf). Retrieved May 7, 2020.

¹⁷ Jim Wilson, "Shortage of talent among top concerns for executives: survey." HRReporter.com, December 19, 2019. <https://www.hrreporter.com/focus-areas/automation-ai/shortage-of-talent-among-top-concerns-for-executives-survey/324343>. Retrieved May 7, 2020.

¹⁸ Deloitte, *Canada's AI imperative: Start, scale, succeed*. 2019. <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/deloitte-analytics/ca-ai-adoption-aoda-en.pdf>. Retrieved May 7, 2020.

¹⁹ Tim Fountaine, Brian McCarthy, and Tamim Saleh, "Building the AI-Powered Organization." *Harvard Business Review*, July-August 2019. <https://hbr.org/2019/07/building-the-ai-powered-organization>. Retrieved May 7, 2020.

Upskilling is increasingly important to organizations' talent strategy

Employers have traditionally relied on university graduates and post-graduates for a number of reasons: to help close talent gaps; to bring new knowledge, skills, and capabilities to the organization; and as a source of future leaders. However, this traditional approach is no longer enough, and colleges and universities simply cannot produce enough graduates to meet industry needs. And with the average lifespan of skills dropping precipitously in recent years, graduates' skills may already be out of date by the time they receive their diploma. The United Kingdom's Careers and Employability Service, for example, has suggested that schools would need to produce 10 times as many computer science graduates as they do today in order to meet market demand for data scientists.²⁰

Organizations therefore cannot rely solely on recruiting the talent they need to succeed in the age of AI. Instead, they are taking a multi-pronged approach to close the talent gap. They're working with vendors across the AI ecosystem, forming partnerships with academia, augmenting existing capabilities with AI tools, and more. As these organizations consider how to adopt and scale their AI capabilities, embracing a culture and mindset of lifelong learning—and continuously

investing in upskilling the workforce—makes more and more sense. Elevating the skills and knowledge of the entire workforce can help create a bridge between any existing pockets of AI expertise. Providing today's workers with the right combination of learning, training, and relevant, on-the-job experience allows organizations to build the talent they require to capitalize on emerging opportunities and make their business future-ready. Organizations that wish to push AI down into the business, by creating integrated teams with technology and business skills, will be more successful if those on the business side have a sufficient level of AI literacy and capability.

Upskilling an existing workforce has other benefits as well. Employees can be trained in the tools and technologies the organization has invested in and that work with existing technology infrastructure. They can apply their skills and knowledge to real business problems facing the organization, adding the practical aspect that adult learners prefer. As well, a commitment to ongoing learning and continual skills upgrading is a powerful strategy to attract and retain top talent—especially for generations entering the workforce and developing their careers. According to one report, one in three millennials (35 percent) said the quality of training and development programs was a compelling factor in choosing an employer.²¹

Upskilling is critical to ensuring Canada is future-ready

Canada is regarded as global leader in AI research, but we are falling behind in AI application. Canadian companies have been, and continue to be, slow to adopt AI, in part because they lack workers with the skills required to build and consume AI solutions.

While 52 percent of Canadian executives believe the country needs to be a global leader in AI,²² research excellence and a plethora of AI startups are not enough to achieve this. Companies will need to rapidly embrace the use of AI to transform and improve their businesses, and only 16 percent have done so.²³ If Canadian companies fail to upskill their talent and successfully implement AI, they risk rapidly falling behind their competitors, losing their ability to develop innovative new products and services, and finding themselves unable to attract or retain top talent. What's more, we will have collectively squandered the critical competitive advantage Canada currently enjoys with AI.

²⁰ Clark Boyd, "AI scientists: How can companies deal with the shortage of talent?" Medium.com, November 8, 2017. <https://towardsdatascience.com/ai-scientists-how-can-companies-deal-with-the-shortage-of-talent-11ab48566677>. Retrieved May 7, 2020.

²¹ Shift eLearning.com, "The True Cost of Not Providing Employee Training." April 19, 2018.

<https://www.shiftelearning.com/blog/the-true-cost-of-not-providing-employee-training>. Retrieved May 7, 2020.

²² Deloitte, *Canada's AI imperative: Start, scale, succeed*. 2019.

<https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/deloitte-analytics/ca-ai-adoption-aoda-en.pdf>. Retrieved May 7, 2020.

²³ Deloitte, *Canada's AI imperative: Start, scale, succeed*. 2019.

<https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/deloitte-analytics/ca-ai-adoption-aoda-en.pdf>. Retrieved May 7, 2020.

How to successfully upskill your workforce



Upskilling a workforce takes planning and preparation. Organizations need to identify where they stand in terms of AI skills, what skills they will need to execute their AI strategy, how to train employees effectively, and how to make that learning last and become part of the “organizational DNA.” We offer some suggestions below.

Stage 1: Assess your current state and identify your desired future state

According to Deloitte research, only 20 percent of executives believe their organizations have the right skills needed to succeed in an AI-enabled world—and 31 percent aren’t sure what those skills will be.²⁴ Yet any organization’s upskilling journey must begin with a clear sense of where the journey begins and where it ends—or at least the direction of travel.

- **Understand your business strategy and determine what you need AI for.** AI is a vast, multifaceted field, and organizations can deploy AI in many different ways. Because of this, it’s essential that organizations begin with a clear understanding of their business strategy and goals, and use that to identify what AI would be used for. The better an organization knows what role AI will play in supporting its business strategy, the better it can determine what investments it will need to make.
- **Articulate the future-state AI vision and the related talent strategy.** After looking at its vision and business strategy and the role AI will play in their execution, an organization should then consider the tasks, skills, and capabilities that will be needed to build and consume AI and achieve its future-state vision.

²⁴ Deloitte, “Are you successfully navigating the intersection of readiness and responsibility in the Industry 4.0 era?” (Infographic.) 2020. https://www2.deloitte.com/content/dam/insights/us/articles/us32959-industry-4-0/ReadinessInfographic_LowRes.pdf. Retrieved May 7, 2020.

- It should consider how the existing talent strategy will support the vision: will the organization attempt to recruit the talent needed? Collaborate with external parties? Train existing employees in the new skills that will be needed in the years to come?
- **Conduct a skills assessment.** The organization should conduct a thorough assessment of the current workforce's technical and contextual skills and capabilities, particularly with respect to AI, analytics, and related technologies. This skills inventory is critical to understanding the AI skills already in place and the size of the skills gap the organization must close in order to reach its future-state objective. This practice is becoming more widespread: the 2019 LinkedIn Learning Report reported a 32 percent increase in skills gap identification and assessment by firms' internal talent developers.²⁵
- **Conduct a learning-needs assessment.** Having identified the skills needed and the extent of the skills gap faced, the organization should assess its current training and learning offerings. What does the existing learning curriculum cover? What learning methods and channels are used? How effective are those methods in terms of learning outcomes? And what are the gaps between the existing curriculum and the skills and capabilities required by an upskilled, AI-enabled workforce?
- **Develop a learning strategy and roadmap.** Once the organization has a clearer sense of the skills and capabilities of the existing workforce, what's needed to achieve the future-state AI vision, and the learning curriculum and methods currently in use, it can then create a roadmap for the journey ahead. This learning roadmap will capture the strategy to be used to upskill the workforce, complement the recruiting strategy, and ensure the organization will have the skills and capabilities it needs to compete and thrive in the future.

It's important that the organization not leave this effort to HR or the Chief Learning Officer (CLO) alone. Upskilling the workforce to thrive in the age of AI demands a collaborative effort between business leaders, HR, and the CLO. Business leaders need to articulate what they require from the workforce in terms of AI skills, and in some cases they may be the ones leading the effort to teach and implement those skills to their teams. HR and the CLO will no longer "own" learning the way they may have traditionally; instead, they will act as coaches and guides to others in the organization as they develop the training programs they need.

²⁵ LinkedIn, *2019 Workplace Learning Report*.
<https://learning.linkedin.com/content/dam/me/business/en-us/amp/learning-solutions/images/workplace-learning-report-2019/pdf/workplace-learning-report-2019.pdf>.
Retrieved May 7, 2020.

Canadian crown corporation uses analytics to understand future skills needs

To respond to major workforce trends—including a rapidly increasing need for digital and data skills—a Canadian crown corporation engaged Deloitte to design and implement a strategic approach to workforce planning to identify the skills they'd need to develop, and the talent options that could be used. The need for a thoughtful approach is doubly important for public-sector employers, which experience lower turnover and slower growth.

Deloitte developed a repeatable series of workshops for each department within the organization. The workshops were designed to identify external trends and internal factors impacting the workforce, identify key skills or tasks that were either rising or diminishing in importance, map those skills to roles for prioritization, and define an approach to close the skill gaps (e.g., automation/digitization, “borrow” short-term talent, or develop internal talent). Workshop outputs were used to drive skill and role-gap mitigation strategies up to the enterprise level, determine estimated upskilling costs, and quantify the impact on the workforce. An analytics tool was also used to evaluate role disruption across the corporation and incorporate deeper insights into mitigation strategies and medium-term planning.

This planning will allow the organization to address changing workforce needs before they affect operations and to develop an action-oriented approach to identifying and closing talent gaps. It also increased leaders' visibility into talent needs across the organization, which can be used to inform strategic goals.

Stage 2: Invest in, develop, and deliver effective training

The next stage requires organizations to dive deeper into the day-to-day details of the actual training needed and how it will be delivered.

For most of us, learning has typically taken place in a classroom environment, with lecture-like instruction interspersed with group discussion and individual or group exercises. While research has found that classroom learning continues to be the most common method organizations use to deliver formal learning and upskilling, accounting for about 50 percent of such learning, its use appears to be declining.²⁶ That should not come as much of a surprise; traditional classroom learning can be time-consuming and hard to fit into workers' busy schedules. And many learners don't feel the training is especially valuable: according to research by the Organisation for Economic Co-operation and Development (OECD), just half of those participating in training find the learning very useful for their job.²⁷

Thankfully, today's organizations and their workers have many more learning delivery options available. Self-study and informal learning are on the rise, as is e-learning through self-paced online courses, with more than 75 percent of organizations offering some form of online study.²⁸ These non-classroom channels allow workers to access the learning they

need when, where, and how they prefer; they can offer other benefits as well, from instructor variety to the opportunity to quickly and directly apply the learnings in learners' day-to-day work. E-learning platforms such as Udemy, LinkedIn Learning, Coursera, and Udacity offer bite-sized technical learning that's easily integrated into an employee's day, and courses are available on a range of subjects, including data visualization and machine learning. Figure 1 provides a more detailed look at the benefits and qualities of various learning options.

Using analytics to better understand disruption's impact on the workforce

Analytics tools can help organizations better understand their future talent needs and the impact of those needs on the business. These tools can allow organizations to break jobs down into their component tasks and explore the “art of the possible” across the dimensions of work, workforce, and workplace. These insights can then be used to identify opportunities to free up employee capacity and costs by capitalizing on technology and social changes emerging around work; they can also be used to understand alternative courses of action in terms of reinventing how work is done and redesigning the workforce. In this way, organizations can align their strategic priorities around the most significant workforce opportunities and future-proof the organization by stress-testing potential workforce strategies.

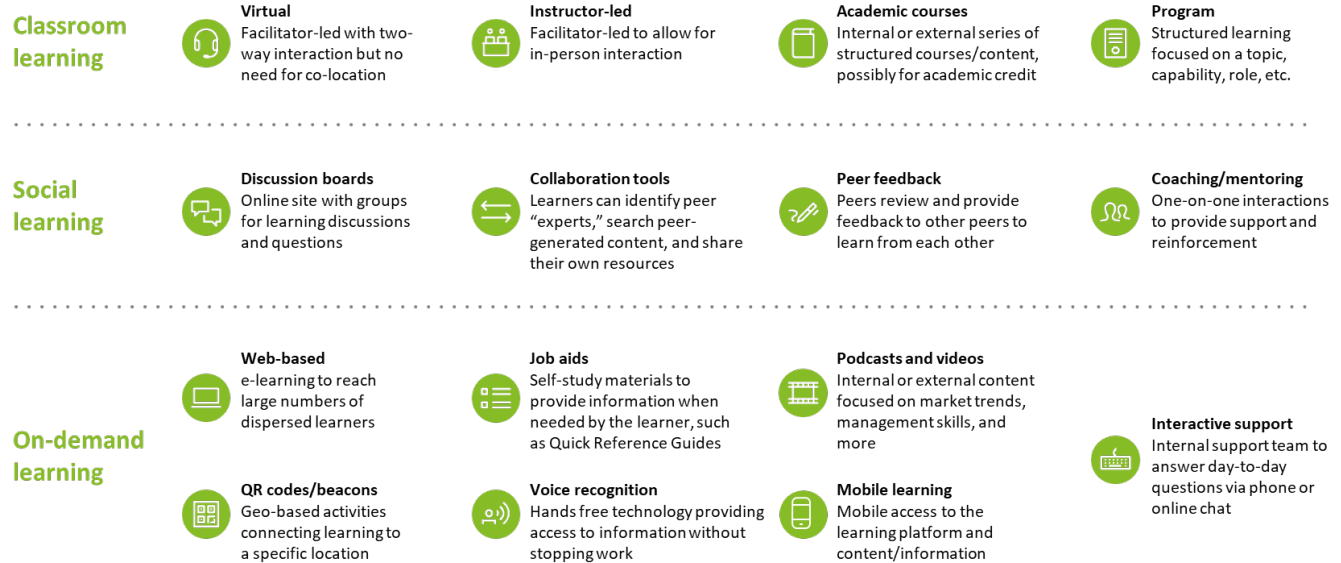
²⁶ Canadian HR Reporter, “Employer investment in learning and development continues to rise.” January 31, 2018. <https://www.hrreporter.com/news/hr-news/employer-investment-in-learning-and-development-continues-to-rise/283094>. Retrieved May 7, 2020.

²⁷ OECD, “Getting Skills Right: Future-Ready Adult Learning Systems.” February 2019. <http://www.oecd.org/employment/skills-and-work/adult-learning/Policy-Brief-Future-ready-adult-learning-2019-EN.pdf>. Retrieved May 7, 2020.

²⁸ Canadian HR Reporter, “Employer investment in learning and development continues to rise.” January 31, 2018. <https://www.hrreporter.com/news/hr-news/employer-investment-in-learning-and-development-continues-to-rise/283094>. Retrieved May 7, 2020.

Figure 1. Learning mechanisms

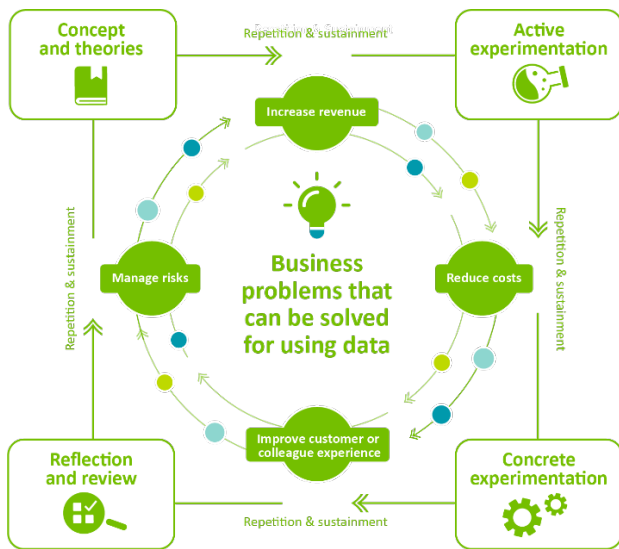
Learning modality mechanisms



Practical application is essential

Research into knowledge acquisition has highlighted the vital role that experience plays in our ability to acquire—and perhaps most importantly, retain—new knowledge.²⁹ According to the Kolb Model of Experiential Learning (Figure 2), for learning to genuinely change behaviour, it must be based on a cycle that explores the practical application of the concepts learned.³⁰ It's not enough to simply provide information: learners must have the opportunity to practice what they've learned in the real world, to reflect on and review the results of that practice and any related feedback, and to try again.

Figure 2. Experiential learning model (based on the Kolb model³¹)



Experiential learning, with its emphasis on practice, real-world application, and repetition, can greatly improve learning effectiveness overall—and that means organizations can expect to drive long-term value from their investments in upskilling their workforces. Experiential learning provides additional benefits as well: it can push learners out of their comfort zone and provide them with challenging, stimulating new knowledge; it provides learners with the opportunity to better understand which learning styles work best for them; and it can spark or improve collaboration among peers, as learners look to each other for clarification, feedback, and new insights around what they'd learned.³²

²⁹ Carleton University, "Experiential Learning Cycle Model." <https://carleton.ca/experientialeducation/what-is-experiential-education/experiential-learning-cycle-model/>. Retrieved May 7, 2020.

³⁰ Saul McLeod, "Kolb – Learning Styles." [Simplypsychology.com](https://www.simplypsychology.org/learning-kolb.html), 2017. <https://www.simplypsychology.org/learning-kolb.html>. Retrieved May 7, 2020.

³¹ D.A. Kolb, *Experiential Learning: Experience as the Source of Learning and Development*, 2015.

³² Vishnu Vardan, "Why Experiential Learning Is Better." [LinkedIn.com](https://www.linkedin.com/pulse/why-experiential-learning-better-vishnu-varadhan/), October 16, 2016. <https://www.linkedin.com/pulse/why-experiential-learning-better-vishnu-varadhan/>. Retrieved May 7, 2020.

The Schulich-Deloitte cognitive analytics and visualization lab: Accelerating analytics and AI

The Schulich- Deloitte Cognitive Analytics and Visualization Lab, housed in the Rob and Cheryl McEwen Graduate Study and Research Building at the Schulich School of Business at York University, is the centrepiece of the Schulich School of Business’s master of management in artificial intelligence (MMAI), and master of business analytics (MBAN) programs, providing students with an innovative space to learn advanced analytics and AI concepts. The lab is a hotbed of collaboration, innovation, and research, created to foster advances in the interpretation of big data and artificial intelligence.

The lab’s advanced platforms allow students and researchers to explore advances in predictive analytics, natural language processing, machine learning, artificial intelligence, and visualization. The lab shapes tomorrow’s analytics and AI leaders while helping businesses address their most pressing challenges by using data to uncover insights and set strategy.

The lab is also where students work on the consulting project, the capstone of their studies. Over the course of eight months, students work as analytics and artificial intelligence consultants. Real client data is fed into the lab platform, students perform data cleansing, verification and QA, and uncover insights using advanced analytics and artificial intelligence methods and visualization tools. Students collaborate closely with clients, creating key career connections while gaining real-world experiential learning.

Deloitte has found that experiential AI-focused learning programs are particularly effective when they enable participants to bring their own problem—or opportunity—to the sessions and tackle the scenario using data. For learning program designers, this approach does mean that internal and external data sets should be carefully curated to support the practical, hands-on labs or exercises. Furthermore, key messages and concepts should be repeated to ensure retention, and participants should be provided with ample opportunities to practice new capabilities right away. Performance evaluations should also incorporate elements that encourage employees to sustain their learning practice.

Experiential learning could also be a way to overcome many adults’ lack of desire to learn. According to the OECD, 50 percent of adults neither train nor want to train.³³ This disinterest in learning may reflect years of experience with training felt to be irrelevant or, at best, somewhat useful; practical, applied, and repeatable skills-development programs could persuade many workers that learning new skills is in fact worth the time and effort.

How to create self-motivated learners

It’s challenging to create a culture of lifelong learning at any organization, but that hasn’t stopped many from trying a variety of incentives. Deloitte’s Omnia AI practice, for example, provides financial bonuses to its professionals who obtain upskilling certifications; the firm has also established communities of practice, where people can connect with those with similar skills. LinkedIn offers badges that users can show to demonstrate their upskilling qualifications. Other organizations use rotation programs to instill a sense of continuous learning among employees: Anheuser-Busch InBev and Labatt, for example, rotate new management hires through sales, data science, brewery, and other functions to provide employees with vital learning, and help develop a broad understanding of the business.

³³ OECD, “Getting Skills Right: Future-Ready Adult Learning Systems.” February 2019. <http://www.oecd.org/employment/skills-and-work/adult-learning/Policy-Brief-Future-ready-adult-learning-2019-EN.pdf>. Retrieved May 7, 2020.

Effective upskilling demands sufficient investment—and Canadian organizations are falling behind

Upskilling an existing workforce to meet the demands of an AI-driven future represents a significant, long-term investment in learning. Organizations are responding to the need for more training in a fast-changing world, but are they investing enough to achieve their upskilling ambitions?

According to a Deloitte survey of more than 2,000 C-suite executives in 19 countries, 84 percent of respondents said their organizations had increased funding for reskilling and retraining, with 18 percent describing their additional investment as “significant.”³⁴ Learning investments are on the rise in Canada, as well. The Conference Board of Canada reports that organizations’ average investment in employee learning rose from \$800 to \$889 per employee between 2015 and 2017, while average learning and development hours rose from 25 to 32 hours per employee as well.³⁵ Canada’s major banks, by comparison, invest an average of \$1,187 per employee on training.³⁶

Canadian organizations’ learning investments may be on the rise, but they pale in comparison to other companies. In the United States, for example, AT&T is investing USD \$1 billion to retrain nearly half its workforce for the jobs of the future, or roughly \$10,000 per employee.³⁷ Similarly, Amazon announced it would be investing \$700 million to retrain 100,000 employees—a third of its US workforce—in new technologies; that investment translates to just under \$11,000 per employee.³⁸

Government funding available for upskilling in the age of AI

The federal government has recognized that ensuring Canadian workers can adapt to and capitalize on AI and other new digital technologies is critical to ensuring the country’s long-term economic growth and competitiveness. Organizations intent on upskilling and reskilling their workforce can take advantage of a variety of government funding programs.

- In 2017, the federal government appointed CIFAR, the Canadian Institute for Advanced Research, to develop and lead the \$125 million Pan-Canadian Artificial Intelligence Strategy, the world’s first national AI strategy.
- In February 2019, the ministers of Finance and of Employment, Workforce Development, and Labour launched the Future Skills Centre and the Future Skills Council as part of the federal government’s plan to develop and keep good-quality jobs in Canada and grow the country’s middle class. The government announced it would invest \$225 million in Future Skills over the next four years, and \$75 million annually thereafter.
- In budget documents released in March 2020, the federal government announced that it was preparing to invest roughly \$4.9 billion in unclassified AI and machine-learning research in fiscal year 2020.
- Scale AI, a co-investment and innovation hub jointly funded by the governments of Canada and Quebec, is providing \$23.4 million in funding between 2019 and 2023 for Quebec organizations that develop a customized learning and development program.

³⁴ Deloitte, “Industry 4.0: At the intersection of readiness and responsibility: Deloitte Global’s annual survey on business’s preparedness for a connected era.” January 20, 2020. <https://www2.deloitte.com/global/en/insights/deloitte-review/issue-22/industry-4-0-technology-manufacturing-revolution.html?id=ca:2el:3or:4dius32959:5awa:6di:dr26:wef20:4ir:vanity&pkid=1006897>. Retrieved May 7, 2020.

³⁵ The Conference Board of Canada, “Canadian Employers’ Investment in Employee Learning and Development Continues to Rise.” January 31, 2018. [https://www.conferenceboard.ca/\(X\(1\)S\(yaoev11wvynhtj0bmc2hjc\)\)/press/newsrelease/2](https://www.conferenceboard.ca/(X(1)S(yaoev11wvynhtj0bmc2hjc))/press/newsrelease/2)

018/01/31/canadian-employers-investment-in-employee-learning-and-development-continues-to-rise?AspxAutoDetectCookieSupport=1. Retrieved May 7, 2020.

³⁶ Deloitte research

³⁷ Susan Caminiti, “AT&T’s \$1 billion gambit: Retraining nearly half its workforce for jobs of the future.” CNBC.com, March 13, 2018. <https://www.cnbc.com/2018/03/13/atts-1-billion-gambit-retraining-nearly-half-its-workforce.html>. Retrieved May 7, 2020.

³⁸ Scott F. Latham, “Amazon plans to upskill 100,000 employees. Here’s what that means for the future of work.” Fastcompany.com, July 23, 2019.

<https://www.fastcompany.com/90380050/amazon-upskilling-100000-employees-and-the-future-of-work>. Retrieved May 7, 2020.

Stage 3: Sustaining change and making learning stick

To successfully upskill their workforces, organizations must assess their learning needs and goals and invest in, develop, and deliver effective training to employees. Ensuring this learning ‘sticks’ and results in lasting organizational change requires additional, important support from the perspectives of people, processes, and technology.

People: *Is the organization ready for AI and the AI-powered workforce?*

An organization can recruit and upskill all the AI talent it needs to achieve its future ambitions—but if the organization’s culture and structure aren’t designed to operate in an AI world, all that talent and learning investment may go to waste.

- **Growth mindsets needed.** Organizations need to foster a growth mindset among leaders, managers, and employees alike with regard to AI.³⁹ They need to build a sense of understanding—and, critically, optimism⁴⁰—around what AI can mean to the business and to people’s careers in order to smooth the path to AI adoption and encourage employees to be more open to learning new skills and new approaches to working.
- **Prepare for a different kind of decision-making.** As well, leaders throughout the organization must understand and come to terms with the way AI can change decision-making.⁴¹ Instead of making decisions based solely on instinct or experience, leaders will need to make them based the insights gleaned from data and algorithms—insights that may sometimes be surprising or even counterintuitive. Yet this doesn’t mean leaders must cede decision-making responsibility to the machines; instead, they and the organization must learn how to combine AI rigour with human ingenuity to decide on the appropriate path forward.
- **Interdisciplinary teams are essential.** Organizations must rethink the way they structure teams if they are to make the most of their investments in AI and AI upskilling.

AI should never be regarded as the sole domain of technology experts and data scientists; effective AI teams should be multidisciplinary, combining individuals with technical skills and those with business skills in order to build and consume AI solutions that address real business problems and organizational priorities.⁴² Non-data scientists are essential to ensuring the team understands and focuses on solving the business problem at hand—and communicating insights and their implications to business decision-makers. Data scientists and technical experts, on the other hand, are critical to harnessing and applying the full force of AI and analytics.⁴³

- **Don’t lose sight of retention.** After investing in recruiting or upskilling talent, the last thing organizations want is for that talent to leave for a new opportunity. They should re-examine their HR policies and practices through the lens of AI transformation. Policies and practices that reflect an organization’s workplace demographics and provide a supportive work environment—flexible working arrangements, attractive benefits programs, progressive parental leave programs, for example—can play a significant role in retaining talent.⁴⁴ HR policies based around restrictive job levels, salary bands, and contracts that don’t reflect market realities, on the other hand, could persuade an organization’s talent to seek opportunities elsewhere.⁴⁵
- **Opportunities for ongoing, lifelong learning.** Rapid technological advances and equally rapid skills obsolescence have made lifelong learning an essential element of our personal and professional lives. Not only does it ensure employees’ skills keep pace with continuous technological change,⁴⁶ it also contributes to improvements in life expectancy and quality of life.⁴⁷ Encouraging lifelong learning—and providing a range of opportunities to do so—can enable organizations to support innovation and employee well-being at the same time. It’s notable that 86 percent of companies report that they are taking steps to instill a corporate culture that fosters lifelong learning.⁴⁸

³⁹ Tim Fountaine, Brian McCarthy, and Tamim Saleh, “Building the AI-Powered Organization.” Harvard Business Review, July-August 2019. <https://hbr.org/2019/07/building-the-ai-powered-organization>. Retrieved May 7, 2020.

⁴⁰ Deloitte, *Canada’s AI imperative: Start, scale, succeed*. 2019. <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/deloitte-analytics/ca-ai-adoption-aoda-en.pdf>. Retrieved May 7, 2020.

⁴¹ Tim Fountaine, Brian McCarthy, and Tamim Saleh, “Building the AI-Powered Organization.” Harvard Business Review, July-August 2019. <https://hbr.org/2019/07/building-the-ai-powered-organization>. Retrieved May 7, 2020.

⁴² Tim Fountaine, Brian McCarthy, and Tamim Saleh, “Building the AI-Powered Organization.” Harvard Business Review, July-August 2019. <https://hbr.org/2019/07/building-the-ai-powered-organization>. Retrieved May 7, 2020.

⁴³ David Hurwitz, “The importance of interdisciplinary collaboration in AI projects.” Allscripts.com, September 5, 2019. <https://www.allscripts.com/2019/09/the-importance-of-interdisciplinary-collaboration-in-ai-projects/>. Retrieved May 7, 2020.

⁴⁴ Deloitte, “People in payments: A spotlight on the need for talent transformation in financial services.” <https://www2.deloitte.com/ca/en/pages/financial-services/articles/people-payments.html>. Retrieved May 7, 2020.

⁴⁵ Deloitte, “People in payments: A spotlight on the need for talent transformation in financial services.” <https://www2.deloitte.com/ca/en/pages/financial-services/articles/people-payments.html>. Retrieved May 7, 2020.

⁴⁶ Deloitte, “Industry 4.0: At the intersection of readiness and responsibility: Deloitte Global’s annual survey on business’s preparedness for a connected era.” January 20, 2020. <https://www2.deloitte.com/global/en/insights/deloitte-review/issue-22/industry-4-0-technology-manufacturing-revolution.html?id=ca:2el:3or:4dius32959:5awa:6di:dr26:wef20:4ir:vanity&pkid=1006897>. Retrieved May 7, 2020.

⁴⁷ Ates, H., & Alsai, K. (2012). The importance of lifelong learning has been increasing. *Procedia-Social and Behavioral Sciences*, 46, 4092-4096.

⁴⁸ Deloitte, “Industry 4.0: At the intersection of readiness and responsibility: Deloitte Global’s annual survey on business’s preparedness for a connected era.” January 20, 2020. <https://www2.deloitte.com/global/en/insights/deloitte-review/issue-22/industry-4-0-technology-manufacturing-revolution.html?id=ca:2el:3or:4dius32959:5awa:6di:dr26:wef20:4ir:vanity&pkid=1006897>. Retrieved May 7, 2020.

Technology: *Ensure technology and data infrastructure can support AI talent and AI transformation*

Without the right technical and data infrastructure in place, organizations' investments in upskilling their employees will be unable to reach their full potential. While "plug-and-play" technology solutions offer a way for organizations to start their AI journey and realize some quick returns on their investments, such solutions will only take organizations so far. Ultimately, they will need to make necessary investments in data infrastructure, AI software tools, and model development that are better suited to their specific needs and AI vision.⁴⁹

In addition, leadership may need to review and re-evaluate the organization's operational policies and operational structure more broadly. Other functions such as finance, HR, and shared services may have policies or practices that hinder efforts to build a data-driven organization; these may need to be changed so that data can be more freely shared across the enterprise. In some cases, organizations may find they need to adjust their operating model as well.

Process: *It's time to embrace a new, more agile way of working*

For many organizations, risk is something to be utterly avoided. Yet this risk aversion can come at significant cost. It can leave organizations unwilling or unable to innovate effectively. It can frustrate key talent and lead to retention challenges. And it can mean organizations are too slow to sense or respond to disruption or market changes.

Adopting AI, on the other hand, demands organizations be comfortable with speed and imperfection. With AI, organizations can't wait for the solution to be fully formed or error-free prior to implementation; it's far too slow. Instead, they need to embrace AI adoption using an agile, iterative approach that enables teams to move forward quickly using a "test and learn" mentality, continuously tweaking and refining the solution until it delivers the desired result.

This shift will require organizations to rethink levels of accountability as well as the measures and key performance indicators they use to track project progress and evaluate success.

Schulich Executive Education Centre (SEEC) and Deloitte team up to deliver Data and Analytics Fundamentals Academy for non-data executives

In 2020, the SEEC and Deloitte teamed up to provide AI academy learning to Canadian executives to help them close the AI and analytics knowledge gap in their organizations. The Data and Analytics Fundamentals Academy is a boot camp for non-data and analytics professionals. With modules built around a business problem that can be solved through data and analytics, the academy is designed to equip non-technical professionals with an analytical mindset and foundational capabilities in six key areas: framing business problems as analytical questions; data engineering; data modelling; data visualization; data storytelling; and rapid prototyping.

The academy includes real-world, practical case studies and hands-on experiential learning. Successful completion is recognized with an SEEC AI certificate of recognition.



⁴⁹ Tim Fountaine, Brian McCarthy, and Tamim Saleh, "Building the AI-Powered Organization." Harvard Business Review, July-August 2019. <https://hbr.org/2019/07/building-the-ai-powered-organization>. Retrieved May 7, 2020.



The age of AI is here. Are you and your organization ready?

AI is changing the way we do business and the way we work at an astonishing pace. Industries are being disrupted, and organizations face incredible new opportunities and sometimes-daunting challenges.

Finding the talent needed to make the most of AI-driven opportunities is potentially the most significant challenge facing organizations. Demand for AI talent far outstrips its availability, and even a steady stream of new graduates cannot hope to meet needs. There is a solution that can help organizations close the AI skills gap: they can upskill their existing employees and build the AI-ready workforce they need, tailor-made to suit their AI vision.

It's time for Canadian organizations to act on the upskilling imperative. It's time to make deliberate, significant investments in learning to equip their people with the knowledge, skills, and capabilities needed to work effectively in a digitized, automated world—and to build and consume AI-powered insights. If we fail to acquire or develop critical AI skills and capabilities, businesses in this country risk quickly falling behind their competitors, and Canada will have squandered its AI leadership and the economic prosperity it could have delivered.

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