Future Skills for Highly Qualified Personnel: Mapping the Challenges

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Executive summary

Skills and work-integrated learning have become a significant public policy priority in recent years. Yet the skills needs of highly qualified personnel (HQP) are often overlooked. HQP, no less than other workers, are confronted with a rapidly changing labour market and evolving employer demand for skills. If Canada is to remain competitive, productive, and prosperous in the face of disruptive long-term trends such as globalization, technological change, sustainability, and population aging, it will rely on the innovative potential of its HQP.

Mapping the challenges
Based on a review of recent literature and a half-day consultation with stakeholders invested in Canadian skills policy, we have identified the following four major challenges to successfully developing sought-after skills for Canada’s HQP:

- System misalignment
- Information gaps
- Tension between academic culture and labour market needs
- School-to-work transitions.

Addressing the challenges
Creating better linkages among stakeholders can address the fragmentation of Canada’s skills ecosystem and inform ongoing adaptation to address future skills needs. More and better data would help inform the development of common frameworks and shared understanding of the challenges, as well as more concrete understanding of employer needs on the demand side of the future skills equation. Assessment of skills acquisition by students and graduates would inform effective supply-side program changes by PSE institutions. More robust data on employer needs, and greater awareness among employers of the value HQP bring to their enterprise, will help inform demand-side solutions to complement the work being done in other sectors.
1. Introduction

Skills and work-integrated learning have become a significant public policy priority in recent years. Yet the skills needs of highly qualified personnel (HQP) are often overlooked. HQP, no less than other workers, are confronted with a rapidly changing labour market and evolving employer demand for skills. By effectively addressing the future skills needs of HQP and the employers who hire them, Canada can help ensure that the specialized knowledge and skills of HQP are effectively employed to support innovation, prosperity, competitiveness, and well-being in Canada.

Since its creation in 1999, Mitacs has supported industrial research partnerships, work-integrated learning, and international research exchanges. Mitacs does this by leveraging its global network of industry, academic, and government partnerships to enable scholars from all disciplines to apply their knowledge to contemporary challenges, building the skills they need to translate knowledge into opportunity and grow the productivity capacity of firms across all sectors of the Canadian economy.

This report provides a summary of ideas on the future skills challenges faced by HQP derived from a review of recent literature on skills policy, internal consultations with Mitacs staff, and a half-day consultation involving numerous skills policy stakeholders, including representatives from government, academia, industry, and learners.

2. Why skills for HQP?

If Canada is to remain competitive, productive, and prosperous in the face of disruptive long-term trends such as globalization, technological change, sustainability, and population aging, it will rely on the innovative potential of its HQP. Yet employer surveys consistently point to skills gaps among post-secondary graduates, particularly in terms of professional skills such as self-direction, communication, adaptability, critical thinking, and collaboration. These gaps are cause for concern given Canada’s urgent need for sought-after high-value talent to support its vital innovation agenda.

These future workers will be responsible for developing new knowledge, designing new products and processes, supporting the adoption of new technologies and methods, and helping Canadian communities adapt to emerging challenges. By equipping HQP with the skills they will need to effectively deploy their knowledge in the future workforce, we can help to maximize their contributions and make the most of the significant investments Canadians make in their education and training.

1 Definitions of HQP vary across industries and sectors. In general, HQP are workers who possess significant education and training, are subject to high performance expectations, and are performing roles that employers often find difficult to fill due to high skill or knowledge requirements.

2 This conversation was held under a not-for-attribution agreement and so the participants are not named in this paper. Key ideas that emerged from this discussion are attributed to “stakeholders” throughout.
3. What are future skills for HQP?

Despite the vast recent literature that exists around “future skills,” a precise definition remains elusive. A short examination of the term helps to illustrate why this remains the case. First, as the word “future” implies, we are dealing with a moving target because (a) our concept of the future is always in flux due to both changing conditions and our changing perceptions of those conditions; and (b) labour market demands are notoriously difficult to predict with certainty even a year in advance, much less the, say, five years it might take a student to complete an advanced degree and find a job. Secondly, the labour market is an exceedingly complex system with a wide range of needs specific to regions, industries, professions, and periods in time, making broad generalizations challenging. Asking, “what are future skills?” therefore raises questions such as: Future skills for whom? For when? For where?

In our discussions with stakeholders, some remarked that while the term “future skills” possesses intrinsic uncertainty, it nevertheless needs to be defined with some practical specificity if it is to help us identify policy challenges and inform responses. A failure to define our terms can risk contributing to misalignments across the many players responsible for skills development, introducing inefficiencies and unintended consequences down the road. Moreover, widespread use of catch-all terms such as “soft skills” and “hard skills” often serves only to increase ambiguity about future skills while also setting off circuitous and largely unproductive debate over terminology.3

This definitional uncertainty raises important questions. To what extent can we precisely define future skills in order to ensure that various players are addressing the same concept? And to what extent do we have to accept uncertainty as part of the landscape, given all the unknowns about future labour market needs? Fortunately, based on our review, there are broad areas of consensus that serve as useful starting points.

For example, there appears to be a growing appreciation among employers, educators, and graduates of a consistent demand for general professional skills across economic sectors — that is, broad social and cognitive skills applicable to a variety of contexts, including social and emotional intelligence, collaboration, sense-making, foresight, creativity, and adaptability. These are skills around which stakeholders can coordinate their skill development efforts, and they provide as precise a definition of future skills as we are likely to achieve outside of detailed, industry-specific frameworks.4 Technical skills, on the other hand, are implicitly task oriented and therefore defy simple classification. Understanding future technical skills requires industry-specific analyses, which is beyond the scope of most future skills research papers, this one included.

The conclusion we draw from these ideas is that the lack of a perfect definition of future skills should not prevent efforts to maximize the value of HQP in the modern workforce. In the absence of a fully articulated theory of future skills, a flexible working understanding can help guide discussion. Therefore, in the context of HQP, we see future skills primarily as professional skills such as self-management, communication, and collaboration that enable the deployment of expertise across a variety of sectors, industries, and labour market contexts regardless of the time-, region-, and industry-based variations in demand for specific technical skills.

3 This paper tries to avoid using terms such as “soft skills” and “hard skills.” Instead we use the term “professional skills” to describe the broad set of cognitive and social skills required for effective performance in most work settings (such as collaboration, critical thinking, communication, etc.), and “technical skills” to describe the skills required to accomplish specific tasks (such as operating a piece of equipment or being fluent in a coding system or language).

4. Mapping the challenges

Interest in skills policy in Canada has been growing in recent years and there is now strong appetite among stakeholders to engage in cross-sector discussion of the challenges facing Canada’s skills ecosystem and how those challenges might be addressed in a coordinated way. Recent reports, surveys, and government-supported interventions have helped to identify some of the big challenges to effective skill development for HQP. Based on a review of recent literature and a half-day consultation with stakeholders invested in Canadian skills policy, we have identified the following four major challenges to successfully developing sought-after skills for Canada’s HQP.

4.1. System misalignment

Skills policy stakeholders themselves describe the skills policy and programming landscape in Canada as fragmented and siloed, slowing efforts to understand future skills challenges and develop solutions. The main players in Canada’s skills ecosystem bring different interests, mandates, and perspectives to the question of future skills for HQP, which contributes to misalignments between the efforts of employers, students, educators, and policy-makers.

For example, surveys have shown there are significant differences between the skills that employers say they are looking for, the skills that students think they will need after graduation, and the skills that students actually develop during their post-secondary education. Employers consistently point to the need for broad professional skills such as willingness to learn, initiative, self-direction, communication, and collaboration, and yet these are the very skills where employers report gaps in the graduates they hire. In fact, employers tend to rate graduates lowest on professional skills, adaptability, and basic business acumen. However, despite this dissatisfaction, we’ve seen a long-term decline in private sector investments in skill development, due to such factors as competitive pressure to reduce costs, the risk of talent poaching, and a low tolerance for long-term investment among small and medium-sized companies, which make up the majority of Canadian employers. Employers therefore rely increasingly on public agencies, such as post-secondary institutions, to deliver the skill development they’re looking for.

However, solutions to the skills gap problem are not obvious for the higher education sector either. Despite employers’ recent emphasis on the shortage of professional skills, stakeholders point out that employers continue to recruit largely on other measures, such as demonstrable technical skills and years of experience. Stakeholders have expressed concern with these apparent mixed messages, since they leave post-secondary institutions struggling to find the right balance between technical and professional skills while still meeting academic requirements and time-to-completion constraints.

Addressing this kind of market failure often falls to government, but governments currently struggle to address these misalignments. Post-secondary education and training is a provincial jurisdiction, and federal government interventions have resulted in a system of supports that is largely focused on students and workers rather than on employers and institutions, a notable example being recent federal supports for work-integrated learning, such as the Student Work Placement Program. While this program and others like it no doubt provide great

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8 Ibid.
value to the students and employers who participate, they are not designed to tackle systemic issues in the skills ecosystem, such as improving skill development within individual post-secondary programs, building skill development (and skill utilization) capacity among employers, or providing standard metrics to help us understand the skills we have and the skills we need.

To summarize, each of the three major players in the skills ecosystem for HQP (employers, post-secondary institutions, and governments) is in a position to point out failings in the other two that inhibit their efforts to provide effective skill development. The result is a consistent call by stakeholders representing all groups for greater system alignment, which is by no means easily accomplished considering the rest of the challenges discussed in this section.

4.2. Information gaps

Key among the challenges preventing greater alignment between stakeholders is a lack of consistent and broadly accepted data on the status of skill development. Unlike other jurisdictions, Canada lacks a national outcomes survey of graduates as well as a unified framework of agreed job categories to help map competencies and facilitate understanding and coordination. While federal and provincial governments in Canada have cooperated to make significant progress on labour market information in recent years, persistent shortcomings in available data remain a major challenge. Periodically, third party actors have attempted to measure national outcomes, but obtaining buy-in from essential groups has been a persistent challenge.

Significantly, stakeholders have expressed concerns that much of what we hear from employers on skills gaps is anecdotal. While employer surveys often highlight skills deficits such as willingness to learn, initiative, self-direction, communication, and collaboration, we still lack concrete information on employer needs that goes beyond asking hiring managers and business leaders “what do you think?” and that sheds light on what skills people use day-to-day in different jobs. Stakeholders observed that it is difficult to assess whether interventions to address employer needs are successful if employers themselves do not fully understand their skills needs.

Recently, many organizations have produced taxonomies of skills in an attempt to build shared understanding of skills categories. While many of these frameworks show significant alignment — particularly in the way they describe the broad social and cognitive skills we term “professional skills” — no clear consensus has emerged. This, in turn, prevents standardized data collecting, as various stakeholders track different aspects of the skill development question.

4.3. Tension between academic culture and labour market needs

The post-secondary system plays a crucial role in supporting the skill development of HQP. However, in discussion with stakeholders, academic culture was frequently critiqued for inhibiting the development of work-relevant skills. In particular, this is seen to be the case when academic career preparation is prioritized to the exclusion of non-academic careers. This is a notable challenge in the case of prospective HQP, who are more likely to be studying at higher academic levels, including at the PhD level, where the emphasis on academic training is strongest.

While universities are now paying greater attention to employer feedback on skills needs, they are nevertheless large and complex institutions that have difficulty changing course and managing rapid change. Integrating employer feedback on rapidly evolving skills needs into academic curricula in a manner that coheres with

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program requirements and constraints, and in a way that can be effectively operationalized over the long term, is an ongoing challenge.

There is a significant dialogue underway about the role of PhD programs in Canada, in particular, stemming from the fact that most PhD students begin their degrees with the intention of pursuing academic careers but only one in five actually becomes a full-time university professor.\textsuperscript{10} This pattern lends weight to the argument that more effort should be made to prepare top-level students for the non-academic careers most will ultimately find. This question is relevant to stakeholders outside of academia considering the substantial public resources that are devoted to educating HQP, including at the PhD level. However, the ability of policy-makers, especially at the federal level, to influence individual academic programs is limited.

Among the more vocal critics of academic culture are graduates themselves as many come to terms with the scarcity of permanent academic positions and abandon long-held academic career aspirations to pursue unanticipated non-academic career paths. This can be an especially painful realization for those who have invested in completing a PhD.\textsuperscript{11} Among the hardships reported by graduates having this experience is a crisis of personal self-worth, stemming from an aspect of academic culture that regards non-academic careers as a mark of personal and professional failure. When discussing the impact of this culture on young academics, stakeholders described how graduates can emerge from their studies feeling misled, disillusioned, and even cheated when academic careers do not materialize and they face difficult choices about their futures, such as between long-term precarious academic employment or working in unfamiliar non-academic sectors for which they feel underprepared.

These challenges relating to academic culture can be difficult to address because academic culture is supposed to adhere to different values and priorities than non-academic sectors. There are significant societal benefits to having institutions that operate according to a different set of rules and standards and are thus able to pursue projects and ask questions no one else will. There is therefore understandable resistance to the idea that post-secondary institutions should align themselves more closely to non-academic needs, lest they lose characteristics that enable them to perform their unique social function. The challenge facing institutions is balancing academic needs and the needs of the other sectors they serve and upon which they rely.

\textbf{4.4. School-to-work transitions}

The transition from school to work is arguably one of the biggest milestones in a young person’s lifetime. Many graduates find the transition to careers outside academia challenging due to underdeveloped professional skills and networks and difficulty articulating the value of their skills to non-academic employers. In addition, graduates often find it difficult to acquire guidance on non-academic career paths because their academic mentors simply don’t have that experience themselves. Even more concerning are anecdotal reports by stakeholders that trainees who express interest in non-academic career paths risk penalties such as being taken off projects and grants. Moreover, these challenges are compounded by limited employer awareness about the potential value of HQP such as PhD holders to their enterprise.\textsuperscript{12} The result of these challenges can be in skills mismatch, where workers are over-skilled for the jobs they hold, resulting in loss of earnings, low job satisfaction, poor productivity, and unrealized potential of Canada’s investments in the production of HQP.\textsuperscript{13}

\textsuperscript{10} One example of tracking these outcomes is the University of Toronto’s 10,000 PhDs Project (2018).
\textsuperscript{11} Polk, Jennifer (2017), “Advice for PhDs seeking non-faculty jobs.” University Affairs Magazine.
\textsuperscript{12} Ibid.
\textsuperscript{13} CD Howe Institute (2019). \textit{Bad Fits: The Causes, Extent and Costs of Job Skills Mismatch in Canada.}
While the transition between school and work has arguably never been easy, there are recent trends that suggest the transition is especially difficult for graduates today. For instance, all the labour market uncertainties discussed in this paper have a significant effect on students’ ability to make concrete career plans for launching their careers — something we expect them to do many years in advance when they select an area of study. And yet the consequences of their education choices are increasingly significant. Investments in workplace training have declined and school stays have lengthened since the 1930s, and employers increasingly expect graduates to be job-ready upon hiring.

Students are also deeply affected by the misalignments discussed in the previous sections. Consider the situation of a student who has completed a post-secondary program that is designed to provide the broad social and cognitive skills employers say they need, only to face job postings whose major criteria are previous years of experience. It falls on the graduates to navigate these inconsistencies, which is something that has often not been a part of their training. And a failure to do so not only adversely impacts their own well-being but — especially in the case of HQP — also blunts the impact of the significant public investment that has gone into their skill development.

5. Addressing the challenges

In our conversations, skills policy stakeholders broadly agreed that there is a need for key players in the skills ecosystem to work more closely together to more effectively support the skill development of HQP. The following are some of the key contributions that major players can make to help address the challenges described above.

5.1. Employers

Employers represent the demand side of the HQP skills equation and are on the front lines of the rapidly changing market forces that drive change in skills demand. These forces include pressures arising from consumer demand, just-in-time supply chains, technological change, increasing the inclusion of underrepresented groups, and intense competition.

A better understanding of the skills needs facing employers is a crucial ingredient for more effective skills policies and programs, and employers have an important role in producing this critical information. Furthermore, many employers are seeking better ways to align their job criteria and hiring requirements with their true skills needs, as opposed to relying on proxies such as past experience. These efforts can be advanced by sharing data, best practices, and results with other stakeholders.

There is also significant potential for employers to make more use of approaches that are shown to support skill development and skill utilization of HQP. Mitacs recently partnered with Adoc Talent Management on surveys of PhDs and employers and found evidence of significant skill development benefits for PhDs participating in industry internships, with a strong majority of interns and host employers affirming the value of the internships in developing more competitive market skills, including technical skills and broader skills relevant to the workplace. And these benefits also appear to affect school-to-work transitions. Among PhDs surveyed, those who had professional experiences outside of university — including Mitacs internships and other work-integrated learning
experiences — were more likely to be holding a permanent position (51 percent compared to 40 percent) and less likely to be seeking a position (12 percent compared to 15 percent).14

Among the top-cited skills developed during these internships were: critical and creative thinking, analytical and experimental techniques/methods, ability to conduct research to address private sector problems, communications, and project management skills.

Significantly, Mitacs surveys have also found that work-integrated learning opportunities help launch non-academic careers for PhDs. Among employers participating in Mitacs internship programs, a significant proportion opted to hire their interns. This demonstrates the potential of work-integrated learning to highlight the value of HQP talent to non-academic employers and help lead highly credentialed HQP to successful and rewarding careers outside of academia.

5.2. Institutions

Post-secondary institutions play a unique role on the supply side of the future skills question, and many are currently making significant investments in strengthening their skills development programming in parallel to their traditional research- and education-related activities.

While some Canadian universities have made substantial progress in building professional development programs (for instance, the University of Alberta has made participation in professional development training mandatory), others are still at early stages, according to a recent survey of professional development programming in PSE sector offerings at Canadian universities.15 The study also found that there is not yet a consensus position on how to evaluate the effectiveness of these programs. Reliable data is still lacking, and there is also resistance in some quarters to the idea of direct assessment of skills acquisition in post-secondary education.

The lack of direct assessment of skills acquisition in universities is a significant gap in the skills ecosystem, particularly since employers use academic credentials as a proxy for skills assessment. A solution might include embedding direct assessment of skills acquisition into existing evaluation and grading processes, or developing shared evaluation frameworks that yield externally comparable data across programs and institutions. Approaches to skills evaluations are currently being developed in Canada — for instance, by organizations such as the Higher Education Quality Council of Ontario — and these efforts could be greatly enhanced through further prioritization, experimentation, and collaboration throughout the sector.

Metrics and evaluation criteria can be effective levers for culture change. Universities and research funding bodies have begun reappraising how research success is recognized in a number of areas. For instance, the graduate studies community has been engaged in a national dialogue on alternatives to the traditional PhD dissertation, in order to recognize and elevate other kinds of scholarly activity. Some academics have also urged greater recognition of service work that falls outside of traditional activities recognized by university departments, such as off-campus mentorship activities and research leadership roles. These efforts support the idea that new kinds of success metrics and performance measures have immense potential to encourage positive change.

14 Adoc Talent Management (2019), Understanding PhD Competencies Survey of PhDs, N=593.
15 Lypka, C.; Mota, M.H.R.; (2017). Graduate Professional Development: Towards a National Strategy. For the Canadian Association for Graduate Studies and the Consortium of Canadian Graduate Student Professional Development Administrators.
5.3. Governments

Governments have a significant interest in effective skill development for all citizens in order to achieve high levels of productivity that support prosperity and well-being. Furthermore, governments have a unique role in building (and potentially imposing) shared structures that are able to correct for market failures and to provide public goods where private incentives are lacking.

All of these characteristics apply to governments’ ability to contribute to skills policy. For instance, governments are well placed to take on tasks such as developing standard definitions, building national data resources, and setting program delivery standards. National and provincial governments have taken important steps to address these needs in recent years. For example, addressing and helping to resolve ambiguity around future skills was a key rationale for the Government of Canada’s creation of the Future Skills Centre, and improving pan-Canadian labour market data is the reason the Labour Market Information Council was created.

Finally, the government has a unique role to play in fostering better long-term strategic foresight to understand what the future holds for various sectors and fields, and what skills will be needed. The Government of Canada recently asked automotive sector employers to present a technology roadmap for their industry and identify the skills that would be required to support the roadmap. While ideally this initiative would be taken up by private sector actors working in concert, government is nevertheless well positioned to play a convenor role to encourage the long-term planning needed to support economic stability. Where gaps exist between the PSE sector and industry to address skills needs, governments can step in to facilitate collaboration and provide sustained services to support other stakeholders.

6. The way forward

Fortunately, the urgency of effective policy and programming to support future skills has resulted in concrete action by government, industries, and PSE institutions. The Advisory Council on Economic Growth created by the Government of Canada in 2016 warned that Canada’s skills development infrastructure was not equipped to meet the challenges ahead. Since that time, many of the Advisory Council recommendations have been implemented. The Future Skills Centre has been established, measures to better support lifelong learning have been introduced, and new investments have been made in experiential learning. Meanwhile, PSE institutions have ramped up professional skills programming to complement traditional academic offerings, and we are beginning to see more collaboration between academia and employers to support skills development initiatives through expanded work-integrated learning opportunities.

For its part, Mitacs is working to both expand and better understand the positive impacts that work-integrated learning opportunities have for Canada’s HQP and for the employers who hire them. We see that these experiences have significant potential to address the challenges associated with both developing and utilizing the skills of HQP in the economy, including building connections between academic and non-academic sectors, assisting highly trained graduates to make the transition into non-academic careers, and demonstrating to employers the ability of new HQP to contribute to innovation.

But much work remains. Creating better linkages among stakeholders can address the fragmentation of Canada’s skills ecosystem and inform ongoing adaptation to address future skills needs. More and better data would help inform the development of common frameworks and shared understanding of the challenges, as well
as more concrete understanding of employer needs on the demand side of the future skills equation. Assessment of skills acquisition by students and graduates would inform effective supply-side program changes by PSE institutions. More robust data on employer needs, and greater awareness among employers of the value HQP bring to their enterprise, will help inform demand-side solutions to complement the work being done in other sectors.

Stakeholders are interested in furthering these efforts and increasing cross-sector collaboration to enable the development, implementation, assessment, and ongoing calibration of responsive solutions that are effective in addressing the multifaceted and rapidly evolving challenges presented by future skills for HQP.