COLLEGES & INSTITUTES

What does the future of work look like?

In these pages, education leaders share their insights.

Colleges and institutes, such as First Nations Technical Institute, Seneca College, Durham College and ITHQ, equip their students with the means to embark on successful careers. SUPPLIED

FLYING IS "ALWAYS A THRILL" FOR VANESSA BROWN – and when the Inuit from Happy Valley-Goose Bay, NL (above left), received her Aviation Technology accreditation from First Nations Technical Institute (FNTI) in 2017, her career immediately took off.

Training with Canada's only Indigenous aviation post-secondary program of its kind at FNTI on the Tyendinaga Mohawk Territory and in partnership with Canadore College, Ms. Brown acquired the skills and competencies that set her on the trajectory to becoming what she is today: first officer with Missinippi Airways, an airline that serves northern – and many Indigenous – communities. In landing a desirable position upon completing a college or institute education, Ms. Brown is not alone.

"Colleges and institutes provide the kind of training that prepares people to be successful in today's job market, since their programs are developed in close consultation with companies and communities," says Denise Amyot, president and CEO of Colleges and Institutes Canada.

Ensuring that colleges and institutes are aware of current trends, opportunities and challenges are Program Advisory Committees, she explains. "Every single course is informed by people from the industry, who provide advice on curriculum development, the type of equipment employees need to be trained on and the competencies that are required. This advice ensures that colleges and institutes are always on the leading edge."

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>
> **Denise Amyot**
> president and CEO of Colleges and Institutes Canada

Being responsive to industry and market needs is part of the "DNA of colleges and institutes. It enables them to be prepared for the future and offer programs in emerging fields, such as the Internet of Things, AI, blockchain, cybersecurity or cannabis," says Ms. Amyot.

According to a 2018 study by RBC, half of all jobs will be disrupted by technology and automation within the next decade, which will not only affect how we work but also how we learn. Colin Ewart, president of B.C. Colleges, believes that colleges and institutes in B.C. and across Canada are well equipped and flexible enough to meet the challenges expected in educating people for the emerging labour market.

"The future of work will demand competencies such as adaptability, teamwork and resilience, plus human skills like active listening, speaking and critical thinking," he says. "Colleges, by design, are focused on developing such competencies and skills through programs that are built around occupation-relevant content and work experience."

In addition, fast-paced societal and industry changes mean that learning "is not something you do once and then you're done," adds Ms. Amyot. "Today, it is essential to continue to learn."

People looking to further their education will never encounter closed doors – colleges and institutes may be the first place they turn to for post-secondary education or the next place for updating skills, says Ms. Amyot.

And a variety of learning options, from boot camps and weekend sessions to part-time, full-time or accelerated programs, are designed to meet the needs of diverse students, she says. "This means that people can pursue an education at any time – and increasingly, due to the prevalence of online learning, also at any place."

Mr. Ewart adds that the education provided by colleges and institutes "is and will remain the most affordable, accessible and applied pathway to jobs in our communities."

Colleges and Institutes Canada
Collèges et instituts Canada

ABOUT COLLEGES AND INSTITUTES CANADA

Colleges and Institutes Canada (CICan) is the voice of Canada's publicly-supported colleges, institutes, cegeps and polytechnics. With 95 per cent of Canadians living within 50 kilometres of a college or institute, CICan's members work with industry and community partners all over the country to offer more than 10,000 programs that equip students at all career stages to thrive in today's job market.

For more information, visit www.collegesinstitutes.ca.

MOHAWK COLLEGE • mohawkcollege.ca

BUILDING NEXT-GENERATION DIGITAL TALENT

In its commitment to building a pipeline of talent for the digital age, Mohawk College hasn't stopped at re-imagining all of its laboratories, tackling strategic industry partnerships and installing the latest technologies from cybersecurity to augmented and virtual reality.

The Hamilton, Ontario, school has put all of that and more into its new Joyce Centre for Partnership & Innovation, a seven-storey, net-zero-energy facility – the largest building of its kind in Canada – equipped with digital sensors that control and monitor all aspects of its operation. Every inch of the building, from its basement geothermal pumps to its rooftop solar arrays, "is accessible to student learning and building institutional best practices," says David Santi, Mohawk's dean of engineering technology.

The Mohawk College's Joyce Centre for Partnership & Innovation allows students and industry partners to experience a functioning zero-carbon building. SUPPLIED

"It's a living laboratory that encourages students to think dynamically and collaborate in emerging, high-demand industry disciplines," he says, noting that they come from across the college and are "cross-functional," including engineering and skilled trades, business, data analytics, change management and entrepreneurship.

The building, which opened last autumn, is named in honour of a $5-million donation from the Joyce Family Foundation created by Ronald Joyce, the Canadian entrepreneur who invested in the first Tim Hortons donut shop, located in Hamilton. It includes labs focused on avionics, digital health, IIoT digital, cybersecurity, clean and renewable energy and power management, and sustainable design.

Mr. Santi says that industry is increasingly asking colleges and universities to train students on state-of-the-art technology in such settings. They earn "micro-certifications" in

See DIGITAL TALENT on CICan 7

With many sectors affected by globalization, students with cultural competencies and soft skills will have an advantage. Sylvie Carrière, ITHQ (Page 8)

SENECA COLLEGE • senecacollege.ca

PREPARED FOR INDUSTRY 4.0

The fourth industrial revolution is officially underway, and its effect on the economy and the world of work is proving to be profound. Industry 4.0, as the process is commonly known, is the current trend of automation and the utilization of data in advanced manufacturing technologies. It includes cyber-physical systems and the Internet of Things (IoT) as well as cloud and cognitive computing.

With the opening of its new Centre for Innovation, Technology and Entrepreneurship (CITE) at its Newnham Campus in Toronto, Seneca College is advancing its leadership position in training students to adapt and succeed in Industry 4.0. "CITE will bring a variety of technology and business programs together under one roof, including applied research and a suite of mechanical engineering programs," says Seneca president David Agnew.

"It is the kind of place where you can actually be doing what everybody is talking about.

David Agnew
president of Seneca College

In addition to highly specialized training, CITE will also focus on research and innovation with industry partners, and serve as an accelerator for both student and industry-led entrepreneurial activities. "It is the kind of place where you can actually be doing what everybody is talking about," says Mr. Agnew.

The space will include classrooms, labs and a presentation gallery incorporating a unique Indigenous design as well. "It's also designed to allow students to acquire in a hands-on way both hard and soft skills in an interdisciplinary environment that will enhance their communication skills and ability to work effectively in interdisciplinary teams, which are very common today in both business and industry," says Mr. Agnew.

The development of CITE and its programs has been shaped by the current and future needs of industry, he adds. "Our industry program advisers have been an important part of the process." One of those advisers and partners is KUKA Canada, a world leader in advanced manufacturing and intelligent automation, which is providing Seneca students with state-of-the-art robotic equipment to enhance their manufacturing skills.

"Robotics has become a fundamental component of the modern manufacturing process, and this partnership will allow us to extend our offerings in this important field," says Mr. Agnew.

"It's the kind of partnership that's not only good for students and industry but for Canada," says Ed Manera, KUKA's VP sales. "The area of robotics is extremely important; if we don't automate and become more efficient as a country, we won't be able to compete."

KUKA and Seneca share a vision when it comes to education, says Mr. Manera. "We want to help graduates develop the skills they need to succeed, and graduates from these kinds of programs are in high demand."

According to Mr. Agnew, Seneca plans to continue to strive to attract a wide range partners to collaborate at CITE and expand the range of opportunities and benefits for students, the community and the country.

"The invitation is out for small and medium-sized enterprises to come in and test ideas and commercialize concepts because we want this to be their place too," says Mr. Agnew. "Applied research represents a very important learning experience for our students, and is also a great way to bring our faculty's expertise into play."

FLEMING COLLEGE • flemingcollege.ca

NAVIGATING THE DISRUPTION OF WORK

The disruption of the way we work is under way and gathering momentum. Shaped by multiple drivers, including political, social, digital and environmental factors, this change can create uncertainty, yet some skills and aptitudes are sure to serve students well today and in the future, believes Maureen Adamson, president of Fleming College.

"We know that technology will be embedded in all jobs, so education in technology is essential," she says. "We also know that there are some soft skills that will not be replaced by AI, like interpersonal skills, collaborative problem-solving and creativity. In addition, resilience is very important."

One of the best ways to establish – and hone – this comprehensive skill set is "learning to learn," says Ms. Adamson. "Very often, what enables students to succeed isn't just about skills, but also about aptitude and agility."

In addition to classroom instruction, Fleming College offers a range of experiential learning opportunities, including applied research projects and field placements, where students apply what they learn in real-world settings, she says.

An example is the Centre for Advancement of Water and Wastewater Technologies (CAWT), which works with about 130 industry partners, supporting research into new ways of protecting, reusing, treating and managing water.

"One of our partners is a Toronto-based disinfection company that ensures water purity," says Ms. Adamson. "Fleming College was involved in proving that the technology has the capacity for larger applications, like a municipality. We also provided a third-party validation that the technology meets global Environmental Protection Agency regulations."

Students can test their skills and aptitude with a range of experiential learning opportunities at Fleming College. SUPPLIED

By providing access to state-of-the-art equipment and highly skilled faculty and students, the CAWT helps companies test and improve their technologies. It has also pioneered made-in-Canada validation processes for water and wastewater technology, says Ms. Adamson. "As a leader in applied research in the environmental and natural resource sciences, we offer small and medium-sized businesses opportunities to grow."

The interaction with businesses not only enriches the experience for students – it can also lead to "finding fabulous jobs," says Ms. Adamson. "At Fleming, we focus on 'stepping up and standing out.' Our goal is to produce the preferred graduate."

> **Times are changing, and learners now need to be prepared for more than a single job.**
> John Bowman, BC Colleges (Page 7)

SASKATCHEWAN POLYTECHNIC • saskpolytech.ca

DELIVERING REAL-WORLD SOLUTIONS

The challenge? To enhance the experiences of about 30,000 visitors and 450 exhibitors of the annual three-day Glacier FarmMedia (GFM) Ag in Motion outdoor farm expo, held near Langham, Saskatchewan. The solution came from Saskatchewan Polytechnic students, who designed a custom app that offers wayfinding information, event details and bonus information for expo attendees, plus insights for exhibitors and organizers into visitors' behaviours.

This was the first college and polytechnic project supported by Mitacs, a national, not-for-profit organization dedicated to advancing industrial and social innovation by funding student research internships. A second project, also involving students from Saskatchewan Polytechnic's Computer Systems Technology diploma program, led to the development of a new data analysis system that measures the impact of initiatives by the Restorative Action Program (RAP), a non-profit group working with Saskatoon high schools to offer students counselling, conflict resolution and leadership skills training.

Students at Saskatchewan Polytechnic were the first polytechnic recipients of Mitacs funding in Canada. SUPPLIED

"These two projects, which were possible because of the incredible support from Mitacs, show what can happen when polytechnics and organizations work closely together to drive innovation," says Dr. Larry Rosia, the polytechnic's CEO. "We turn ideas into reality. Saskatchewan Polytechnic's focus on applied research, coupled with our deep connections to industry and our strength in work-integrated learning, equip our students with skills that will serve them well into the future."

Colleges and polytechnics have the capacity to do well in preparing students for a rapidly changing work environment "since they deliver training that addresses the specific needs being expressed by their partners," says Kevin Rogers, Saskatchewan Polytechnic's acting associate vice-president for Applied Research.

To ensure that programming is up-to-date and reflective of societal needs, instructors have relevant industry experience, and Program Advisory Committees provide constant input into current opportunities and challenges faced by industry and communities, he says. "They are telling us how programs need to evolve and what skills students need."

As part of Saskatchewan Polytechnic's experiential learning, students complete capstone projects, where they may develop very specific solutions sought by industry partners or tackle broader challenges – from environmental to social innovations that can improve the daily lives of Canadians, according to Mr. Rogers. "With our applied research projects, students don't deal with abstracts – they tackle real-world problems."

Students involved in the Mitacs projects, for example, were able to demonstrate the capacity to deliver innovative and highly impactful solutions. "We were very impressed with the entire process," says Winston Blake, RAP's executive director. "The students were able to educate us about how technology can work within the context of our program."

Mr. Rogers adds that the projects met a direct need. "Everyone wins in this kind of arrangement," he says. "Such experiences give students an edge when it comes to finding jobs, and employers are typically thrilled with the work readiness of our graduates."

FIRST NATIONS TECHNICAL INSTITUTE • fnti.net

DEVELOPING CAPACITY, STRENGTH AND IDENTITY

Imagine an intelligent building with interactive elements providing data about its net-zero environmental performance as well as insights into Indigenous knowledge. The First Nations Technical Institute (FNTI) envisions its future facility as an educational tool that uses sensors and apps for enhanced learning – while building on the success of existing programs that incorporate new technology. Language revitalization programs, for example, already draw on virtual reality elements, where students can explore a garden or a kitchen and listen to explanations in the Mohawk language about traditional methods for growing, harvesting and preparing food. Another language presentation in Anishinaabe takes viewers on a journey to harvest wild rice.

"We tie in new technology with Indigenous thinking and cultural practices," says Suzanne Katsi'tsiarihshion Brant, FNTI's president. "As an Indigenous institute, we have a strong focus on raising awareness about how Indigenous knowledge can contribute to solutions for today's pressing challenges, such as climate change." A commitment to sustainability stems from a deep respect for the Earth, which is central to Indigenous identity, she explains.

FNTI's pedagogy – referred to as Indigegogy – ensures that vocational and individual learning outcomes are paired with Indigenous outcomes, says Ms. Brant. "First Nations communities lost so much due to residential schools and restrictions of cultural practices; for example, using traditional medicines and speaking First Nations languages were once illegal. As a post-secondary institute, FNTI is proud to be part of their revitalization."

Support services at the First Nations Technical Institute contribute to creating a safe environment, and programs are designed to ensure student success. SUPPLIED

Indigenous ways are deeply integrated into learning methodologies. "For example, we use the circle; we have traditional medicines in the centre of the room, and there are lots of opportunities for drumming, singing and sharing teachings," says Ms. Brant. "Many of our students come into the classroom and say, 'This is part of my family.'"

This sense of belonging allows students to present real-life experiences and community challenges. Students in the social service program, for example, would discuss the trauma of having First Nations children removed from their communities, says Ms. Brant. "Because of the statistics, every First Nations person in the class knows someone who has been impacted. They learn about new legislation affecting Indigenous children and about developing capacity for keeping children in the community.

"When students learn to unburden their own traumas, they take these skills back to their communities and places of work," she adds. Support services contribute to creating a safe environment, and programs are designed to ensure student success. For certain programs, for example, students participate in regular one-week-intensive training and then return to their communities – a format that is effective for many First Nations learners.

The institute's education results in a profound transformation in learners, which, in turn, impacts their communities and has also been noticed by employers, says Ms. Brant. "We have a 93 per cent employment rate. This speaks of our success in unburdening traumas and developing capacity, strength and identity."

Very often, [success] is not just about skills but also about aptitude and agility, which can be advanced through experiential learning. Maureen Adamson, Fleming College (Page 2)

ALGONQUIN COLLEGE • algonquincollege.com

ONLINE EDUCATION BOOSTING SUCCESS

Omar Kiki was gaining valuable work experience as an assistant project manager at a small house-renovation company in Ottawa – experience he didn't want to sacrifice to pursue his educational ambitions.

"I wanted to boost my career with the right credentials in an industry I enjoy," says Mr. Kiki, now 24. He wanted to complete the Construction Project Management program at Ottawa's Algonquin College, but wondered: could he study and work at the same time? "With my job, I often travelled outside the city, and I needed a flexible learning option."

Algonquin College provided the opportunity Mr. Kiki needed: to complete the program in one academic year as a full-time online student. "It was incredible. I was getting a quality education any time I wanted, from anywhere I wanted, while keeping my work commitments."

A growing number of people are seeking the flexibility and innovation of online education. Algonquin College has experienced a significant growth in online courses in recent years – including a 20 per cent growth over the past academic year – and surpassed 40,000 annual course enrolments in 2018-19 (a record high).

Online students fall into two main categories, says Patrick Devey, dean of the college's Centre for Continuing and Online Learning. "Often, recent high school graduates want to both work and study, without having to be tied to a physical location and schedule," he says. "Secondly, we're seeing significant growth among more experienced working adults looking for opportunities to expand their skills. In today's economy, continual learning is clearly a valuable currency."

Negative perceptions of online learning have noticeably dissipated among employers in recent years, says Mr. Devey. "One reason is that prestigious schools such as Harvard and MIT, and in Canada, UBC, U of T and McGill, are getting involved in massive open online courses (MOOCs). Employers have accepted online learning as a valid mode of delivery, especially as they don't have to send employees away to continue their education."

Algonquin is taking several steps to further enrich its online offerings through new technology, the hiring of additional course-design specialists, and more interactive elements and custom video content.

"Our online students can be anywhere in the world, so we also have created a system of supports to personalize the learners' experience and provide some of the same supports in the virtual environment as on campus," says Mr. Devey. In the fall of 2018, Algonquin created a new position called the Online Student Pathway Advisor (PA). "We never want our students to feel isolated," he says. "These PAs frequently check on learners' progress and help them solve any problems – a single point of contact who's supporting their success."

Success certainly flowed from his online education, according to Mr. Kiki. "It opened new doors for me and broadened my network, and now I've launched my own construction consulting firm."

DURHAM COLLEGE • durhamcollege.ca

HUMAN INTELLIGENCE AT THE CENTRE OF AI

Durham College aims to introduce elements of AI into 64 courses across multiple programs, from health-care technology to engineering. SUPPLIED

A smaller company seeking to improve productivity through artificial intelligence (AI) rarely has the expertise and facilities to explore this potential on its own – but help is available at Durham College in Oshawa through its Hub for Applied Research in Artificial Intelligence for Business Solutions (the AI Hub.)

Industry partners from across Ontario are accessing the AI Hub's technical expertise, leading-edge facilities and test platforms, and project teams of students and faculty researchers.

One such AI project is engaging the talents of students Steve Bakos and Neil Gaspar, both in their final year of the college's computer programmer analyst program. They are working with a company to develop a prototype chatbot for an intelligent parking-lot kiosk that can understand people's questions and troubleshoot correctly – for example, when someone pays and doesn't get their ticket. The business benefit would be fewer human operators needed to answer a helpline.

Mr. Bakos and Mr. Gaspar recognize the value of their AI Hub experience.

"I want to be at the leading edge of AI research, working in a think-tank where AI discoveries and breakthroughs are unfolding. Working at the hub inspired that in me," says Mr. Bakos.

"This experience has helped me define my goals," adds Mr. Gaspar. "I've learned that AI could be the foundation of a lifelong career."

As the AI revolution spreads, Durham College is responding on many fronts. This fall, it will launch Canada's first graduate certificate program in Artificial Intelligence, Analysis, Design and Implementation.

"Jobs in Canada requiring AI skills have grown by roughly 1,000 per cent since 2013," says Ali Hirji, project manager of the AI Hub. "One myth is that AI skills are only about programming and computation. Other skill sets are also important, such as understanding how to work with data and comply with privacy laws, and to manage the ethics and socio-economic impacts of data use.

"We're taking a broad, interdisciplinary approach, and plan to introduce elements of AI into 64 courses across multiple programs, from health-care technology to engineering."

The college also holds "Tech Talks" with the business community to forecast AI impacts in different industries, such as cybersecurity and real estate, and this June, a one-day industry-college summit is planned.

"Our academic, research and community initiatives share a key theme," says Mr. Hirji. "The future of AI is not about replacing people, but about building knowledge and skills to ensure individuals and companies are competitive in a world being transformed by artificial intelligence."

> **Robots are getting better all the time, but they still require human intervention and course corrections.**
> Chris Dyck, Georgian College (Page 8)

CENTENNIAL COLLEGE • centennialcollege.ca

WHERE AND HOW INNOVATION HAPPENS

Match sets of real-world challenges with multidisciplinary teams of motivated students and bring them into a space designed for experiential learning. That's where innovation happens, says Dr. Eric Blaise, director of Applied Research and Innovation at Centennial College.

He is speaking of the Toronto college's new Innovation Hub, an open and modular 4,500-square-foot space, where power ports are embedded in the floor and desks have wheels. There are boardrooms of different sizes to accommodate meetings for project groups and industry partners, and space configurations are conducive for brainstorming and sharing information, says Dr. Blaise. "The space is designed for collaborative interaction, where people from different programs and with different perspectives work together on developing new concepts."

Dr. Eric Blaise, director of Applied Research and Innovation at Centennial College, says the Innovation Hub facilitates the kind of hands-on experiences that makes graduates valuable to employers. RAPHAEL TIGNO

It's no accident that the hub is designed with flexibility and practicality in mind, as these are among the attributes students need to embrace when they tackle challenges presented by industry partners. Current projects, for example, explore the feasibility of operating aircraft landing gear with electrical systems rather than hydraulics, says Dr. Blaise. "We received funding from the Natural Sciences and Engineering Research Council to work with partners in the aerospace industry to develop electrically actuated landing gear."

Extending and retracting landing gear with electrical systems "requires different technology and different physics" from the traditionally used hydraulics, he explains. Last year, 11 co-op students worked on three projects with Safran Landing Systems, one of Centennial College's key aerospace partners.

With backgrounds in automation and robotics, electrical systems and mechanical design, the students brought different – and complementary – skill sets. They also saw tremendous gains in "soft skills," such as communication and presentation skills, and confidence due to frequent interactions with industry partners, believes Dr. Blaise.

Coming up with novel solutions applicable in the real world "is not a linear process," he says. "There typically are no ready-made solutions that can be picked up from a book or Google. Sometimes, the required technology might not yet exist or not be mature enough."

The process of first gaining a deep understanding of the problem and then exploring avenues for solving it resembles how students would work in a company, and Dr. Blaise says this makes graduates exposed to such opportunities sought-after future employees.

The Innovation Hub further advances Centennial's institutional commitment to applied research. With a 10 per cent rise in research income, valued at over $7-million, the college placed seventh in Canada, according to Research Infosource's annual ranking of Canada's Top 50 Research Colleges.

In addition to the aerospace sector, future projects will be in health technology and cybersecurity, with the Innovation Hub boasting a prototyping lab with powerful CAD stations and a cybersecurity lab that is isolated to enable testing in a secure environment, says Dr. Blaise.

PORTAGE COLLEGE • portagecollege.ca

FLEXIBLE EDUCATION PATHWAYS SPARKING CONFIDENCE

Traditionally, education has been a top-down affair; students were told what they needed to learn and how they were going to learn it. That logic is being turned on its head as an increasing number of colleges and universities, in co-operation with school districts, turn to a more client-driven model, says Robin Tizzard, dean at Portage College in Alberta. One of the manifestations of this revolutionary way of delivering education has been the introduction of dual-credit courses for high school students that allow them – at no charge – to take university- and college-level courses for a test drive before committing time and money to them at the post-secondary level.

"There are a lot of young people who don't know what they want to do, or what options are available for them," she says. "If you give them the chance to try different things, they can find out."

According to Amanda Wildman of the Lakeland Catholic School District in Bonnyville, who is working in partnership with Portage to develop programs, the "try it before you buy it" option is not only immensely popular, it is helping many students re-engage with an education system they were losing interest in because of a perceived lack of relevance to their lives.

"We're now able to offer flexible pathways to education, which is helping [students] build confidence in their abilities and take a new interest in their future," says Ms. Wildman.

In an effort to create further linkages between trades and technology, Portage is currently developing a dual-credit robotics course in co-operation with Lakeland Catholic School District, which will introduce students to coding and computer science. A new introduction to heavy equipment technician course will allow grads to challenge the Alberta Apprenticeship period one exam, making them job-ready faster, and at less personal expense. The ability to offer these programs is accelerated by Portage's capability to deliver at least some content online.

Ms. Tizzard adds that the key to the dual-credit model's success is establishing good partnerships with school districts. "Working together, we're able to find out what students need and want, and once we know that, we can get to work on delivering it in such a way that they can move seamlessly onto the next level when they leave high school."

Pathways of education are becoming more multidisciplinary, more collaborative, to ensure graduates can address the complex needs of businesses. Kevin Rogers, Saskatchewan Polytechnic (Page 3)

LETHBRIDGE COLLEGE • lethbridgecollege.ca

LEARNING WITH AND FOR VIRTUAL REALITY

Talk about an alternate universe. Virtual reality (VR) and its cousin augmented reality (AR) are changing the way we see the world and opening doors of perception into a universe of possibility for young Canadians.

According to Dr. Kenny Corscadden, dean at the Centre for Technology, Environment and Design at Lethbridge College, the new realities are not only revolutionizing education and training in a wide variety of industries, but reducing the costs associated with delivering both.

"VR is a very cost-effective way of creating a high-powered visual of something that is being created in a two-dimensional space," he explains. "We're using it in a number of areas; interior design students can create virtual walk-throughs of potential designs, while multimedia students are using it in a variety of ways, including gaming."

It also creates safer learning environments. Students in the wind turbine technician program can experience what it's like to ascend a tower and walk out on top, thereby not only seeing but feeling what it would be like to work in such a precarious environment. The college is also using it in its policing and emergency medicine programs so students can do walk-throughs of the kinds of scenarios they'll run into on the job. The possibilities are endless. "Early childhood educators could use virtual reality to observe how children interact without their presence influencing their behaviour or becoming a distraction," he says.

> **Having the base skills necessary to use platforms for virtual environments will make graduates highly employable across a wide spectrum of industries.**
>
> **Dr. Kenny Corscadden**
> dean at the Centre for Technology, Environment and Design at Lethbridge College

Lethbridge College has played a leadership role in integrating VR and AR into its programs, and is anticipating that its growing expertise in these disciplines is going to attract a number of industry partners to its nascent applied research programs. As an example, Dr. Corscadden says the college is already in discussions with the City of Lethbridge about creating a virtual tourism platform that would allow potential visitors to whet their travel appetites and plan itineraries prior to arrival.

To meet the demand for emerging VR and AR expertise, the college is developing two new programs, a Virtual Reality/Augmented Reality Certificate and an Architectural Animation Diploma, starting next fall. Dr. Corscadden says the college shouldn't have any trouble filling seats. According to International Data Corp, global revenue for the AR and VR market is forecast to grow exponentially to $215-billion (U.S.) by 2021.

Graduates who understand the technology, the platforms and the kinds of opportunities that are emerging are going to be in high demand, he adds. "Technology is changing how we're going to be working in the future, and automation is changing jobs, and this is another step toward helping our students find a place in that future. Having the base skills necessary to use platforms for virtual environments will make graduates highly employable across a wide spectrum of industries."

SHERIDAN COLLEGE • sheridancollege.ca

CYBERSECURITY GRADUATES ESSENTIAL TO DIGITAL ECONOMY

It's the email from a "friend" that says, "I thought of you," beside a link – from an email address that doesn't look right. For businesses, it might be an invoice that's already been paid, with slightly different payment instructions.

These irritations are regular reminders that cybersecurity is a moving target, and the cost of not getting it right can be astronomical. In 2018, Risk Based Security in the U.S. reported that Canada was third on its list of countries most impacted by cybercrime, with 48 privacy breaches and 12.5 million records exposed. Another study by Symantec revealed that, after a breach, 49 per cent of businesses lost customers and 43 per cent reported damage to their brand; 41 per cent had increased expenses and 37 per cent lost revenue.

Digital transactions dominate the globalized economy, making security a key competitive factor and the job prospects for cybersecurity professionals compelling. In 2003, Sheridan College was the first post-secondary institution in Canada to launch a degree program in cybersecurity. For graduates, the CICan National Award of Excellence winning program provides an entryway into a field on which the future success of business and security of Canadians depends.

In 2003, Sheridan College was the first post-secondary institution in Canada to launch a degree program in cybersecurity. SUPPLIED

Organized international crime has become the largest player in online fraud, meaning that companies are up against powerful and well-resourced organizations when it comes to securing their data and guarding against financial fraud.

"The profit motive has spurred a lot more research and design on the part of the bad guys, so organizations struggle to keep up if they can't find the right people," says Nicholas Johnston, a professor and program co-ordinator at Sheridan's School of Applied Computing. Sheridan students learn the many ways that businesses might be attacked as well as policy, legislation, regulation and standards, and technique. The four-year honours degree in information systems and information security includes an eight-month paid internship in the security field, and also provides a means for graduates to continue to update their skills.

"We are very proud of everything our graduates and alumni have achieved, from speaking at conferences to organizing lessons for young people in high school to engaging with business at the highest levels," says Prof. Johnston.

> **Behind the computer code that now masters most manual tasks, there need to be thinkers who love to create and dabble in the unknown.** Robin Tizzard, Portage College (Page 5)

HUMBER COLLEGE • humber.ca

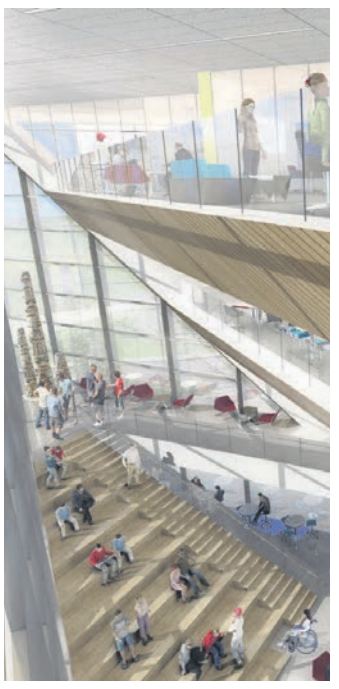
GAME-CHANGING NEW LEARNING MODELS

The manufacturing workplace of the future will evolve rapidly, driven by ultra-highly skilled talent equipped with the latest knowledge of mechanics, artificial intelligence and robotics. For workers in the sector, this means lifelong learning and ongoing skills development must become the norm, says Darren Lawless, the dean of Applied Research & Innovation at Humber College.

His predictions aren't just a theory, because in many sectors, the future is here and the scenario he describes is already the norm. "I know companies that have 25 high-paying positions open because they can't find the talent necessary," he says.

This future also demands a new approach to education, he notes. Graduates will return again and again once they "go out and learn what they don't know"; institutions such as Humber will partner with industry as well as academia to stay ahead of the curve and develop programs for upskilling.

The Barrett Centre for Technology Innovation at Humber is designed to facilitate this new reality, preparing students for this new world of work while providing solutions for companies in the region today. Opening later this year, the centre's aims are guided by the Advanced Manufacturing Skills Consortium that includes industry partners Cimetrix, Cisco, DMG MORI Canada Inc., Festo Didactic, KUKA Canada Inc., Rockwell Automation and SEW-EURODRIVE, SICK and more. Multi-year partnership agreements with these and other companies mean that Humber students will have access to tailored learning programs as well as recruitment opportunities.



At Humber College's Barrett Centre for Technology Innovation, industry and community partners, students and faculty collaborate to advance cutting-edge projects. SUPPLIED

Instead of traditional classrooms, the 93,000-square-foot centre will feature flexible spaces where students, faculty and companies can bring together the tools, skills and resources required to solve real problems facing industry partners.

For students, the centre will "be a game changer," says Dean Lawless. "Working on multiple projects with different partners within the centre links what they're doing here with the careers ahead of them. It instills confidence as well as skills."

Humber's applied learning approach has already proven effective, with graduates going on to excel in organizations such as Magna, appear on CBC's Dragons' Den and achieve top awards at the WorldSkills Competition. Avery Bird and Theo Willert, who studied electro-mechanical engineering technology, won third place at WorldSkills in Abu Dhabi in the mechatronics category after winning gold medals at Skills Ontario and Skills Canada. Mateusz Cwaliniski and Bogdan Malynovskyy won gold at the national Skills Competition in June in the mechatronics category, a key step to qualifying for the Canadian Team at the WorldSkills competition in Russia in August 2019.

The new centre will expand on these successes. "By developing and demonstrating skills on real-world problems, our students are able to perform admirably when they launch their careers," says Dean Lawless.

OPINION

OPPORTUNITIES FOR ALL

BY JOHN BOWMAN, CHAIR OF B.C. COLLEGES

From artificial intelligence and advanced robotics to big data and self-driving vehicles, disruptive technologies both stir the imagination and threaten to reshape our economy. It is an exciting time, fuelled by innovation and creativity. Yes, some jobs are being displaced, but many more are being created. While we can't predict tomorrow's breakthroughs, education leaders at British Columbia's 10 colleges are focused on the future.

To ensure lifelong success, we are adapting to the rapidly changing shifts, tailoring educational programs to economic needs, and fostering applied research and innovation. For us, it's about developing talented, innovative and adaptable learners. With nearly a million job vacancies to fill over the coming decade in British Columbia, today's learners will be the ones moving our economy forward.

It's already happening. In Victoria, college learners are using wearable technology to improve the safety of pilots who are fighting forest fires. In the Okanagan, they are developing innovative energy efficiencies for hydroponic farming. And in Vancouver, sophisticated software is being created to improve worker safety in mines, mills and on complex construction sites. These are just a few of the many examples demonstrating the leadership of B.C. colleges as we adapt to the emerging economy. We know that more than 90 per cent of our graduates transition to the workforce within six months, so they need to be equipped with the right skills.

To meet B.C.'s future employment needs, more people must develop the skills and knowledge required by the province's labour force. Fortunately, with campuses and learning centres in over 60 communities around the province, B.C.'s colleges are well positioned to produce graduates with the right mix of subject matter expertise and employability skills.

These competencies include digital literacy, critical thinking, team building skills, and enhanced flexibility and a willingness to embrace the unknown. They are the skills required by our fastest growing sector, high tech, which now employs more people than mining, oil and gas, and forestry combined.

At B.C.'s colleges, it is no longer business as usual, where learners are prepared for a single job. Modern British Columbia colleges are transforming for tomorrow's economy, embracing online teaching and new technologies, offering digital courses and adapting for those seeking retraining, upskilling and experiential learning. It's a flexible delivery model that brings higher education to people, communities and marginalized groups.

The future represents opportunity for all. In colleges across British Columbia, we are working to understand the changing landscape and respond proactively, ensuring career success for our citizens and economic prosperity for our province.

John Bowman is president of North Island College and board chair of B.C. Colleges, representing 10 of the province's public, post-secondary education institutes.

FROM PAGE 1

DIGITAL TALENT: REAL DATA INFORMING STUDENT LEARNING

the latest robotics or automated equipment, a practice that is "ramping up quickly" at Mohawk. Resumé-boosting co-op programs, experiential opportunities and "real-life" research in the classroom ensures that graduates are "job ready."

Important partnerships with technology leaders such as Cisco, EON, Dell, Palo Alto, Microsoft and VMware provide the digital assets that underlie labs, along with fully developed curriculum and faculty training. Mr. Santi says that IBM is "in every component of the college." Mohawk is part of the IBM Premier Academic Initiative, and its multi-faceted alliance with IBM includes a 2,500-square-foot Industrial Internet of Things (IIoT) lab where artificial intelligence tools such as IBM Watson and Maximo are used to help students and faculty develop, study and improve IIoT systems. "IBM's cloud-based analytics provide the tools needed to turn data into insight," Mr. Santi says.

Building next-generation digital talent is not limited to Mohawk's labs and classrooms. In a nod to Hamilton as the industrial and manufacturing capital of Canada, Mr. Santi calls the college a "factory," where the facilities among its three campuses are being connected "so we can take the data from any of the labs and building systems and incorporate it into student learning."

At its core, the Joyce Centre offers critical lessons. Students get hands-on experience in operating, monitoring and maintaining a zero-carbon building, while the centre serves as a demonstration site for industry partners looking to adopt such technologies into commercial, industrial and residential buildings.

"We can extrapolate what we've done here into other opportunities," says Mr. Santi, who feels that the facility's real value will be to look at how to rehabilitate older buildings using new digital elements emerging through the students' applied research.

"They are learning how to manage these technologies and make the right use of them," he says. "We can help our students understand, behave and influence how we can operate better as a society."

> **The challenge we are now faced with is not simply adapting to change, but preparing for ongoing disruption.**
> Denise Amyot, CICan (Page 1)

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FUTURE-READY WITH BIG DATA LITERACY

Machines already cover a wide variety of physical work tasks. They are also gaining more and more capabilities that allow them to outperform humans in areas of the cognitive realm. Just consider a computer's ability to dominate at chess, translate spoken language into text or analyze big data sets.

As AI technologies mature, their potential for replacing humans for certain types of work is growing. Yet people will always have a role – and responsibility – in guiding technology development and machine learning, says Chris Dyck, program co-ordinator for Georgian College's Big Data Analytics program. "The future is shaped by technology capabilities, but to make the technology work, people have to train it."

Chris Dyck, program co-ordinator for Georgian College's Big Data Analytics program, is passionate about exploring the implications of human-machine interactions. SUPPLIED

Any demonstration of functional AI typically comes out of many years of training with data sets. For example, when people are asked to identify objects for online security features, they unwittingly contribute to machine learning, says Mr. Dyck. "If you are directed to a form that asks whether there is a car in the picture, it is part of a training algorithm – and billions of feedback forms then enable AI to get better at identifying cars."

Similarly, a large number of examples would be required to train technology to identify bird calls, an application Georgian College is exploring in partnership with the Ministry of Natural Resources and Forestry, says Mr. Dyck. "The project involves placing devices in conservation areas to pick up bird sounds. This can provide information about which and how many birds are in the area and for how long."

This exciting use of technology also illustrates the kind of training AI requires, he explains. "There are thousands of species with unique sounds in the area. Rather than using one example of a bird call, we need thousands, since each bird sounds different."

With the amount of human- and machine-generated data growing exponentially, the question is how to leverage it for the most meaningful outcomes, says Mr. Dyck.

Data science, which uses automated methods to analyze massive amounts of data, can provide knowledge for stakeholders to enable informed decision-making, predicting trends and understanding customers better.

These variety of uses mean that Georgian College students enrolled in the nine-month Big Data Analytics graduate certificate program gain skills that are applicable – today and in the future – in a wide range of fields, including government, applied research, human resources, health care and marketing, says Mr. Dyck. They also benefit from another key collaboration. "We were the first in Canada to start a program with Microsoft. That's a big leap forward in our ability to adopt cutting-edge technology and train students so they can hit the ground running," he says, adding that Microsoft AI technology has been found the "most human-like."

Mr. Dyck shares his passion for exploring the implications of human-machine interactions with enthusiasm. He invites his students to use data analysis to probe the connection between certain topics and sentiment in news articles, and to investigate why AI often fails to recognize people's gender. "This raises questions of how people identify gender and why a computer can't identify certain things well," he says. And if AI tends to identify gender as neutral, could that lead to media and society moving towards a reduced emphasis on gender as well?

"I am always intrigued by how we influence data and how data influences us," says Mr. Dyck.

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EMPOWERING TOMORROW'S LEADERS IN HOTEL MANAGEMENT

Two weeks after Magali Vincent completed her Advanced Studies in International Hotel Management diploma, she received an invitation to apply for a management position from the human resources manager at a Fairmont hotel, whom she had met during her studies. Her experience of landing a sought-after job in a highly competitive field is the norm – rather than the exception – for graduates of the Institut de tourisme et d'hôtellerie du Québec (ITHQ) in Montreal.

"Our goal is to train future leaders in international hotel management," says Sylvie Carrière, student recruitment coordinator for ITHQ, which is known as Quebec's leading hotel school and offers programs in tourism, hospitality and food service. "When our students work hard, we guarantee that they are going to be very much in demand."

At ITHQ's bilingual hotel management program, students gain a balance of knowledge, in-the-field-training and access to an extensive network of contacts. SUPPLIED

This bilingual hotel management program, which has been running for almost a decade, is designed to deliver a balance of knowledge, in-the-field-training and access to an extensive network of contacts at the world's best hotels to enable graduates to make meaningful contributions to the hotel industry, says Ms. Carrière.

"The 26-month continuous university-level program has two paid internship components at renowned Canadian and international hotels, where students typically complete over 675 hours – and often 900 hours – of work," she says. "It is a very practical program, and students gain lots of hands-on experience and contacts."

Among the approaches that ensure student success is personalized coaching on the best steps for completing the program, Ms. Carrière explains. "For hotel managers to thrive, they need soft skills like communications and dealing with people. They also need a solid understanding of finances, regulations and the latest tools, such as social media and online booking, for selling rooms."

Students learn with international instructors and guest speakers and are part of an international cohort (where half the students come from outside Canada, such as France, Africa or the U.S.). They also have opportunities to participate in international competitions and placements.

The competencies students come away with include fluency in French and English, and confidence in working in different areas of responsibility and different cultural settings, says Ms. Carrière. "Students gain a good understanding of various cultures and clientele and how to best serve them. They also see different types of hotels and what is going on around the world."

The international focus appeals to today's young people, who value experiences over possessions, she adds. And this appetite for different cultural experiences serves them well in a job market that is increasingly globalized and competitive.