



BC COLLEGES

ACCESSIBLE. AFFORDABLE. APPLIED.

TRANSFORMING FOR TOMORROW

BC Colleges: Creating Opportunities for All





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This visioning document has been created to acknowledge British Columbia's rapidly changing landscape - economic, social and cultural - and to offer a coordinated response from British Columbia's colleges. The intention is not to provide a prescriptive roadmap for the future but rather to indicate how BC's colleges plan to respond collaboratively and constructively to the emergent needs of learners, employers, and communities, on behalf of government and all British Columbians. Our positive actions will ultimately contribute toward the shared goal: creating opportunities for all, prosperity and well-being for our people in all parts of the province.

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EXECUTIVE SUMMARY

British Columbia has an impressive, nation-leading track record when it comes to job creation, employment rates and economic performance. Behind the statistics is a skilled and creative made-in-BC workforce, ready to harness today's technologies for the future. But they are facing unprecedented change that is occurring at an ever-accelerating rate and is transforming entire economies and societies.

No learner, sector of the economy, or region of British Columbia is immune to the associated disruption. Rapid technological change has caused traditional jobs to disappear, new industries to be created and business models to be fundamentally altered. "The era of disruption" is a global reshaping of economies, which requires new skills, rewritten roles and reshaped workplaces as employers increasingly seek flexible, adaptable and innovative employees.

The disruptive economic forces in British Columbia will be augmented by an aging population, a wave of retirements and nearly a million job vacancies over the next decade. Our collective ability to train young people for these opportunities, as well as those displaced by the labour market, will ensure the strength of BC's economy and the sustainability of our medical, social and education systems.

Fortunately, BC's colleges are uniquely positioned to provide leadership through the change as they are geographically dispersed, adaptable and have strong connections to communities and industry. Leveraging these strengths, colleges can ensure they are strategic partners in the future economy by developing nimble talent, tailoring educational programs to economic needs and new technology, and fostering applied research and innovation.

This will require new thinking, enhanced flexibility and a willingness to embrace the unknown. The result may involve more online courses and new delivery approaches designed to bring higher education to marginalized groups. Or it may mean more fully digital courses, shorter courses, additional experiential learning and more upskilling, to appeal to mature learners.

Because small and medium-sized enterprises (SMEs) are the backbone of the economy - 98 per cent of the 400,000 businesses in BC employ fewer than 50 people - more collaboration between employers and educators can result in the workers of tomorrow arriving on the job with the skills for success.

Learning spaces, both on- and off-campus, will also have to evolve with the rapidly changing needs of learners and requirements of the future economy. Digitized classrooms, simulation labs, virtual reality, flex space and mobile learning centres may augment or replace traditional brick-and-mortar campus infrastructure.

This comes at a time when Canadians and British Columbians are renewing relationships with Indigenous peoples. Colleges fully



embrace this objective and are committed to engaging with the communities and Indigenous learners to deliver successful outcomes in support of the principles and calls to action of the Truth and Reconciliation Commission.

BC colleges have a track record of innovation which will continue to ensure British Columbians are prepared for the future economy. Our province will be stronger if colleges, governments and key stakeholders structure solutions aimed at supporting lifelong learners, fuelling the labour market with talented graduates and ensuring Indigenous peoples, women and equity-seeking groups play a vibrant role in the future economy and the well-being of their communities.

Solutions include:

- Enhanced services to help learners navigate their educational needs;
- Improved work experience, transition and placement services;
- More strategic partnerships between colleges and employers;
- Funding for applied research and innovation, such as community Technology Access Centres;
- More progressive and flexible government policy regarding college spaces, to ensure the campus of the future reflects modern requirements; and,
- Increased collaboration between colleges and the K-12 system to enhance the pathways for learner success and in-demand credentials.

Together, these solutions and the others contained in this report, represent an investment in British Columbia's greatest asset - our people. Everyone deserves the opportunity to benefit from an innovative economy. By adapting our education and training system today, we can ensure tomorrow's leaders and employees are nimble and equipped with the skills for lifelong success.



OKANAGAN COLLEGE

Collaboration with two Shuswap-area entrepreneurs has led Okanagan College (OC) into a research partnership that could have far-reaching implications for Canada's greenhouse and hydroponics businesses. A two-year, \$200,000 grant from the federal government is fueling research into more efficient, reduced carbon footprint ways of heating greenhouses and developing an automated control system for operating a large-scale indoor hydroponics farm. OC researchers and students are doing on-site work with the businesses over the next two years.

INTRODUCTION

British Columbia was built on the strength of its natural resources. But increasingly, the province is becoming known as one of Canada's largest industrial centres and a destination for tech innovation. According to the BC Tech Association, high-tech now employs more than 106,000 people across British Columbia, making up approximately five per cent of BC's workforce. That is more people than are employed in mining, oil and gas, and the forestry sectors combined.

We are at the forefront of an economic shift toward a low-carbon, green economy. Nearly every industry, in every community, is experiencing digitization and the pace is accelerating. Predicting the precise skills of the future workplace is impossible amid such technological change, but understanding the disruption and evaluating the key workforce competencies of a modern economy is critical.

This report draws on an expansive review of Canadian economic studies, reports and forward-looking research that assess the competencies required for our economic growth. Augmented by interviews with key British Columbia leaders in business and government and higher education, our summary - Ideas for Action - positions BC's colleges for the emerging economy to ensure they are effectively serving learners, communities and the province.

Today, digital fluency is essential in every workplace. In fact, the vast majority of jobs require moderate to high levels of digital literacy. Successful organizations in all sectors, including not-for-profits, will be those which can embrace digital technologies, navigate the new world and leverage them to drive productivity, growth and competitiveness - locally and globally.

Artificial intelligence, big data, robots and self-driving vehicles are all technologies that threaten to displace or reshape existing jobs. History tells us these technological advancements are likely to create as many new jobs as they displace.

Educators and policy makers are responsible to predict the competencies required for the new economy. Preparing learners to be part of the new workforce demands more than honing skills to succeed at a single job – truckers learn to drive trucks, mechanics learn to fix vehicles – as that is quickly becoming obsolete. Just as certain jobs are being overtaken by technology, the shelf-life for a learned skill is now about five years.

While digital literacy and technical fluency are key ingredients for the employee of the future, employers are also looking for employees with so-called "soft" skills. Sometimes called human skills, they can't be replaced by computers: leadership, teamwork skills, people management, and creativity.

Business as usual is not a success strategy for industry, government or BC's colleges. In a fast-moving digital environment, thriving in the new economy will require increased innovation, flexibility and an enthusiasm for change. Adaptability may become the most sought-after characteristic in both organizations and individuals.

The objective – and challenge - for colleges is to provide students with the learner-centered creative and mental elasticity to invent, discover, create and adapt to a changing work environment; to be ready for innovation across all sectors of society, including robotics and artificial intelligence.

The disruptive economy and future of work present great opportunities for BC's colleges, especially as they play a vital role in supporting a strong economy in every region of the province. Moving forward, the demands on colleges are likely to increase in order to:

- Support a growing economy through the development of an adaptable workforce;
- Adapt to accelerating technological changes;
- Respond quickly to the shifting needs of employers and;
- Modernize the way local education and training is delivered.

And colleges must accomplish this within a revenue envelope that is constrained.

A recent federal discussion paper on the future of work signalled that the digital economy promises to be more inclusive, diverse and democratized. Seeking the full participation of women, Indigenous peoples and other equity-seeking learners will be critical in sustaining the Canadian economy. As the search for talent intensifies in British Columbia, colleges are well positioned to help the province remain competitive and innovative by providing increased opportunities for all - including Indigenous peoples - to ensure that everyone has a chance to contribute to, and participate in, the emerging economy.

By making proactive changes today, BC's colleges will ensure they remain at the forefront as they develop talented, innovative and adaptable learners for a talent-hungry labour market, thereby strengthening our economy. The scope of challenges and opportunities makes it obvious that colleges can't do it alone, which is why we support convening a regular meeting of the public post-secondary education sector to foster collaboration, eliminate duplication and embrace strategic partnerships as we move British Columbia forward.

Thinking about the future now can help ensure we capitalize on opportunities for all learners, communities and our province.



NORTH ISLAND COLLEGE

NIC recently partnered with Tla-o-qui-aht Nation on one of North America's most innovative housing projects.

The BC First Nation converted shipping containers into affordable, multi-unit rental housing to address Tofino's housing crisis and provide band members with local housing and employment.

The Tla-o-qui-aht worked with NIC and other institutions to bring construction training to the West Coast, giving members the skills to build and support their own community.

BRITISH COLUMBIA'S EMERGING ECONOMY

The forces of change will affect all citizens, communities and organizations. Just as Blockbuster, Sears and HVM shuttered their doors leaving thousands unemployed, a growing generation of small- and medium-sized companies operate and grow in fields that didn't exist a decade ago.

Automation has obliterated some jobs that existed for generations. Other jobs, such as truck drivers and sawmill operators, now require an increased level of technological skills as workplaces embrace new digital technologies that fuel competitiveness.

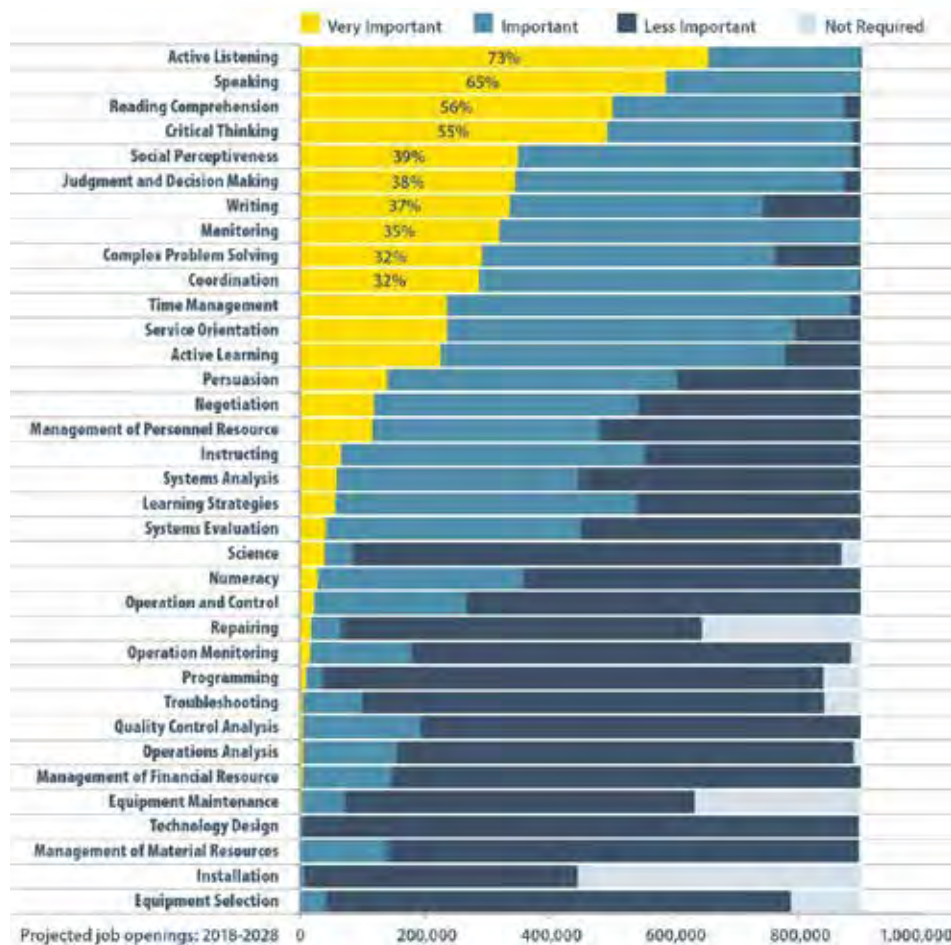
Canadians, and British Columbians specifically, have enjoyed robust economic growth in recent years and those gains are forecast to continue through 2019. But predictions about the medium- and long-term economic outlook reference risks associated with inflation, global trade tensions, and labour market supply.

A review of the relevant research, augmented by interviews with key British Columbia leaders, identified a number of noteworthy points:

Future skills

- BC employers are transitioning toward higher-skilled workforces. In the years ahead, the majority of BC businesses will undertake up-skilling in their workplaces in order to meet their talent and skills needs.
- Canada's Future Skills Council is identifying emerging skills and developing innovative approaches to skill development to allow Canadians to make informed training decisions.
- Numerous reports have shown the British Columbia economy is foregoing billions in GDP and lost tax revenues because too few people have the education and skills required to help businesses grow and innovate. (2016 Conference Board Report).
- Facing an aging population and rising retirement rate, BC employers have expressed concerns about the future availability of highly educated workers.
- Critical thinking and problem-solving skills are identified as the most challenging skills to find in new employees.
- A 2016 survey by the Business Council of Canada revealed, among the 90 major Canadian companies surveyed, the top three most important competencies for mid-level hires were non-technical: leadership, people/relationship, and collaboration/teamwork.

Skills and Competencies Demand Forecast



BC Labour Market Forecast August, 2018



LANGARA COLLEGE

Kim Lam is working with Vancouver software developer Vandrico on a project that, when completed, could make the workplace safer for thousands of employees. Lam, along with colleagues at Langara College, designed a smartphone and app that an employee can wear. The device would track the employee's movement in an industrial Wi-Fi network – a mine, mill, or complex construction site, for example. Lam's project previously secured a \$25,000 Engage Award from NSERC.

- It is estimated that hundreds of thousands of immigrants are not seeing their credentials fully recognized in Canada, hindering their ability to participate in the labour market.
- Private labour market information sources, such as LinkedIn, can provide up-to-date insights on in-demand skills, thereby assisting in the development of curriculum and content selection.

Transition and Training

- 42 per cent of jobs in the Canadian labour market are considered high risk for automation, including data collection, data processing and repetitive physical work.
- Waiting until workers lose their jobs to automation and relying on multi-year programs could create a significant training challenge.
- Between six- and 11-million Canadians will need retraining to new fields while others will require additional training to remain employed in their present positions.

Jobs of the future

- In-demand jobs of the future include health care providers, engineers, scientists, accountants, analysts, IT professionals, managers and executives, and educators.
- Investments in renewable energy, such as wind and solar power, along with other energy efficient technologies present new employment opportunities.
- As with much of the rest of Canada, in order to remain competitive, BC needs to continue its development as a digital-based economy, while still taking full advantage of the natural resources it has to offer the world.



*No College,
learner,
sector of the
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or region of
British Columbia
is immune to
disruption.*

Colleges are uniquely positioned for the emerging economy. They are adaptable and have strong connections to community, business, employers, and industry.



NORTHERN LIGHTS COLLEGE

Kory Wood knows first-hand about the importance of college and education.

The accessibility of Northern Lights College gave Kory the opportunity to complete the electrical foundations program. After his final apprenticeship year and receiving a Red Seal electrician journeyman ticket, Kory started his first business.

Today, he is President of Kikinaw Energy Services, a company with over 50 staff, some of whom are graduates of his alma mater.

RECONCILIATION AND INDIGENOUS LEARNERS

BC colleges are fully committed to working with Indigenous partners to enhance access, provide upgrading, establish pathways to support community development, and to create life-changing opportunities for Indigenous learners. These efforts demonstrate the colleges' commitment to supporting the United Nations Declaration on the Rights of Indigenous Peoples and the Calls to Action of the Truth and Reconciliation Commission (TRC.) BC colleges aim to deliver results consistent with the Government of British Columbia's mandate expectation of the Minister of Advanced Education, Skills and Training (AEST) to:

- Implement the education-related TRC Calls to Action relevant to education institutions;
- Actively participate in an engagement process with the ministry with local, regional and other Indigenous partners to develop and implement a comprehensive strategy that:
 - Increases student success, and;
 - Responds to the TRC Calls to Action and the UN Declaration.

As colleges transform to meet the needs of the emerging economy, it is clear that Indigenous people will have a particularly important role to play. As Minister AEST notes in the Labour Market Outlook: 2018 Edition, "Indigenous communities are a fast-growing demographic in British Columbia." This fast-growing demographic will need post-secondary education and it seems clear that British Columbia must increase enrolment of Indigenous learners to meet its future labour market needs.

The Ministry of Indigenous Relations and Reconciliation website states that, "reconciliation and related agreements focus on closing socio-economic gaps that separate Indigenous people from other British Columbians, and building a province where all citizens can participate in a prosperous economy."

The Ministry of Jobs, Trades and Technology includes a commitment to closing economic gaps with the objectives to, "support BC communities and Indigenous peoples to increase participation in established and emerging economic sectors."



Colleges are well positioned to help close the socio-economic gaps for Indigenous people because we:

- Offer a wide-range of adult education, trades, career and degree programs;
- Have a long and well-established commitment to accessibility and student success, and;
- Provide education and training at 60 locations throughout the province and further enhance our reach through technology-assisted learning.

British Columbia's colleges will work in collaboration with Indigenous leaders and students, governments, industry, communities and our partners across the education and post-secondary system to ensure we are inclusive, sensitive and effective in helping Indigenous learners achieve their goals.

BC colleges have already established partnerships, and built a foundation for successfully working with Indigenous learners. At the 10 colleges represented by BC Colleges, there were 10,720 learners enrolled with aboriginal identity during the 2017/18 academic year, according to the Ministry's Central Data Warehouse. Further, Indigenous students represent about 10 per cent of the total number of students registered in the college system.

Three of our colleges, Okanagan College, College of New Caledonia and Coast Mountain College, each had more than 1,700 Indigenous students in 2017-18, with Coast Mountain College having the largest proportion of Indigenous learners, representing 49 per cent of its total enrolment.

The opportunities and challenges for Indigenous learners will be different throughout the province, but we aim to ensure that the themes contained within Transforming for Tomorrow are relevant to Indigenous learners and their communities. Individual colleges must be creative in how they adapt to the emerging economy, responding in ways that are most relevant to their communities. Our approach to innovation, applied research, new learning spaces and enhanced access to our colleges will increasingly be informed by the needs of Indigenous learners.



THE IMPORTANCE OF COLLEGES

To meet BC's future employment needs, more people must develop the skills and knowledge to meet the province's labour force needs. Fortunately, BC's colleges are well positioned to produce graduates with the right mix of subject matter expertise and employability skills.

With 60 locations across British Columbia, colleges are community learning hubs, offering the most affordable, accessible and applied education programs in the province. Because of their size and geographic distribution, they are leveraged by government to adapt programming quickly to meet ever-changing regional economic needs.

The colleges provide opportunities for a more diverse array of learners than most post-secondary education institutions. For example, developmental programs are core to the mandate of our colleges. These programs are often key for learners, particularly those in traditionally under-represented groups, to obtain the knowledge, skills and confidence necessary to participate in the emerging economy.

Colleges have also been effective in recruiting international students to study in all regions of British Columbia. International students add new perspectives to improve the learning environment for domestic students, contribute significant revenue to both the college and the community in which they live, and, in many cases, choose to stay in the province and fill critical skill gaps to help drive our economy.

The forward-looking leadership of BC colleges dovetails with the direction of the provincial government. The mandate letters from the premier to every cabinet minister outline key commitments:

*More people must
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- “To build a strong, sustainable, innovative economy that works for everyone, not just the wealthy and the well-connected;” and,
- “To create good-paying jobs in every corner of the province, and ensure people from every background have the opportunity to reach their full potential.”

British Columbia’s colleges support these commitments and they have the expertise, focus and geographic locations to contribute in a significant manner to their success. The emerging economy will demand that all players involved in achieving this commitment, including colleges, must adopt new ideas and different approaches to meet the challenge.

The provincial government and colleges can help build this innovative and inclusive economy through a partnership approach with employers that embraces the effective use of technology, innovation and applied research. This will attract employers to work with us, provide work experience opportunities, and ultimately transition graduates into the workforce.



VANCOUVER COMMUNITY COLLEGE

A collaborative agreement between Vancouver Community College (VCC) and BMW Group Canada for the past three years supports the development of high-level automotive collision and refinishing technician graduates. Students are trained to be proficient with BMW’s stringent guidelines required to restore their sophisticated vehicles to safety specifications. BMW also invests in the students through financial support and job placements. The collaboration clearly demonstrates VCC’s commitment to meet the needs of our industry partners while providing students with the newest technology the industry has to offer.

THE FUTURE LEARNER

The emerging economy is bringing rapid, and often confusing, changes to the labour market. Students coming from high school, from the workforce or from years outside of traditional education environments, need expert advice and guidance to understand the opportunities available to them. Moving learners into and through the post-secondary education system more efficiently and effectively has significant benefits:

- More informed choices by students reduces both the time and cost of being a student, and allows them to get into the labour market more rapidly and earn an income;
- Employers benefit because skilled graduates move through the system more quickly and can fill critical positions in the workforce; and,
- When students move more effectively through the system, it reduces pressure on government grant funding and student financial assistance.

British Columbia already provides valuable support to learners transitioning from high school to college through dual credit collaboration. But the post-secondary system can work with the K-12 system and employers to do more to help all learners map out their educational goals, career ambitions and entry or re-entry into the labour market.

In order to help students and employers, the British Columbia government in partnership with post-secondary institutions can:

- Enhance learner navigation services;
- Develop and pilot new “Future of Work” programs; and,
- Expand work transition and placement services.

Skills: What, Who, How?

We need to ensure that the workforce of today is prepared for the jobs of tomorrow.



BC Labour Market Forecast August, 2018

While many colleges are actively engaged in facilitating student pathways, the opportunities for effective guidance are inconsistent throughout the province. It is difficult to have an economy that works for everyone in all parts of British Columbia if we cannot provide consistent roadmaps for students to gain the training and education necessary to participate in the economy.

A number of studies note that the learner of the future is increasingly likely to learn by doing, at least in part, because of how technology has influenced their learning experiences. These learners seek engaging, interactive learning experiences and value the use of technology, hands-on learning, and individual attention.

The future learner, including those from underrepresented groups, is increasingly focused on learning opportunities that facilitate the transition to a good job. Increasingly, students are seeking work-integrated learning, in the form of applied research projects, undertaken as a partnership between colleges and local businesses. This gives students relevant employment experience and helps partner agencies or businesses become more productive and innovative.

The changing characteristics of the future learner will require innovative new approaches from government and colleges to ensure British Columbia has the skilled workforce to power the emerging economy. The “sage on the stage” model that has defined post-secondary education in British Columbia, and most other jurisdictions, since the rapid expansions that began in the 1960s can no longer be the exclusive framework for post-secondary education delivery, nor government funding and policies. Instead, we must work together to modernize the post-secondary experience for learners, through enhanced system-wide collaboration with K-12 and employers.



COLLEGE OF NEW CALEDONIA

Technology has always stood at the forefront of higher education. At the College of New Caledonia, Digital Delivery Instruction (DDI) technology has expanded the educational opportunities for hundreds of rural and remote CNC students at its six community campuses.

Delivering programs to communities within a region spanning almost 12 per cent of the province can be challenging. In the past, classes with low enrolment were often cancelled. Now, using DDI, students can learn where they live in an innovative and immersive virtual classroom with students at other CNC campuses.


ADAPTING EDUCATION AND DELIVERY

Teaching methods must continue to adapt - at a faster pace - in order to respond to British Columbia's growing diversified economy, skill requirements and future learner needs. An opportunity exists today for colleges to respond rapidly to the demand and to deliver significant benefits.

The Province of BC is in the process of transforming the K-12 education system. All areas of learning have been redesigned to a Know-Do-Understand model to support a concept-based, competency-driven approach to learning. The curriculum design enables a personalized, flexible and innovative approach to the education system.

BC's colleges must now accelerate the reinvention of their programming to ensure students acquire the required competencies. College programs can:

- Place a greater emphasis on mental agility, critical thinking, insight, analysis, teamwork, relationship management, and the capacity to learn itself rather than teaching individual subjects.
- Encourage students of all ages to take risks, fail, and begin again to equip them with the courage and resilience they'll need to learn new capabilities, start a new career, or launch a new business.
- Include experiential learning that gives prominence to soft skills—such as the ability to collaborate, work in groups, read social cues, and respond adaptively – to foster more transferable skills.
- Incorporate the guidance of both the Truth and Reconciliation Commission and the United Nations Declaration on the Rights of Indigenous People to adapt educational content and program delivery to enhance opportunities for Indigenous learners.



BC's colleges will ensure they remain at the forefront as they develop talented, innovative and adaptable learners.

- Provide applied research opportunities that allow students to work with employers, solve complex problems and build workforce connections.
- Integrate interdisciplinary training that allows students to develop skills and knowledge in a range of subjects.
- Integrate new-media literacy into education programs.
- Implement technological change such as automation and robotics, virtual and augmented reality, simulation, and artificial intelligence.
- Acknowledge internet and 24/7 connectedness; and, the requirement for flexible program delivery with respect to time, place, space, - reflected in the growth of blended learning (a combination of in-person and online components); short, modular, and part-time courses to enable learners to take brief career leaves, get credit for work experience, and accumulate and transfer credits flexibly within and between colleges to obtain an applied certificate, diploma or a degree.
- Integrate third-party content so that BC's colleges can focus on areas where they provide unique value-add. For example, leveraging Open Educational Resources or Lynda.com to teach project management, a software language or basic digital literacy, while providing case studies and work-integrated learning opportunities in and outside of class.
- Improve credentialing methods to reflect both technical and soft skills, to allow employers to better communicate their needs, and workers to better communicate their strengths.



COAST MOUNTAIN COLLEGE

At Coast Mountain College, innovative, high-tech training spaces aren't just housed in brick and mortar buildings – they are also on wheels. Our modern 53-foot long, 1,000 square foot mobile training unit has a flexible design, allowing it to transform from a classroom, to a trades shop or lab, depending on the program being delivered. This mobile solution brings the training of tomorrow to remote communities today, giving students access to post-secondary education in hard-to-reach locations.

INNOVATION, TECHNOLOGY AND APPLIED RESEARCH

BC's colleges are positioned to provide applied research and support innovation throughout the province as a consequence of the scope of their teaching and community activities, as well as the extent of staff knowledge. Colleges can play a vital role in the research continuum that includes research-intensive universities, employers, and other government and private sector entities. Colleges can take advantage of their unique attributes, which include:

- A teaching-centered environment that integrates applied research into instruction for better learning outcomes;
- A pragmatic and problem-solving focus;
- Regionally dispersed learning hubs that serve all parts of British Columbia including many small communities not served by other institutions;
- Strong partnerships with local industry, local leaders and Indigenous communities;



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economy.*

- A culture that applies technology and innovation to solving problems and/or creating new opportunities;
- A proven ability to develop and implement successful initiatives in applied research and innovation; and,
- Extensive experience working with underrepresented groups and empowering them to participate in the economy.

Canadians and British Columbians will develop their own approach to the emerging economy, but governments and colleges can accelerate our response by making use of existing models that are demonstrating success.

The Government of Canada has set aside targeted funding for colleges. Through the leadership of the National Sciences and Research Engineering Council (NSERC), the Technology Access Centre (TAC) program has been established. TACs are designed to increase innovation at the community level by connecting colleges and local companies in applied research collaborations that facilitate commercialization. There are currently 30 TACs in Canada primarily in Quebec, Ontario and Alberta and only one in British Columbia.

Some key points on TACs are:

- Each TAC receives a federal grant of up to \$350,000 per year for five years and the grants are renewable.
- It is vital that TAC proposals demonstrate support from regional organizations including provincial governments and "contributions in cash and/or in-kind towards the establishment and operation of a proposed centre signals the support



CAMOSUN COLLEGE

Camosun College spearheaded an interdisciplinary and collaborative project to monitor fatigue levels of pilots battling forest fires. During BC's 2017 forest fires season, Camosun researcher Sydney Chapman monitored pilot's vital signs using wearable technology such as heart rate monitors and Fitbits. Transport Canada watched the project with interest and will use the results to develop a system that will alert pilots when they should and should not fly, thereby enhancing the safety of flight crews.

and involvement of these organizations.” The application does not specify precise funding requirements from stakeholders, but does request letters of support from these stakeholders that outline their planned contributions to the centre.

- Existing TACs have demonstrated considerable success providing innovative solutions in areas including advanced manufacturing, agriculture, construction technology, digital media and graphics communications, environmental technology and biotechnology, food products, healthcare technology, nanotechnology and transportation.
- British Columbia’s only TAC at present is a Centre of Excellence in Advanced Manufacturing at Camosun College which has established an enviable track record with projects ranging from simulation technology for analyzing pilot fatigue to harvesting energy from municipal sewage.
- Since 2010 when the TAC program was established, Quebec, Ontario and Alberta have provided targeted funding to support their institutions while British Columbia has not. So instead of four or five TACs providing the innovation required to respond to the emerging economy, British Columbia has a single TAC.
- Canada’s Economic Strategy Tables have recently released a report entitled, *The Innovation and Competitiveness Imperative: Seizing Opportunities for Growth* recommending that government “establish a network of technology adoption centres” to accelerate technology uptake and close the gap between research organizations and industry.

The good news is that in 2018 the BC government appointed an Innovation Commissioner with a mandate to advocate for British Columbia’s fair share of federal innovation funding. In addition, there is a national competition underway for 16 more TACs with Okanagan College seeking support. A recent NSERC discussion paper proposes a network of 200 TACs as a goal for the future. So, there are opportunities for British Columbia to design and implement the strategies that will lead to a fair share of TACs being located here to help the province develop the innovation necessary in the emerging economy.

The Province of British Columbia is moving to help establish Technology and Innovation Centres (TICs) that can work in conjunction with TACs. The goals for the TICs are to enhance student experience, bolster economic development, promote innovation in specific sectors, realize social and environmental benefits through innovation and leverage investment from the Government of Canada and others.

Another part of the provincial strategy could be a British Columbia applied innovation grant providing small amounts of targeted funding tied to key economic areas aligned with provincial priorities and conditional upon success in the national TAC competition.

There are examples of growing innovation and applied research expertise in agricultural engineering, climate adaption, geothermal heating, rural development and other areas.

Such an approach would be consistent with the BC Knowledge Development Fund that was designed in 1998 and has since leveraged millions of dollars in matching federal funding from the Canada Foundation for Innovation and brought significant economic, social and environmental benefits to British Columbia.

It is not likely that all of our colleges will be able to acquire TACs in the near future, but they can all play a role in strengthening work-integrated learning and creating an innovative economy that works for everyone. There are smaller NSERC grants designed to develop applied research at colleges including the entry level Innovation Enhancement (IE) grants, the Applied Research and Development (ARD) grants, Applied Research Tools and Instruments (ARTI) grants and the College-University Innovation to Idea (CU-I2I) grants.

A policy framework that supports a role for colleges in applied research that is linked to provincial priorities would be an important step towards leveraging these federal funds and establishing the innovative post-secondary education environment that responds effectively to the emerging economy. The innovation transformation can be further strengthened by the availability of small amounts of targeted funding for proof-of-concept initiatives tied to key issues for the province.

For example, the following areas might benefit from applying innovative thinking:

- Project collaboration with digital supercluster leaders;
- Strategies to engage underrepresented groups including Indigenous peoples and new Canadians in the emerging economy;
- Support for the established and growing wine, craft beer and craft spirits sector as it evolves in the face of changing trans-national trade and contributes to the growing tourism economy in the province;
- Pilot projects focused on increasingly important issues such as new approaches to prevent and fight forest fires; and,
- Exploring social issues that impact the labour market supply such as health determinants of Indigenous people.

The small steps proposed above will allow the provincial government and colleges to work together and jointly test ideas that work effectively and provide the greatest benefit. College and provincial goals are compatible. Colleges want to develop and apply innovative solutions to fill labour market gaps more quickly, ensure graduates have the resiliency and adaptive skills necessary for disruptive economic challenges, and work with employers, industry, unions, Indigenous peoples and community groups so that all may prosper in the years ahead. A progressive new approach to innovation and applied research at colleges will help achieve these goals.

Colleges are natural locations for Technology and Innovation Centres across British Columbia.

FUTURE LEARNING PLACES AND SPACES

Modern, progressive enhancements to education must also be applied to on-campus learning spaces. Many post-secondary buildings were built during the campus construction boom experienced throughout North America during the 1960s and '70s. With infrastructure approaching a half-century of use, many facilities are in poor condition and most lack the kinds of amenities required by today's students and teaching methods.

Post-secondary institutions must be redesigned into vibrant, diverse learning zones with space that is accessible, flexible and accommodates diversity.

Research indicates that a supportive physical learning environment can enrich students' college experience, satisfaction, and academic performance; contribute to their sense of belonging; and, respond to their social and emotional needs. Quality space will attract and retain students, faculty and researchers.

Students want to learn in a variety of styles and settings, and at their own pace. These include mobile training facilities, flexible, technology-enhanced classrooms, learning labs, student lounges, learning commons and alcoves. Innovation labs, maker spaces for sharing and collaborating, collision spaces where learners gather to brainstorm, entrepreneurship hubs, and centres for digital media are some of the new space types that draw together students from multiple program disciplines, researchers and industry partners.

Equally important are the support spaces, cafes and collaborative places outside the lab where students and faculty can meet to share ideas.

Libraries have become more vibrant places, bringing together individuals, interdisciplinary groups, creative technologies and collections. New amenities not only support formal academic and social learning but also multiple methods of learning. Gaming modules, pop-up event spaces, and branded food service are starting to be incorporated into libraries to support spontaneous learning and extended hours.

Meeting the needs of Indigenous learners may require flexible new approaches to learning spaces. Within the spirit of the Minister's mandate letter, colleges will partner with the Ministry and with Indigenous communities to expand learning options within Indigenous settings. Partnering with First Nations communities can often result in setting up community-based learning environments. This approach enables local students who have family, cultural or community responsibilities to study in locations that don't require them to leave their community.

Housing can assist in the recruitment of Indigenous, non-local, and international students, while supporting greater access for regional students. Student housing will also help strengthen the campus community by establishing a 24-7 presence that will increase the demand for student-focused wrap-around services and facilities BC needs to continue its development as a digital-based economy, while still taking full advantage of the natural resources it has to offer the world. These include student centres, libraries, and fitness centres across all hours of operation. Numerous studies show consistently higher graduation rates for students living on campus.

Strategies for improving campus learning spaces

It is clear that today's campuses require significant improvement to accommodate the new teaching methods, programs and partnerships required for sustained growth and prosperity.

The significant pressure already experienced by BC's college campus infrastructure and capital budgets will only increase.

Facilities such as health simulation labs with integrated platforms for inter-professional education and manufacturing workshops with up-to-date machinery and interfaces are expensive to build and maintain, but essential in fully engaging students in their fields of study.

Recent institutional and governmental investments in capital renewal, modernization and expansion have supported transformation of the learning and research environments in many BC public post-secondary institutions. In 2016, the federal government announced the Post-Secondary Institutions Strategic Investment Fund (SIF) to enhance and modernize research, commercialization and industry-relevant training facilities at colleges and polytechnic institutions in Canada, as well as to improve their environmental sustainability. British Columbia has received \$256 million through the SIF program which has benefited 30 individual projects throughout the province.

However, there continue to be pressures to modernize existing spaces and transform them into flexible, technologically-equipped learning environments, address deferred maintenance and building repair issues and ensure safe learning and research space. In the coming years, additional funding sources and changes to government's budget priorities, policies and practices will be essential to meet these increasing needs and demands.

Options for government and colleges to collaborate to increase the amount of funding available for investment in infrastructure - without significant increase to the capital budget include:

- Providing access to debt financing and the provincial government loan program to enable colleges to modernize their facilities;
- Ensuring that colleges are prepared with a Campus Master Plan and shovel-ready capital project proposals to leverage future federal government funding initiatives;
- Prioritizing the ministry's 10-Year Capital Plan to maximize the funding allocation for Whole Asset Replacement and Renewal projects that address functional obsolescence; and,



SELKIRK COLLEGE

Rapid innovation and technology adoption across the forest sector in rural BC is being fostered through a new research program spearheaded by Selkirk College's Applied Research & Innovation Centre. Funding from the Natural Science & Engineering Council of Canada is enabling applied research at Selkirk College. This work is designed to advance the West Kootenay and Boundary regions' economy and establish partnerships with forestry companies, other educational institutions, government agencies and venture capital in a cluster-based model. The goal is to build a regional forest tech ecosystem more vibrant than the sum of its parts.

for new IM/IT infrastructure and equipment that supports modern learning and teaching requirements;

- Instituting an Innovation Fund for capital projects that support future learners and spaces e.g. learning labs, simulation and maker spaces, Artificial Intelligence and Virtual Reality teaching technologies;
- Enabling colleges to access their budget reserves to renew and upgrade infrastructure; and,
- Enabling colleges to establish a revolving fund with their annual Routine Capital (or other) funding allocation, without fiscal year limitation.
- First Nations often have access to capital resources not available to other entities and a successful partnership plan might be able to leverage these resources.

For BC's colleges, other strategies to achieving their goals and address needs include:

- More collaboration across the sector;
- Partnering with institutional, government, corporate and not-for-profit organizations;
- Joint procurement; and,
- Sharing spaces and resources.

Many local industries are willing to subsidize or cover the cost of high-tech experiential environments that correspond to the specifics of their industry. This enables students to graduate with the skills and knowledge they need to transition directly into employment with significantly less on-the-job training.

In addition to industry partnerships, synergies with community organizations can also yield significant program and financial benefits for both schools and communities. These partnerships should be complemented by space and design that encourages increased physical interaction and/or co-location between the two parties, both on campus and in the community.

Providing increased flexibility and streamlined approvals for colleges to access the value of their real estate assets (e.g. dispose of land through sale or lease) to leverage land value, at no cost to taxpayers, would support partnerships and co-locations.

Colleges could financially gain through lease revenue from incubator space; and, private sector purchase, including intellectual property rights, for innovations and technology being developed in colleges.

A review and update of government's post-secondary capital budget priorities, policies and practices to reflect the needs of the campus of the future would allow the province and colleges to ensure that the right capital funding decisions are being made to accommodate learners, teaching methods, programs and partnerships.

MOVING FORWARD

- IDEAS FOR ACTION

Based upon the review of studies, stakeholder interviews, and an analysis of solutions that offer measurable benefits, several key action ideas have been generated. All can be successfully implemented by 2021, and are organized under three related areas – Ideas That Benefit Students; Ideas That Benefit Employers; and, Supportive Policy and Practice Ideas. Each action idea will require the support of colleges, government, and key system stakeholders in order to be implemented effectively.

Ideas That Benefit Students

1. Enhance learner pathway services;
2. Enhance work transition and placement services;
3. Develop and pilot new “Future of Work” programs; and,
4. Provide applied research opportunities that enhance both learning and student transition to the workplace.

Ideas That Benefit Employers

1. Secure BC Funding to leverage Federal (NSERC/SSHRC) funding dedicated for college-specific applied research;
2. Define and undertake Digital Supercluster projects where colleges act as partners; and,
3. Support improved employer and college partnerships.

Supportive Policy and Practice Ideas

1. Develop new policy regarding the role of colleges in innovation and applied research;
2. Review and update government’s post-secondary capital budget priorities, policies and practices to reflect the needs of the campus of the future;
3. Clarify Dual Credit policy to support increased K-12 and college collaboration; and,
4. Convene post-secondary system leaders and experts to collaborate on solutions to future strategic system challenges and opportunities.

All ideas align with government needs and offer a system response to the “Future of Work” and the emerging economy. Inherent in ideas that benefit students will be a focus on pathways and opportunities for Indigenous learners and on supports that target all underrepresented learners across British Columbia.

CONCLUSION

Advanced technology. Artificial intelligence. Innovative manufacturing. Big data. They are just a few of the forces of economic disruption. They also represent opportunity.

Understanding the changing landscape, and responding proactively, can help colleges provide British Columbians with the skills for career success and ensure our economy remains strong.

Those who remain complacent amid such forces will be left behind. The solutions aren't easy, clearcut or universal. They are not the responsibility of any one group, sector or government. BC colleges, working collaboratively with government, the private sector and key stakeholders, can provide valuable leadership as the next generation of learners is stewarded to the emerging workplace.

According to the Canadian Chamber of Commerce, 42 per cent of current jobs in this country are at high risk of disappearing. That means BC colleges can also play an increasingly important role in retraining and upskilling our current labour market.

From fully digital programs and online courses to mobile training centres and enhanced work-integrated learning opportunities, BC colleges are working on solutions to address the challenges. New investments in applied research will strengthen British Columbia's capacity for innovation and thereby increase Canada's competitiveness.

These ideas, aimed at delivering education and skills training where people live and when they need it, will help reduce the barriers to higher education often felt by Indigenous peoples, new Canadians, women and minorities. It is an inclusive strategy that will bring more people into the future labour market at a time when British Columbia desperately needs highly-skilled talent.

BC colleges are leading through change. Investments made today in British Columbians will unlock our potential and ensure a stronger, more secure, tomorrow.

BC's colleges plan to respond collaboratively and constructively to the emergent needs of learners, employers, and communities.

ABOUT BC COLLEGES

Our colleges make a big impact in BC.

The role of public colleges is to provide British Columbians with the essential and advanced skills needed in an ever-changing workplace. And we're clearly doing our job: over 90 per cent of our college students graduate and transition into the workforce within six months.

The BC college system has been in place for over five decades and serves over 125,000 students annually. With campuses and learning centres in over 60 communities throughout BC, our network of colleges provides close-to-home education that is directly linked to the labour market.

BC's colleges serve people and communities from all walks of life with a diverse range of programs - from adult education, through to career, technical, trade, university transfer and applied baccalaureate programs. Our programs provide relevant opportunities and pathways to employment or further education.

As the primary supplier of a well-educated, highly skilled workforce our system of community colleges is crucial to building sustainable communities and maximizing individual potential throughout BC.



COLLEGE OF THE ROCKIES

Canadian Mountain Holidays (CMH), the largest helicopter skiing operation in the world, and College of the Rockies' Mountain Adventure Skills Training (MAST) program, partnered on a student-driven applied research project to help minimize risk for backcountry skiers. The aim is to develop tree well extraction protocols and document best practices. The results of this research will make it possible to publish best-practices guidelines for tree well incidents and make the backcountry a safer place for all to enjoy.

ACKNOWLEDGEMENTS

This report was prepared by BC Colleges' staff and the following team members:

Jim Beatty is a communications consultant specializing in strategy, crisis management and media training. For more than 25 years, he was a journalist working at some of the largest media outlets in British Columbia including the Vancouver Sun, CTV News and CHEK News.

Patrick Kelly is a member of the Leq:amel First Nation (Sto:lo Nation.) He was Board Chair CEO of Coastal First Nations and was Advisor and Director of the Missing Women Commission of Inquiry. In September 2012 he completed a 5-year term as Advisor to the Lieutenant Governor of BC. Currently Patrick co-chairs the Banff Centre Indigenous Program Council and is a member of the UVic Gustavson School of Business International Advisory Board and the UBC Sauder School of Business Ch'nook Indigenous Business Advisory Board. He is Past President of BC Golf and past Board Chair of the Victoria Foundation. The Leq:amel First Nation elected him Treaty Representative for treaty negotiations, and in December 2016 Patrick completed a six year term as Governor, Law Foundation of BC. He was appointed to the BC Provincial Judicial Council in November 2016.

Catherine Nickerson is a consultant to government and project owners in the broader Public Sector specializing in the planning and development of major and complex capital construction and renewal projects. Catherine's broad range of technical, financial, regulatory and project management expertise draws on over 25 years of work experience with the Province of BC, coupled with a Master of Architecture, Bachelor of Interior Design and LEED AP designation.

Ron Rice is from Cowichan Tribes of the Coast Salish Nation and his hereditary name is Wush'q. He has worked with BC Aboriginal Friendship Centres since 1998 and accepted the post as the Executive Director of the Victoria Native Friendship Centre in January 2018. He has events management experience, most notably with the Cowichan 2008 North American Indigenous Games where he was the Manager of Cultural Events & Ceremonies. In 2013 he received an Order in Council appointment to the Board of Governors for Camosun College in Victoria BC; he currently sits as Board Chair.

Jim Soles worked with the Government of British Columbia for 25 years serving in Assistant Deputy Minister positions in the Ministry of Advanced Education, the Ministry of Labour and the Ministry of Economic Development. Jim has a Bachelor of Arts and a Master of Public Administration from the University of Victoria and an honorary Doctor of Laws from the University of Northern British Columbia.

The Key Findings from Relevant Studies and Reports was researched and prepared by:

Logan Simonson is an undergraduate student of English and Writing. In his spare time, he enjoys poetry, mountain biking, and Rush. Logan is commencing his graduate studies in English at the University of Victoria.

About the Artist

Amanda Dionne Hugon was born in Chilliwack, BC in 1982. She is a Northwest Coast Artist with ancestry of Métis and Stō;lo, Coast Salish People. She is a graduate of the First Nations Fine Arts program at the Freda Diesing School of Northwest Coast Art.

Hugon is studying the Coast Salish Style to connect with her roots and learn about her ancestors, she has worked very hard to earn spots for her permanent installations that she has made for Northern BC communities. Amanda has been living in Terrace since 1993, where she currently lives with her family in a small bungalow that sits parallel to the Skeena River. Amanda feels that art is truly meant to heal the soul.



The Spindle Whorl

A Spindle Whorl is spun to create wool for weaving. When it's spinning it is said to put the weaver into a trance, which inspires the artist to create a blanket design.

This image is my version of the Spindle Whorl spinning and releasing the inspirational designs. It represents the symbol of life, motivation and the ability to follow your dreams.



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