Bursting the Academic Bubble:
Embracing Diverse Post-Graduate Career Paths

A *Science & Policy Exchange* Panel Discussion

REPORT

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A video recording of the forum can be found on the **Science & Policy Exchange YouTube channel**, and can be accessed directly with the QR code to the right.

Contents

Acronyms

CCA	Council of Canadian Academies
CCUNESCO	Canadian Commision for United Nations Educational, Scientific and Cultural Organization
EDI	Equity, Diversity and Inclusion
IQ	Institut Quantique
PhD	Doctor of Philosophy
PI	Principal Investigator
PDF	Postdoctoral Fellows
SPE	Science & Policy Exchange

Executive Summary

In early 2021, reports by the Canadian Council of Academies and CCUNESCO were published detailing the challenges of PhD graduates in Canada as they transition towards the labour market. Building upon this report, Science & Policy Exchange held a virtual panel discussion on February 18, 2021, to elaborate on these challenges while also highlighting promising practices to address them. Key recommendations are found below.

Graduate Students

1. Seek out opportunities to **develop professional skills**.

2. Familiarize yourself with the **career advising and professional development resources**.

3. Actively build your **professional network**.

4. **Gain experience transferring your skills** to other professional contexts.

5. Learn about and identify **corporate cultures** that match your values, goals, and interests.

6. Promote **changes to the academic environment** to better prepare students for future career paths outside of academia.

Research Supervisors

1. Actively and regularly **engage with students** to learn about their career ambitions and interests.

2. **Encourage students** to expand their networks and develop their professional skills.

3. Focus on **teaching a diverse range of transferable skills**.

Graduate Program Faculty and Administrators

1 Include **non-academic advisors** in graduate student advisory committees.

2 Make **student professional development** a priority.

3 Assemble and leverage **alumni networks**.

4 **Track the career outcomes** of student alumni to inform the development of future professional and career development initiatives.

Government Funding Agencies

1 **Revise funding evaluation criteria** to include an emphasis on the larger **societal impact** of a Principal Investigator's research program, including their **students' outcomes**.

2 **Define and systematically track metrics** on the career outcomes of higher education graduates to better inform future initiatives.

The Event

Motivation

PhD holders play a critical role in society by bringing highly valued skills and knowledge to various sectors of the economy. However, until recently, their journey towards the job market has been poorly understood.

Historically, a PhD education was considered an apprenticeship in scholarship (Blume & Amsterdamska, 1987; Goodchild & Miller, 1997); PhD graduates mostly found employment in academia where they would seek employment as tenure-track professors. However, in light of increasing efforts over the past few decades to track the career trajectory of PhD graduates (Narayan, 2019; Reithmeier et al., 2019; Lee, 2020), this expectation has proven inaccurate in modern day. In January of 2021, the Council of Canadian Academies (CCA) published "Degrees of Success", an extensive report that details the challenges faced by PhD graduates in Canada when seeking employment. When entering the labour market, PhD graduates face many barriers that stem as much from the academic environment itself as the labour market's perceived value of a PhD. These findings also align with the recent article by Baker and Vasseur "Women and post-doctorates: life after graduation."

Building upon these findings, this panel discusses concrete actions that individual stakeholders closely related to research trainees can take to address and respond to these challenges. Research trainees themselves play a key role in overcoming these barriers: they can be aware and adapt to these barriers all while driving for changes to the current academic landscape. This panel aims to equip research trainees with the knowledge and ideas for them to act in response to these challenges and to provide actionable recommendations to other stakeholders.

The panel touches upon three broad themes which are summarized in this report: skills, mentorship, and academic environment.

Panelists' Biographies

Karl Thibault is part of the development team at the Institut quantique (IQ) at the Université de Sherbrooke as Program Manager - Science and Entrepreneurship. He is very familiar with the reality of IQ members, having received his PhD in physics from this organization in the past year. He has contributed to the emergence of an entrepreneurial culture within the IQ through the creation of the Horizon IQ series, which aims to empower the student community and present various diverse career models. He is currently working on the implementation of new training, mentoring and scientific popularization programs with the goal of empowering graduate students, as well as the democratization of quantum technologies.

Gail Bowkett is the Director, Innovation Policy at Mitacs. With over 20 years' experience in the fields of higher education and international development, Gail provides leadership on policy research and analysis in support of Mitacs priorities and programming. Gail's experience covers

a range of policy issues from international higher education to research and innovation policy. Gail holds a Master of International Business Administration degree from the Schulich School of Business at York University, and an Honours bachelor's degree in Russian language and literature from Carleton University.

Liette Vasseur is full professor in the Department of Biological Sciences and a member of the Environmental Sustainability Research Centre at Brock University. Since 2014, she has held the UNESCO Chair on Community Sustainability: From Local to Global at Brock. Her interdisciplinary research deals with issues such as ecosystem management, climate change adaptation and resilience, and sustainable agriculture in rural and Indigenous communities, in Canada, China, Ecuador, Burkina Faso and Senegal.

Tina Gruosso is a translational and biomarker scientist working for Forbius, a biotech company in Montreal that develops new therapeutics for oncology and rare diseases. She completed her PhD at Institut Curie in Paris and her Postdoctoral fellowship at McGill University in oncology and precision medicine. Tina is an engaged scientist and an advocate for science and scientific values in all sectors of society. As a board member and ex-president for Science & Policy Exchange, Tina is devoted to establishing the voices of the next generation as key stakeholders in science policy, diplomacy, and communication. Tina is also a member of the CCA expert panel on The Labour Market Transition of PhD Graduates and the redaction committee of the Acfas magazine.

Moderator Biography

Anh-Khoi Trinh is a Ph.D. researcher at McGill University in the physics department. After gaining experiences in physics educational development and science communication, Anh-Khoi started volunteering with SPE in 2019 before becoming a Vice-President Executive between 2019-2020. He was later elected co-president of SPE during 2020-2021 where he aims to raise awareness of science policy in academia all while representing the next generation of researchers on science policy issues.

Pathways towards fulfilling non-academic careers

PhD graduates face many barriers as they transition towards the labour market. The panel discussed three such major challenges while identifying underlying causes and potential solutions.

Skills

A significant barrier identified in the CCA report concerns PhD graduates' skills. Employers are hesitant to employ PhD graduates as they perceive these graduates as being both simultaneously overqualified and underqualified for non-academic careers; they possess highly technical and hyper-focused skills relevant for their research but lack experience and broad skills needed for the workforce (Ruben, 2019). This highlights a skills mismatch between those fostered in academia versus those valued by non-academic employers. However, this perceived skill's mismatch can often be symptomatic of a skill's awareness gap instead.

Indeed, panelists unanimously expressed that PhD graduates possess most of the necessary skills to work outside academia, and that a lack of good communication contributes to the skill gap. For example, PhD graduates can formulate research questions and effectively manage time, projects and other people; all skills highly sought after. However, there is a large communication disconnect between academia and industry. Companies struggle to articulate the traits they're looking for. As Tina Gruosso said, "so many talented people are looking for jobs, while employers have a hard time filling the gaps they have".

Nonetheless, teamwork in academia does not parallel teamwork in industry and this holds true for several so called, transferable skills. While graduate students may work with others on smaller projects, due to the individualism of graduate degrees, it is likely that they do not have any real investment in their peers' projects. In comparison, at the individual level there is very little sense of project ownership in industry. Because of the culture and mandate differences, academia and industry definitions of "teamwork" vary in terms of defined skill sets. Involvement in organizations both external or internal to their university, allows trainees to better explore and build the necessary teamwork skills.

Furthermore, organizations like Mitacs, a not-for-profit research and training organization, are essential for fostering collaborations between industry, academia and government in Canada. By partnering trainees with external organizations for internships, as well as offering professional skills development workshops focused on things like time and project management, effective presentation skills and entrepreneurialism, it helps students build the necessary skills and streamlines the transition process.

Mentorship

Echoing major findings in the CCA report, the panelists discussed many aspects of the relationship between graduate students and their advisors as well as the underlying expectations of most PIs. They agreed that there remain many gaps in the training of graduate students and an urgent need for PIs to increase their own awareness and be more supportive of their students for a life outside academia.

Many PIs want their students to solely focus on their academic projects consequently making it difficult for students to be prepared for diverse careers and can make them underprepared for the job market. There is also an increasing expectation of PIs that their trainees need to establish a career in academia to be successful. This strongly discourages students to seek out other opportunities and think about diverse careers outside academia.

The panelists strongly advocated for students to broaden their own networks and find non-academic mentors apart from their own PI. Graduate students can seek out mentorship support from non-research non-for-profit groups. Tina Gruosso recalled Women in Bio as one such group that she greatly benefitted from and found female mentors she could learn from and relate to. Such non-academic mentors can help students obtain transferrable and important skills needed for the job market, such as time and project management, communication skills as well as how to work within a team. Non-academic mentors can be included in the panel of advisory committee members for graduate students.

Since most PIs have only been in academic institutions throughout their careers, it is understandably challenging for them to be supportive of students who wish to pursue diverse careers. Consequently, all the pressure cannot be placed on PIs to know all the different career options available. The proper investment of PIs in the professional development of their students should also be adequately recognized and valued by their institutions. Thus, PIs must be supportive and give their students the chance to seek out these mentors and also encourage them to gain these skills. Importantly, the panelists urged PIs to ask their students what careers the students see themselves in and discuss different ways they can acquire the skills to efficiently transfer to diverse career paths. The panelists also advocated for students to take the time during their graduate training to acquire these important transferable skills.

Academic Environment

Finally, as highlighted in the CCA report, the academic culture plays a crucial role in shaping PhD graduates' employment outcomes. The report recommends cultivating a culture that prioritizes the needs of students. The panel elaborated on this change in culture.

A key change to the academic environment is the awareness and perceived value of non-academic careers. It was pointed out that there are limited resources at universities to learn of diverse career paths. Some universities offer career seminars in their academic programs to prepare students to reach the job market after their graduation. However, the career paths depicted are sometimes always the same ones that students encounter in their daily lives: PI, assistant professor, associate professor and full professor. Career seminars could be more diverse to better represent the diversity of the career paths available after a PhD. An academic environment that values and promotes diverse career paths is necessary to remove the stigma towards non-academic careers. This can be achieved by better including alumni graduates to share their stories and experiences.

The panel further raised the importance of incorporating aspects of corporate culture in academia i.e., to better bridge the gap between universities and companies. While collaborations exist between PIs and industry partners, students are rarely exposed to the experiences and workplace habits of these partners. Bridging the gap between these cultures is key to facilitating the transition of PhD researchers towards the private sector. To achieve

this, internship programs such as those by MITACS can offer students a unique opportunity to propose their own projects to work between an academic professor and an industry partner.

As discussed previously, there must also be a change in the perceived value of diverse skill sets. The importance of inter-, multi- and transdisciplinary skills, such as communication, management and leadership, was heavily emphasized by all panelists. Collaboration between disciplines can further help students diversify their skills and adapt to diverse workplace environments. In a rapidly changing world, problems increasingly require novel solutions that transcend traditional disciplines and therefore embracing diverse skill sets would not only improve employment outcomes for researchers, but it would further lead to better problem solving and research outcomes. A change in culture is necessary for the academic and research community to embrace and promote such skill sets. Universities can increase the visibility and number of diverse skills workshops to contribute to this changing culture. Funding agencies may further re-evaluate fellowship evaluation criteria to better support and incentivize the development of such skills.

The panel also discussed the need for stronger EDI policies; both the CCA and CCUNESCO (Baker & Vasseur, 2021) reports identified variability across gender lines regarding employment challenges and outcomes. Fostering a more inclusive and equitable environment can reduce barriers for historically excluded groups to enter the labour market. A first and necessary step towards better EDI policy is the collection of disaggregated data about career paths followed the completion of studies. While the discussion mostly centered around inequities across genders, the panel acknowledges the necessity to address the needs of other historically excluded groups in academia.

Recommendations and Strategies

Graduate Students: Learn by Doing

1. **Seek out opportunities** to develop professional skills (e.g., project management, teamwork, digital skills, and entrepreneurial skills).
2. **Familiarize yourself with the career advising and professional development resources** available from your university and the broader community.
3. **Actively build your network** as early as possible and leverage the strength of your network to learn about new opportunities and make new connections.
4. **Gain experience transferring your skills** to other professional contexts by participating in community engagement activities.
5. **Learn about and identify corporate cultures** that match your values, goals, and interests, rather than looking for specific job titles.
6. **Be the change**. Amplify your voice to promote changes to the academic environment to better prepare students for future career paths outside of academia (e.g., joining student societies or university committees with student representatives).

Research Supervisors: Listen, Support, and Adapt

1. **Take the time** to learn about each student's career ambitions and interests. Actively and regularly engage with them to nurture their reflections.
2. **Encourage students to expand their networks and develop their professional skills** by engaging in opportunities outside of the laboratory and classroom.
3. **Think transferable.** Revise course syllabi to include greater diversity in the skills that are taught and assessed, rather than focusing primarily on skills specifically relevant to academia (e.g., grant writing).

Graduate Program Faculty and Administrators: Broaden Your Horizons

1. **Include non-academic advisors** in the advisory committees of graduate students, in order to provide these students with an official mentor to help them prepare for potential future careers outside of academia.
2. **Make student professional development a priority**. Ensure the availability of a wide range of professional development workshops and career seminars for graduate students, offered at different times throughout their degree progression. Integrate such professional development activities within graduate program curricula. Recognize and value the involvement of research supervisors in their students' professional development.
3. **Assemble and leverage alumni networks.** Make alumni networks available to students and train them how to build, leverage, and nurture their own networks to learn about different available career opportunities and strategize their professional development.
4. **Track the career outcomes of student alumni** to inform the development of future professional and career development initiatives.

Government Funding Agencies

1. **Redefine research excellence.** Revise the criteria used to evaluate funding applications to include an emphasis on the larger societal impact of a Principal Investigator's research program, including the outcomes of their students.
2. **Collect disaggregated data on career outcomes.** Define metrics related to the career outcomes of higher education graduates and start tracking them systematically to better inform future initiatives.

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About the SPE Team

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