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Project Insights Report

A New Model for Workplace-Integrated Learning

PARTNERS
Canadian Alliance for Skills and Training in Life Sciences (CASTL)

LOCATIONS
New Brunswick
Nova Scotia
Prince Edward Island

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Executive Summary

The bioscience sector, encompassing biopharmaceutical manufacturing and vaccine development, is one of Canada's fastest-growing industries. The COVID-19 pandemic highlighted the urgent need for Canada to become self-sufficient in this field. Despite substantial investments, a significant workforce shortage looms, with educational institutions often failing to meet industry requirements.

This project by the Canadian Alliance for Skills and Training in Life Sciences (CASTL) sought to bridge this gap by aligning academic and industry training programs. From March 2020 to September 2022, FSC supported CASTL to develop newskilling, reskilling, and upskilling initiatives in Prince Edward Island. These initiatives included integrating bioscience education in K-12 and post-secondary institutions, retraining unemployed individuals, and offering advanced training for current employees.

CASTL's efforts yielded positive outcomes with high satisfaction rates among participants, successful employment placements, and the establishment of new training centers. Key lessons highlighted the importance of tailored academic partnerships and curriculum that integrated theoretical and practical training to meet the needs of industry.

More recently, CASTL has expanded into Quebec and British Columbia, and with additional support from the Future Skills Centre, conducted market research, consultation and discussion with industry, and developed a case study, using long-time partner BIOVECTRA to showcase the effectiveness of training for upskilling the private sector workforce.

KEY INSIGHTS

1. By aligning closely with industry needs, CASTL cut employer onboarding time, demonstrating the effectiveness of the programs in preparing participants for immediate employment.

2. The upskilling initiative, delivered through the CASTL Online Academy, had 907 enrollments across courses, and participants completed over 700 modules.

3. Good manufacturing practices (80%) and laboratory techniques (70%) are critical for workforce readiness and regulatory compliance.

The Issue

The bioscience sector is one of Canada's fastest-growing industries, which includes biopharmaceutical manufacturing and vaccine development. The COVID-19 pandemic emphasized the critical need for Canada to grow the bioscience sector in order to be self-sufficient in biopharmaceutical manufacturing. In response, there has been a significant focus on strengthening and investing in the sector, as evident from government investments and growing venture capital.

To keep up with the demand of the sector, there is a need for a workforce that is knowledgeable and possesses practical, industry-specific skills. A national report from BioTalent Canada indicated that with the expected growth of the sector by 2029, there will not be enough skilled workers to meet the labour needs.

Traditionally, there has been a mismatch between the training provided by educational institutions and the actual requirements of the biosciences industry, leading to a shortage of graduates ready to fill technical and professional roles. The top technical skills that employers in the bioscience sector are looking for in employees are good manufacturing practices (GMP) and laboratory skills and techniques.

The pre-existing training efforts were not sufficiently preparing students for the workforce, contributing to a talent shortage exactly when both national and global demand for these professionals was increasing. In general, there is a lack of biomanufacturing-specific training programs that can address the skill demands of the sector.

What We Investigated

This project from the Canadian Alliance for Skills and Training in Life Sciences (CASTL) focused on expanding the quality and responsiveness of CASTL academic and direct industry training programs to support bioscience sector needs. The project ran for 2-years from March 2020 to September 2022 and was focused on Atlantic Canada, and led to successful scaling across the country over the course of the project. CASTL was formed to build a strong talent pipeline by enhancing collaboration between academia and industry, including incorporating work-integrated learning experiences to equip learners with the skills necessary to succeed in the bio-economy.

The project aimed to enhance bioscience programming by implementing educational and training initiatives across three key streams: newskilling, reskilling, and upskilling. Each stream targeted different demographic groups and sought to equip them with theoretical knowledge and practical skills necessary for the bioscience industry.

- **Newskilling.** CASTL focuses on integrating bioscience education into K-12 and post-secondary institutions. In this project, this included working with post-secondary institutions such as the University of Prince Edward Island and Acadia University to develop curriculum and facilitate work-integrated learning placements. K-12 programming took place in elementary and secondary schools, as well as summer camps, to deliver math literacy and bioscience workshops. CASTL also developed a financial award program designed to incentivize participation for minorities in the Science, Technology, Engineering and Mathematics field.

- **Reskilling.** CASTL developed a 12-week program aimed at retraining unemployed or underemployed individuals, including 8 weeks of online learning and 4 weeks of work-integrated learning delivered in collaboration with Holland College and Skills PEI.

- **Upskilling.** The pilot program, CASTL Online Academy, offered online training to current bioscience employees with identified skills needs and gaps. This program was developed and delivered in collaboration with a private sector partner – BIOVECTRA – and the National Institute for Bioprocessing Research and Training (NIBRT). In addition to the CASTL Online Academy, CASTL designed, built and launched a physical Biomanufacturing Training Centre in Prince Edward Island, which opened in October 2022.

Building on the feedback received through the implementation of these programs, in 2024, CASTL (in partnership with BioTalent Canada), conducted an employer survey and employer interviews to address workforce challenges in Canada's biomanufacturing field. The surveys and interviews focused on the foundational skills, competencies, and training needs identified through research with 50 biomanufacturing employers.

✔ What We're Learning

The first phase of this project was tremendously successful in partnering with academic institutions to provide key training for the bioscience sector across the three training streams.

- **Reskilling.** Three cohorts participated in the reskilling program. Participants reported high satisfaction and that the program helped them secure employment in the sector. Additionally, industry employers were impressed with the program, with many reporting a reduction in onboarding/training time for participants of the program, making it easier to obtain skilled talent in a highly specialized sector.

- **Newskilling.** The project extended its reach to younger audiences through K-12 programming, engaging over 500 students in in-school workshops and 117 children-in-bioscience summer camps. Both teachers and parents expressed strong support, with all teachers keen on future workshops. CASTL also facilitated curriculum development and work-integrated learning (WIL) placements with academic partners to support a specialized pathway for students and a regional WIL network. They partnered with the University of Prince Edward Island, Acadia University and the University of British Columbia to develop biotechnology programs and courses.

- **Upskilling.** CASTL was successful in implementing the upskilling pilot through both the Online Academy and physical training centres. The CASTL online pilot had a total of 907 enrollments across all courses, with 700 modules completed. Both employees and supervisors were highly satisfied with the training, with supervisors indicating the training was a worthwhile investment and helped improve job performance among participants. In addition to the physical training centre in PEI, two additional centres were subsequently opened in Montreal and Vancouver, in partnership with multiple levels of government and private sector partners.

- **Partnership development and implementation.** Building relationships with academic institutions was key to the success of the programs. However, there were some logistical challenges in working with academic institutions. Academic institutions had longer timelines to their programming that were often not compatible with rapidly changing sector needs. Some academic institutions were able to quickly integrate content into their programming in a matter of months, while others took over a year. This was especially challenging for smaller institutions. Originally,

CASTL was focused on developing a singular approach to academic partnership, but pivoted to develop customized one-to-one approaches that best served different partners and their biotech program offerings. This was an important factor to ensure each partnership was supported with sufficient resources and bought into the program.

In phase 2 of the project in 2024, Canadian biomanufacturing employers surveyed and interviewed emphasized the need for more technical expertise and regulatory skills. The key skills employers were seeking included:

1. Good Manufacturing Practices (GMP) – Essential for 80% of employers.

2. Laboratory Skills and Techniques – Critical for 70%.

3. Manufacturing and Production Techniques – Highlighted by 64%.

4. Documentation and Reporting – Necessary for 60%.

5. Hands-on Technical Experience in Regulated Sectors – Valued by 58%.

6. Quality Control and Assurance – Prioritized by 58%.

Results from the survey and interview also showed that 78% of employers required introductory training for new hires in the next 12 months, while 62% of employers highlighted the need for similar training for current employees. Employers consistently cited gaps in practical, hands-on skills as a challenge.

Why It Matters

Biomanufacturing is a growing industry, impacted by broader changes to immigration and trade policy, as well as the rapid progress of artificial intelligence and automation.

The multiple phases of this project emphasized the integration of practical training with theoretical knowledge, addressing a notable gap in current educational practices that often prioritize one over the other. This comprehensive approach not only better prepares students for the workforce but also makes them more appealing to employers seeking well-rounded, job-ready candidates. Practitioners in other highly technical industries should focus on programming, where practical skills are as vital as theoretical understanding.

State of Skills: Effective Employer Engagement in Skills Development: From Rhetoric to Solutions

The findings from this project showcase the importance of collaboration across the skills development ecosystem and staying closely connected to industry needs. The collaboration between academia partners and industry highlights the necessity of tailoring educational programs to meet the evolving demands of the sector, and regularly checking in to make sure those needs are well understood by training providers. By working with both academia and industry, a relevant curriculum is developed that equips graduates with the skills sought by employers. This approach successfully prepares graduates for employment and helps address the skills gap.

Supporting employers in overcoming structural barriers to training investment is key to addressing labour and skill shortages.

Read Thematic Report

Practitioners aiming to address similar challenges in other growing sectors can take lessons from the model CASTL has implemented to ensure academic institutions are aligned with industry needs and creating relevant training programs. Central to this collaboration are intermediaries, like CASTL, who can facilitate the coordination of objectives and activities.

What's Next

CASTL has training facilities in PEI, BC and Quebec, aiming to meet the increasing demand for bioscience training and bolster the national bio-economy. To support this growth, CASTL is successfully attracting further investments and forging new partnerships with government agencies, private sector companies, and educational institutions.

Investing in research and development is essential for keeping the curriculum relevant and up-to-date with industry changes. Collaborations with technology companies and regular feedback from industry leaders will enable the adaptation of training programs to meet emerging needs effectively.

Following the success of the pilot, the survey and interviews with industry, CASTL is working with the Future Skills Centre to evaluate the impact of CASTL's work-integrated learning approach for co-op students, as well as the employers who host students. Results from this work are expected in early 2026.

Have questions about our work? Do you need access to a report in English or French? Please contact communications@fsc-ccf.ca.

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