



GRADUATE
STUDENTS'
ASSOCIATION

UNIVERSITY OF CALGARY

ENGINES OF THE FUTURE: GRADUATE STUDENTS AND THE CAPSTONE PROJECT

October 25th, 2024

The University of Calgary Graduate Students' Association brief to the Standing Committee on Science and Research for its study on "The Mission, Mandate, Role, Structure and Financing of the New Capstone Research Funding Organization Announced in Budget 2024."

Introduction:

The University of Calgary Graduate Students' Association (UCGSA) thanks the Standing Committee on Science and Research (SRSR) for the opportunity to comment on the Capstone research project. We represent approximately 7,900 students—domestic and international, thesis and course-based—in a wide variety of disciplines and fields. While our members have varying focuses and backgrounds, they are nonetheless united in wishing to emphasize the vital role their research and labour plays in the future of Canada's research and innovation ecosystem.

UCGSA would like to comment on, and provide recommendations to, three themes regarding graduate student education in Canada. These themes are:

1. Governance
2. Funding
3. The Future

Our recommendations aim to address gaps in how graduate students contribute to the research priorities, strategies, and guidelines used by the Tri-Council granting agencies, as well as touch upon some ways to strengthen the competitiveness of Canadian graduate schools. We conclude this brief with a discussion of how empowering graduate students can help Canada's research and innovation ecosystem do more with less.

Theme #1: Governance

There are currently no statutory requirements for graduate student representation on any of the decision-making bodies and committees within the Tri-Council granting agencies. This is despite the fact that Tri-Council funded graduate student awards remain the largest and most prestigious source of award funding for graduate students. Not only do nearly all thesis-based graduate students apply—and compete—for these awards, but a student's success (or lack thereof) in acquiring a CGS influences everything from their future employability as an academic to the ease in which they can access future research funding. This means that the rules and processes that govern the distribution of CGS determine, to a significant extent, the future research potential of Canadian graduate students.

Multiple reviews of Canada's research system have called for increased consultation on governance procedures with graduate students, or outright recommended that graduate student representation be required on the decision-making bodies of funding agencies. This includes a 2006 review of NSERC and SSHRC's consultation processes,¹ and two reports from this very committee: the 2023 *Government of Canada's Graduate Scholarship and Post-Doctoral*

¹ James R. Mitchell, *A Review of NSERC and SSHRC* (Report prepared for Industry Canada, December 15, 2006).

Fellowship Programs Report,² and the *2022 Top Talent, Research, and Innovation Report*.³ We echo these recommendations, because the graduate student experience—and the challenges that graduate students face within Canada’s federal funding system—can only be accurately articulated by current graduate students. The social, political, and economic conditions that shapes graduate studies today are not necessarily the same conditions faced by faculty or industry leaders when they were completing graduate studies. Therefore, if the decision-making bodies wish to have the most accurate and up-to-date information about the state of graduate studies in Canada, the most effective means of ensuring this is to include graduate student voices on these bodies.

One of the goals of the modernization of Canada’s federally-funded research system is to create additional advisory bodies that can identify, respond to, and ultimately mitigate systemic challenges within Canada’s innovation ecosystem, a recommendation that was forcefully made in the *Advisory Panel on the Federal Research Support System Report* (also known as the “Bouchard Report”).⁴ To that end, a proposed change to the Tri-Council governance system, as outlined in the federal government’s 2024 budget,⁵ includes the creation of the capstone research funding organization that this committee is studying, which will help guide the development and coordination of research standards and practices in Canada. An additional change outlined in *Budget 2024* is the creation of a science and innovation advisory council to drive the development of Canada’s research strategies and priorities. As these organizations will have significant influence on how graduate students plan, conduct, and fund their research, the same reasons for including graduate student representatives on existing Tri-Council decision-making bodies applies: only graduate students can provide an accurate, timely picture of what it is like to be a graduate student researcher in Canada.

We also wish to emphasize that the experience of master’s students and doctoral students differ with respect to expectations, scope of research, and resources available to prepare for scholarship applications. Having an accurate picture of the full graduate student experience will, ideally, require timely information and feedback from both types of students. When filling the student seats on each of the decision-making bodies listed in this brief, we would further suggest that the appointments process aims to ensure that there is at least one master’s student and one doctoral student, rather than having the committees be dominated by one type of student.

Finally, we recognize that having graduate students serve on the decision-making bodies of the Tri-Agencies and Capstone project could lead to a perceived conflict of interest if they are

² House of Commons, “Government of Canada’s Graduate Scholarship and Post-Doctoral Fellowship Programs”, <https://www.ourcommons.ca/Content/Committee/441/SRSR/Reports/RP12784325/srsrrp08/srsrrp08-e.pdf>

³ House of Commons, “Top Talent, Research, and Innovation”, <https://www.ourcommons.ca/Content/Committee/441/SRSR/Reports/RP12004489/srsrrp02/srsrrp02-e.pdf>

⁴ Advisory Panel on the Federal Research Support System, “Report of the Advisory Panel on the Federal Research Support System”, <https://ised-isde.canada.ca/site/panel-federal-research-support/sites/default/files/attachments/2023/Advisory-Panel-Research-2023.pdf>

⁵ Government of Canada, “Budget 2024: Fairness for Every Generation; Chapter 4: Economic Growth for Every Generation,” <https://budget.canada.ca/2024/report-rapport/chap4-en.html>.

still eligible for these awards. However, given that Tri-Council awards are not only the highest valued scholarships in Canada, but are also the most prestigious, we do not want to put students in an awkward spot where they must forgo scholarships that advance their careers (and, indeed, help them pay their bills) if they wish to serve on these decision-making bodies. If nothing else, graduate students would have little incentive to serve on these committees if that were the case, and thus these seats would most likely remain unfilled. We hope that graduate students will not be deemed ineligible for these awards outside of the time period where they are serving on advisory or governance committees, and we would suggest awarding students who *do* serve a scholarship that recognizes their commitment to improving the governance of Canada's research ecosystem and compensates them for it accordingly.

Therefore, the University of Calgary Graduate Students' Association therefore recommends that:

- **Recommendation 1:** the federal government reserve at least three seats on the Board of Directors of the new research capstone organization for those from the student research community;
- **Recommendation 2:** the federal government reserve at least four additional seats for the student research community in the Tri-Council Agencies and in the multidisciplinary research unit of the new research capstone organization;
- **Recommendation 3:** the federal government reserve spaces for those from the student research community on every representative committee as part of the new research capstone organization.
- **Recommendation 4:** the federal government ensure that graduate student representation includes both master's and doctoral students in as equal a manner as possible;
- **Recommendation 5:** the federal government ensure that service on these decision-making bodies does not disqualify students from being awarded a graduate student scholarship or post-doctoral fellowship in the future, and that their service is recognized with a monetary award.

Theme #2: Funding

Budget 2024 increased the value of all Tri-Council master's, doctoral, and post-doctoral awards and fellowships.⁶ Prior to this budget, the value of these awards and fellowships had remained static since 2004. To put it into perspective, a \$35,000 CGS-Doctoral award in 2004 would be worth a little over **\$52,800** in 2023, an inflation-adjusted loss of **51%** of its value.⁷

During this period, other countries in the Organization for Economic Cooperation and Development (OECD) rapidly increased funding for graduate students. This was especially true

⁶ See Higher Education Strategy Associates, "The 2024 Federal Budget: A Higher Education Strategy Associates Commentary," <https://higherstrategy.com/wp-content/uploads/2024/04/2024-04-16-Budget-Commentary-v1.pdf>

⁷ Number arrived at by taking 2004-2023 value of CGS-D and plugging it into the Bank of Canada's inflation calculator (September 2023 CPI): <https://www.bankofcanada.ca/rates/related/inflation-calculator/>

of the United States, which earmarked \$13 billion in funding for STEM education, “including scholarships, fellowships, and traineeships for graduate students,”⁸ via the *CHIPS and Science Act* (CHIPS), as part of its plan to decouple the production of semiconductors and the development of artificial intelligence (A.I.) from China.⁹ There was concern that the funding disparities between Canada and the United States would further contribute to the exodus of graduate students and post-doctoral researchers to American universities. Americans already have, on a per capita basis, more doctoral degrees than Canadians do, and the Business Council of Alberta identified this as one possible explanation for the productivity gap (in the United States’ favour) between the two countries.¹⁰ An additional concern was that United States funding for research in strategically valuable fields—like A.I., whether it focused on how to build more powerful A.I. models or studying how human society and the economy may be affected by this technology—would put Canada at a competitive disadvantage in the global economy, given how A.I. was outlined as a possible “Moonshot” project by this committee.¹¹

The incentive for talented Canadian students to study in the United States, therefore, remains a real concern for Canada’s economy. For this reason, the funding increases to the Tri-Council granting agencies—and the subsequent increases in value of their graduate student scholarships and post-doctoral fellowships—represents a positive step in the fight against Canada’s laggard productivity growth. Ensuring that these funding increases are implemented as part of the capstone project would be an important step in ensuring Canada’s competitive advantage in the global economy. But allowing inflation to eat into the value of these scholarships would simply recreate the same concerns over the brain drain and loss of competitive advantage felt by Canada’s research system from 2004 to 2023. This capstone project should also endeavour to ensure, then, that the value of Tri-Council graduate student scholarships and post-doctoral fellowships are *indexed to inflation*, so future generations of scholars see the value of studying in Canada.

Therefore, the University of Calgary Graduate Students’ Association therefore recommends that:

- **Recommendation 6:** the value of graduate student scholarships and post-doctoral fellowships are indexed to the Canadian Consumer Price Index (CPI) to maintain their value year-over-year.

⁸ Karnes, K. (Sept 9, 2022). “CGS Celebrates CHIPS and Science Act Signed Into Law,” *Council of Graduate Schools*. Accessed online: <https://cgsnet.org/press-releases/cgs-celebrates-chips-and-science-act-signed-into-law/>.

⁹ Taiwan’s dominance of the chip industry makes it more important,” *The Economist* (March 6, 2023). Accessed online: <https://www.economist.com/special-report/2023/03/06/taiwans-dominance-of-the-chip-industry-makes-it-more-important>.

¹⁰ Business Council of Alberta. “It’s Not about Winning but We Can’t Help but Notice That We’re Losing (Part Three): Productivity--Why Canada Lags behind the US,” March 10, 2021. Accessed October 19th, 2024. <https://businesscouncilab.com/insights-category/analysis/productivity-part-three-canada-us-productivity-gap/>.

¹¹ House Standing Committee on Science and Research. “Pursuing a Canadian Moonshot Program: Report of the Standing Committee on Science and Research.” House of Commons Canada, 2023, <https://www.ourcommons.ca/Content/Committee/441/SRSR/Reports/RP12490814/srsrrp04/srsrrp04-e.pdf>.

Theme #3: *The Future*

The capstone project presents an opportunity to further improve the research funding system in Canada. From the graduate student perspective, one potential area of improvement concerns the feedback applicants receive on their research proposals. Currently, no feedback mechanism exists for students, particularly those who are unsuccessful in attaining a graduate student scholarship. This is unfortunate, as there is little means available for students to gain insight into how their research or research proposal could be improved; indeed, it is difficult for students to learn how to submit better research proposals in the future without meaningful feedback. A further curiosity is that feedback is available for faculty members and independent scholars who apply for other Tri-Council grants. It should not be difficult, then, to extend the same feedback mechanisms to Tri-Council proposals submitted by graduate students.

An additional consideration for the future is the balance between *free* and *targeted* research. Free research is the broad label given to research projects that instigated by the researchers themselves, independent of any external research priorities or objectives. Targeted research, by contrast, refers to research projects that are carried out in accordance with an external mission or objective. Both types of research have their place in any research and development ecosystem; however, as the Bouchard Report notes, the Canadian government has increasingly prioritized targeted research over free research.¹² This is also true at the provincial level: for instance, the Government of Alberta's *Building Skills for Jobs* strategy (also known as "AB2030") shifted the priorities of Alberta's post-secondary system to achieving government-directed labour market outcomes.¹³

The problem with an overreliance on government-directed research is that major breakthroughs in all fields of inquiry—be they the natural sciences, social sciences, humanities, or engineering fields—are frequently unplanned and arrived at spontaneously. Michael Polanyi, for instance, famously argued that science (and society more broadly) could only flourish if scientists were free to utilize their own personal initiative and judgements in pursuing research projects,¹⁴ a theme echoed by concepts such as Friedrich Hayek's interpretation of "spontaneous

¹² Advisory Panel on the Federal Research Support System, "Report of the Advisory Panel on the Federal Research Support System", <https://ised-isde.canada.ca/site/panel-federal-research-support/sites/default/files/attachments/2023/Advisory-Panel-Research-2023.pdf>

¹³ Advanced Education, "Alberta 2023: Building Skills for Jobs," <https://open.alberta.ca/dataset/24e31942-e84b-4298-a82c-713b0a272604/resource/b5a2072e-8872-45f9-b84d-784d0e98c732/download/ae-alberta-2030-building-skills-for-jobs-10-year-strategy-post-secondary-education-2021-04.pdf>.

¹⁴ Polanyi, Michael. "The Republic of Science: Its Political and Economic Theory." *Minerva* 1, no. 1 (January 1, 1962): 54–73. <https://doi.org/10.1007/bf01101453>.

order,”¹⁵ and Charles Sabel’s work on innovation¹⁶ and experimentalist governance.¹⁷ Nassim Nicholas Taleb further argued that bottom-up research projects, arrived at via experimental “tinkering” from multiple researchers, frequently outperforms directed research in creating new knowledge and driving innovation.¹⁸ This discovery process may be long and filled with false-starts—it may even be hard to see the benefits of certain research in the short-run—but the effects of trusting scholars to freely develop their research priorities pays dividends for the economy and civil society more broadly. Indeed, as the Bouchard Report notes, free research conducted today may be key to addressing the problems targeted missions of tomorrow are tasked with solving, and we neglect its contributions at our peril.¹⁹

In order to ensure that Canada benefits from free research, the capstone project should ensure that funding priorities are not overly geared towards pre-chosen targets, such as labour market outcomes. Funding should also not overly prioritize only a select few fields of research, both because it is exceedingly difficult for governments to forecast the research needs of the future and because new knowledge frequently emerges in unexpected places. Finally, the capstone project should ensure that ample opportunity is present for scholars from diverse fields and backgrounds to interact with one another, in order for truly innovative, transdisciplinary ideas to emerge. This not only would require a commitment to openness and accessibility for Tri-Council research funding, so that scholars from all fields can equally participate in the process.

Therefore, the University of Calgary Graduate Students’ Association therefore recommends that:

- **Recommendation 7:** the federal granting agencies ensure graduate student scholarship and post-doctoral fellowship applications include constructive feedback on all applications, especially those that are not successful in Tri-Council competitions;
- **Recommendation 8:** the federal government ensure the capstone research funding organization strikes a balance between free and targeted research, as well as commits to ensuring all funding and governance policies promote equitable, spontaneous interactions amongst Canadian researchers, including at the graduate level.

¹⁵ Hayek, F. A. *Studies in Philosophy, Politics, and Economics*, 1967. Touchstone.
<https://doi.org/10.7208/chicago/9780226321356.001.0001>.

¹⁶ Sabel, Charles, and AnnaLee Saxenian. “A Fugitive Success: Finland’s Economic Future.” *Sitra Reports* 80. The Finnish Innovation Fund Sitra, 2008.

¹⁷ Sabel, Charles F., and Jonathan Zeitlin. *Experimentalist Governance*. Edited by David LeviFaur. The Oxford Handbook of Governance. Oxford, United Kingdom of Great Britain and Northern Ireland: Oxford University Press, 2012. <https://doi.org/10.1093/oxfordhb/9780199560530.013.0012>.

¹⁸ Taleb, Nassim Nicholas. *Antifragile: Things that Gain from Disorder*. Penguin, 2012.

¹⁹ Advisory Panel on the Federal Research Support System, “Report of the Advisory Panel on the Federal Research Support System”, <https://ised-isde.canada.ca/site/panel-federal-research-support/sites/default/files/attachments/2023/Advisory-Panel-Research-2023.pdf>

The Benefits of a Capstone Project that Empowers Graduate Students

Graduate students play a vital role not only in terms of university-driven research (a theme constantly mentioned in both the *Fundamental Science Review* and the “Bouchard Report”), but also in our support for undergraduate education through our positions as Teacher’s Assistants and Instructors, and in support of faculty research projects through our roles as Research Assistants. Graduate students frequently perform the “academic grunt work” in addition to forwarding basic and applied research. But there is an additional benefit to empowering graduate students: it will allow Canada to do “more with less.”

As an illustration, consider an analogy from the field of Strategic Studies. Military theorist John Boyd argued, in his presentation *Patterns of Conflict*,²⁰ empowering rank-and-file personnel to make vital strategic decisions acted as a force multiplier, above and beyond anything else in a military’s arsenal. A more decentralized command structure allows military units a greater flexibility in coping with uncertainty—something that Boyd argued was an unavoidable part of reality²¹—by enhancing a unit’s ability to acquire, process, and act upon new information. These units could thus complete the *observe, orient, hypothesis, decide* (OODA) loop faster and more effectively than their opponents, and could therefore better adapt and take advantage of a rapidly changing environment.

Competing for graduate students with the United States is far from an armed conflict, and we should want to promote cross-border cooperation between researchers as much as possible. But Boyd’s OODA loop concept—which has been adapted for many non-military situations, including management studies²²—contains a key lesson: supporting individuals from the bottom-up, especially those that do the “grunt work” (like graduate students) allows an organization to better cope with uncertainty and outperform rivals with significantly more resources. In the context of R&D, we would argue that this would translate both to ensuring that graduate students are adequately funded *and* that graduate students have a presence on any governance structure charged with evaluating, administering, and funding research grants.

Enhancing the Canadian PSE sector’s adaptability through supporting and empowering graduate students will only become more important as the global economy becomes more integrated in the future.

²⁰ Boyd, John. “Patterns of Conflict.” Version dated December 1986. PDF available at: <https://www.ausairpower.net/JRB/poc.pdf>.

²¹ Boyd, John. “Destruction and Creation.” U.S. Army Command and General Staff College, September 3, 1976. https://upload.wikimedia.org/wikipedia/commons/a/a6/Destruction_%26_Creation.pdf, pg. 4-6.

²² Ryder, M. and Downs, C. 2022. “Rethinking reflective practice: John Boyd’s OODA loop as an alternative to Kolb,” *The International Journal of Management Education* 20(3): 1-12.

Summary of Recommendations:

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Recommendation 2:

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The Graduate Students' Association
University of Calgary
1030 ES, 844 Campus Place NW
Calgary, Alberta T2N 1N4
(403) 220-5997

Who We Are:

The Graduate Students' Association (GSA) of the University of Calgary was established in 1967, and has approximately 7,900 members, including full and part-time Master's and PhD students. A not-for-profit organization governed by UofC graduate students, the GSA is charged with the social, academic and practical well-being and growth of graduate students on campus. The GSA oversees and promotes workshops, special events, the provision of financial aid and support as well as the facilitation of career-based growth and development for graduate students as they progress through their university programs.

The GSA is governed by a five-person Executive board of full-time graduate students - who are then, in turn, responsible to the Graduate Representative Council (GRC) as a governing and policy-developing body. Over time, the GSA has worked to become a key member of the University of Calgary community via ongoing communication and dialogue with university administrators on pertinent issues.

The GSA represents the collective interests, but not individual opinions, of graduate students to governing bodies of the university, all levels of government and the surrounding community of Calgary.

Contact Information:

For inquiries or follow-up requests, please contact us at advocacy.gsa@ucalgary.ca