

UBC Faculty of Graduate & Postdoctoral Studies

UBC PhD Career Outcomes

Graduates from 2005-2013
UBC Vancouver Campus



THE UNIVERSITY OF BRITISH COLUMBIA

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EXECUTIVE SUMMARY

The research PhD was created to support the development of individuals able to use the power of rigorous scholarly inquiry to advance society. If the academy is committed to ensuring the relevance of the degree for the 21st century, we need to understand how our graduates are, or could be, contributing to the world today. This information will help tremendously in raising awareness of, and increasing the transparency about, potential careers, and in informing our educational endeavours.

For the first time, UBC Graduate & Postdoctoral Studies has taken on the challenge of systematically tracking PhD outcomes, starting with the 3805 students who graduated from UBC's Vancouver campus between 2005-2013. Using a combination of surveys and internet searches, information was obtained for 91% of these graduates. This approach, and the ability to link the outcomes to student data, allowed a more comprehensive and richer analysis of student outcomes than most studies of this kind. The data have been distributed to all programs, and summaries posted for all prospective students.

The high-level trends we found are similar to those found in many other studies. Over all years, 51% of graduates are employed or doing postdoctoral fellowships in higher education, 26% are employed in the private sector (including at least 60 who founded their own companies), and 13% are in the public or not-for-profit sectors. Outside of academia, the major industries of employment are health care, professional and scientific services, manufacturing, and public administration. Almost all graduates employed outside of the academy have professional or management positions. Of survey respondents, 1.6% are unemployed and 1.7% are out of the workforce.

Roles within higher education change significantly by cohort year. Research-intensive faculty positions are held by 16-20% of graduates 3 to 5 years after graduation, and this grows to 34% for those who graduated 11 years previously. Nine per cent of graduates hold teaching-intensive faculty positions, and 18% have other roles in academia.

As anticipated, outcomes vary significantly by discipline. Business, humanities, and social sciences graduates are most likely to be employed in higher education, and engineering graduates in the private sector. There are also some gender-associated differences, most notably women's underrepresentation in the private sector and higher likelihood of staying in Canada.

Over all years, 60% of employed graduates are located in Canada, with 41% overall are in British Columbia. Canadian citizens are the most likely to stay (75%), with international student graduates divided somewhat evenly between Canada, the US, and their home region. One quarter of those from the least developed nations returned to their home country.

Over 91% of the 1800 employed graduates who responded to our survey indicated that their job is a useful step along a desired career pathway, and many said they loved their work and were well-prepared for it. Some, however, felt they had no choice but to accept a less desirable career than they had hoped for or expected.

This information, and the many comments from these alumni about what helped or would have helped them prepare for their career, will be invaluable as we continually seek to improve our educational practices for the scholars of today's world.

DEFINITIONS

Associate researcher: Permanent positions with a primary focus on research carried out under the oversight of faculty members (e.g., research associate, research assistant).

Disciplinary groupings: Programs were grouped according to the Statistics Canada *Classification of Instructional Programs 2000*, the categorization system used for sharing U15 university data. Please see Appendix A for a listing of the graduate programs in each disciplinary group.

Higher education: All post-secondary institutions. Note that these may fall under different economic sectors (public, private or non-for-profit), but all were categorized only as higher education.

Not-for-profit sector: All entities of the economy owned by the private (i.e., non-government) sector, but that are not geared to making profits.

Other, Higher Education: All other occupations within higher education. These include staff administrative and research management positions, service positions, and postgraduate medical training positions.

Postdoctoral fellow (PDF): All positions identified as such or as variants thereof (postdoctoral researcher, postdoctoral associate, research fellow, etc.). These are expected to be temporary research training positions for individuals who obtained their degree within the previous few years.

Private sector: All entities of the economy that are owned by the private (i.e., non-government) sector, and geared to making profits. In general, self-employment (e.g., as a consultant or entrepreneur) was classified in this category, with exceptions including publicly funded health care providers in private practice.

Public sector: All units of the government sector and all publicly controlled non-financial and financial government business enterprises.¹ This includes publicly funded hospitals and research institutes, public schools, Crown corporations, etc.

Research-intensive (RI) faculty: All positions titled assistant professor, associate professor, or professor, or the equivalent terms in non-Canadian countries (e.g., lecturer and its variants in many countries), employed by a PhD-granting institution. The latter stipulation is quite conservative, and was chosen mainly because it was too difficult to differentiate colleges from some universities, and the associated differences in faculty work and responsibilities. The expectation is that these individuals are independent researchers with teaching responsibilities, and generally have the opportunity to gain tenure. Not all appointments in this category, however, were tenure-track, and because the distinction could not usually be made, all positions with the relevant title were included. RI faculty who also held academic administrative positions, such as dean or associate dean, were included in this category.

Teaching-intensive (TI) faculty: Permanent faculty positions at higher education institutions that do not grant PhD degrees, and permanent faculty in PhD-granting institutions with responsibilities primarily for teaching (e.g., instructor stream).

Term faculty: All faculty positions in term appointments, such as sessional lecturers, as well as those in clinical or adjunct appointments for whom no significant other occupation was identified.

¹ [Definition from StatsCan](#)

MAIN STUDIES REFERRED TO

- The [2007 Statistics Canada National Graduates Survey \(NGS\)](#) was conducted with a representative sample of graduates from Canadian post-secondary educational institutions two years after graduation. Analyses of this data include that by Desjardins and King (2011)² and Desjardins (2012)³.
- The OECD/UNESCO Institute for Statistics/Eurostat [Careers of Doctorate Holders \(CDH\)](#) project used standardized survey methodologies to collect data on all doctorate holders in 25 countries, mostly across Europe, and the US. Analyses included Auriol (2010)⁴ and Auriol et al (2013)⁵.
- A 2016 study conducted by the Higher Education Quality Council of Ontario (**HEQCO**)⁶ investigated career outcomes of Ontario's 2009 PhD graduates 6 years after graduation. Information about the 2310 graduates was obtained through internet searches.
- The 2016 **TRaCE** project tracked 2700 humanities PhD alumni from 24 Canadian universities, graduating between 2004-15. Broad career outcome data, explored by internet searches, were determined for 79% of graduates. The data obtained by research assistants at the various universities were not independently verified. A [summary report](#) is available online.
- The National Science Foundation (**NSF**) [Survey of Doctorate Recipients \(SDR\)](#) is a longitudinal biennial study following the careers of graduates who received doctorates in science, engineering, or health from US institutions. The NSF and National Science Board's Science & Engineering Indicators (SEI) is a larger analysis of the scientific and engineering enterprise in the US.
- The Modern Language Association (**MLA**) regularly compiles career information obtained from hundreds of PhD programs in English and other modern languages across the US and Canada. The latest report (2011)⁷ looks at graduates from 2006-07, 3 months to 2 years after graduation.
- The American Historical Association (**AHA**) conducted internet searches for career outcomes of a random sample of 2500 history PhDs who received their degrees from 1998-2009.⁸
- In 2013 and 2014, **McGill** University surveyed their PhD graduates at 2 years and 5 years after graduation, with 453 respondents overall.⁹
- In 2013-14, **Stanford** University conducted internet searches of all (2420) Stanford PhD alumni who had graduated either 5 or 10 years previously, looking at employment during their first year after graduation as well as their 2013 employment.¹⁰ Current information was retrieved for 81% of that population.

2 Desjardins L and King D (2011) [Expectations and Labour Market Outcomes of Doctoral Graduates from Canadian Universities](#). Ottawa: Statistics Canada

3 Desjardins L (2012) [Profile and Labour Market Outcomes of Doctoral Graduates from Ontario Universities](#). Ottawa: Statistics Canada

4 Auriol L (2010) [Careers of Doctorate Holders: Employment and Mobility Patterns](#). Paris: OECD

5 Auriol L, Misu M, Freeman RA (2013) [Careers of Doctorate Holders: Analysis of Labour Market and Mobility Indicators](#). Paris: OECD

6 Jonker, L (2016) [Ontario's PhD Graduates from 2009: Where are they now?](#) Toronto: Higher Education Quality Council of Ontario.

7 [MLA Survey of Placement of 2006-07 Graduates from Doctoral Programs in the United States and Canada](#) (2011) New York: Modern Language Association of America

8 Wood LM and Townsend RB (2013) [The Many Careers of History PhDs: A Study of Job Outcomes, Spring 2013](#). The American Historical Association

9 [McGill's PhD Outcomes: Report on 2013 and 2014 Survey Results](#). (2015) McGill Graduate and Postdoctoral Studies.

10 [The Stanford PhD Alumni Employment Project](#) (2015) Stanford University.

BACKGROUND

Why is it important to understand PhD outcomes?

For the past several decades most PhD graduates around the world have entered a diversity of careers beyond that of the university professor, in part because of increasingly fewer faculty positions relative to the number of PhD graduates. In 2007, for example, there were about 5000 new PhDs and 6000 postdoctoral fellows in Canada, but only about 2600 faculty hires¹¹. Despite the growing variety of career paths graduates take, universities are only beginning to explore their full breadth. Understanding these pathways is vitally important in assessing the quality of education, in guiding universities in their programming, and in helping prospective and current students to make informed decisions about admission and career development.

It is also relevant to society more broadly: How is doctoral education contributing to the public good? Where in the world do our graduates end up? Do graduates (and employers) value their PhD? Are we educating the right number or not? What conditions help to best realize the full potential of the talented, driven individuals considering doctoral education? Although not a vocational degree, the PhD represents a very significant investment of time and resources for students, universities, and society, and it's important that we do all we can to ensure our graduates' knowledge and

capabilities are effectively used to contribute back to society. That is, of course, extraordinarily difficult to measure meaningfully. In decades past, the quality of career outcomes in most disciplines was measured mainly by determining the proportion of graduates entering faculty positions at prestigious universities. Now, not only are there too few academic positions to use this as a measure in most fields, but students increasingly want non-traditional career paths, and make outstanding contributions in all sectors of society. This project goes a short way toward better understanding the impact UBC's graduates are having in the world.

From a number of studies and our own surveys and experience, we know students often feel encouraged by faculty to pursue the professorial path to the exclusion of other possible careers, and sometimes feel misled about the realistic prospects of such a future. Students have also often said they felt their education was solely directed to that end. Although studies have shown that interest in a professorial career tends to decrease through students' programs in some disciplines^{12,13}, many have said they were not sufficiently aware of, and had not devoted enough attention to, preparing for alternatives. UBC graduate programs and central offices have done much in recent years to address this (described below), although there is still much that can and should be done. Transparent information about outcomes for all those associated with doctoral education is essential to these efforts.

11 See *A Postdoctoral Crisis in Canada: From the 'Ivory Tower' to the Academic 'Parking Lot'*. (2009) Canadian Association of Postdoctoral Scholars

12 Sauerman H and Roach M (2012) *Science PhD Career Preferences: Levels, Changes, and Advisor Encouragement*. *PLoS One* 7(5): e36307

13 Fuhrmann CN, Halme DG, O'Sullivan PS, and Lindstaedt B (2011) *Improving Graduate Education to Support a Branching Career Pipeline: Recommendations Based on a Survey of Doctoral Students in the Basic Biomedical Sciences*. *CBE-Life Sciences Education* 10:239-249.

What is already known about PhD outcomes?

Around the world, there has been a recent focus on tracking doctoral career outcomes for many of the same reasons we describe here. It's difficult to make accurate comparisons of data, as the methodologies, populations, and definitions vary greatly, but the following generalizations seem to hold true across North America and at least parts of Europe. Please see Appendix B for a fuller description of the findings from other studies.

- Unemployment rates are low, and vary by discipline.
- About half of recent doctoral holders are employed in higher education.
- Within the professorial stream across Europe and North America, tenure-track position opportunities are falling, and term appointments are increasing.
- The proportion of doctoral recipients in tenure-track positions varies by discipline. Humanities, social sciences, and business graduates tend to have the highest rates (35-70%).
- About one third of graduates enter the private sector.
- Most graduates are employed in positions which require a PhD and are satisfied with their careers.
- A significant minority of graduates from Canadian universities leave Canada by 5-6 years after graduation.
- There are gender-specific trends in employment outcomes.

UBC DATA

Population and approach

Between 2005 and 2013, 3805 PhD degrees were granted by UBC. We are aware of 15 who have passed away, leaving 3790 in the analysis. The response rate to our survey was 56%, out of those we successfully contacted. We obtained publicly available information on career outcomes for 82% of the remaining alumni. Thus, information was available for 91% of the alumni.

Except where noted, the total cohort referred to in our analyses includes those with unknown outcomes and those who indicated they were unemployed and seeking employment. That is, for example, we note that 51% of the graduates work in higher education. That translates to 56% of graduates whose information is known, and who are employed or seeking employment. See Appendix C for the detailed methodology.

The unemployment rate is very low, with outcomes varying by discipline (survey only)

Of 1866 survey respondents, 88% are employed (including 6% who are self-employed), an additional 9% are doing postdoctoral fellowships, 1.6% are unemployed and seeking employment, and 1.7% are out of the workforce (e.g., retired or acting as caregivers, including 0.2% as students). Health science graduates are the most likely to be doing postdocs (17%), education graduates are the most likely to be self-employed (15%; frequently as counselling psychologists), and humanities graduates are most likely to be unemployed (7.5%).

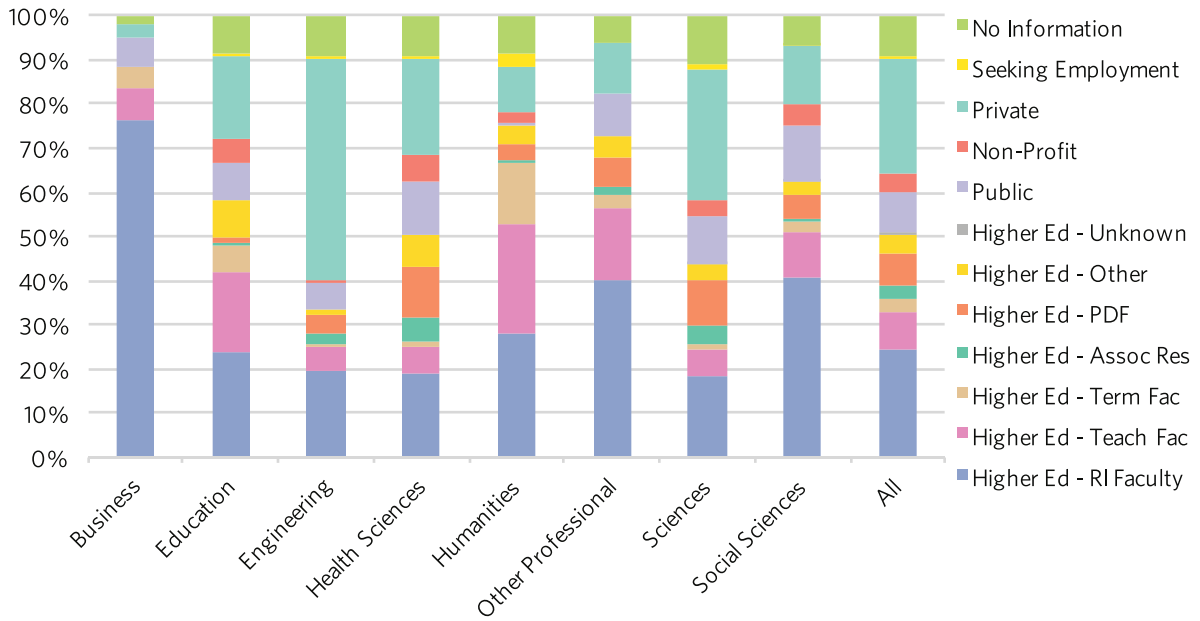
These disciplinary trends are evident in both earlier and later cohorts. The unemployment rate is lower than that found by others at similar time periods (McGill, 5%; NGS, 6%; NSF, 2.3%), although for methodological or definitional reasons, the values may not be directly comparable.

Doctoral Alumni in the Project

Discipline	2009-13 cohort #	2005-08 cohort #	Total PhD #	% With Survey Responses*	Total % Info Known
Business	67	35	102	61.8%	98.0%
Education	192	166	358	52.2%	91.6%
Engineering	384	207	591	45.3%	90.9%
Health Sciences	527	296	823	48.6%	91.0%
Humanities	149	90	239	39.3%	91.6%
Other professional	51	12	63	49.2%	93.7%
Sciences	762	420	1182	49.5%	88.8%
Social Sciences	262	170	432	55.1%	93.5%
Total PhDs	2394	1396	3790	49.2%	90.9%

* This is the per cent of all students in the study who responded to a survey. The 50.8% of students for whom we don't have survey responses include those we did not, or were unable to, contact. Note that data for two humanities departments (philosophy and English) were derived from the TRaCE project. See Appendix C for details.

PhD Career Outcomes, All Graduates, 2005-2013



One half of graduates work in higher education

Over all years, 51% of our graduates are employed in higher education, 26% in the private sector, 9% in the public sector (other than higher education), and 4% in the not-for-profit sector. There are significant disciplinary differences, which are mostly consistent with findings from other universities. Business graduates are by far the most likely to be employed in higher education (88%), mostly as RI faculty.

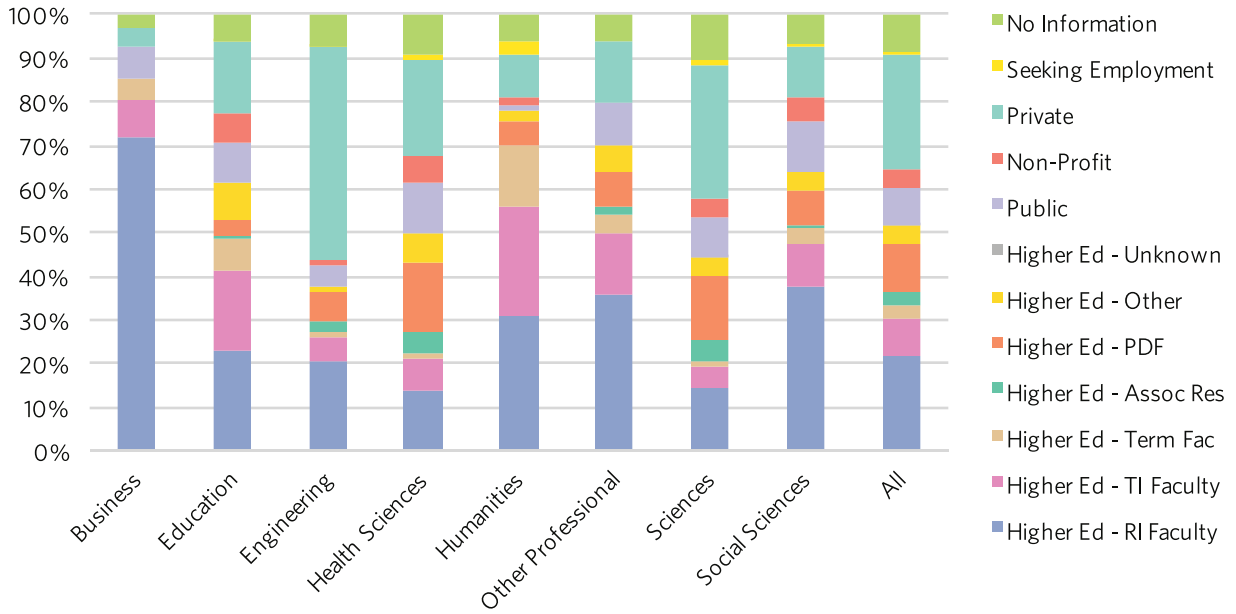
The proportions by sector do not change substantially by the number of years post-graduation, however, within academia, there are significantly fewer postdoctoral fellows and more faculty in later years. The health sciences and sciences showed this trend most strikingly (see “Graduates working within higher education” on pages 18-19).

Top employers, private sector:

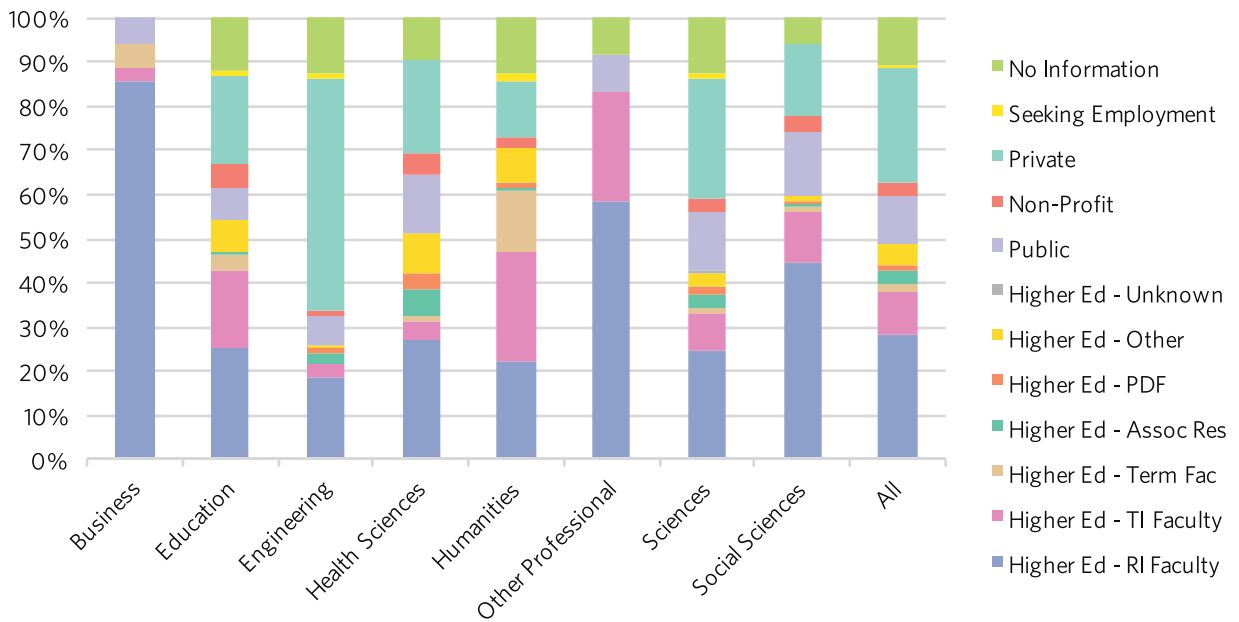
- Google (23)
- STEMCELL Technologies (21)
- Amazon (10)
- Microsoft (9)
- Intel Corporation (9)
- Coanda Research and Development Corp (8)
- Zymeworks (7)
- Gilead Sciences (7)
- Samsung (6)
- IBM (5)
- AstraZeneca (5)
- Golder Associates (5)
- Genentech (5)
- Amgen (5)
- Self-employed (173)*

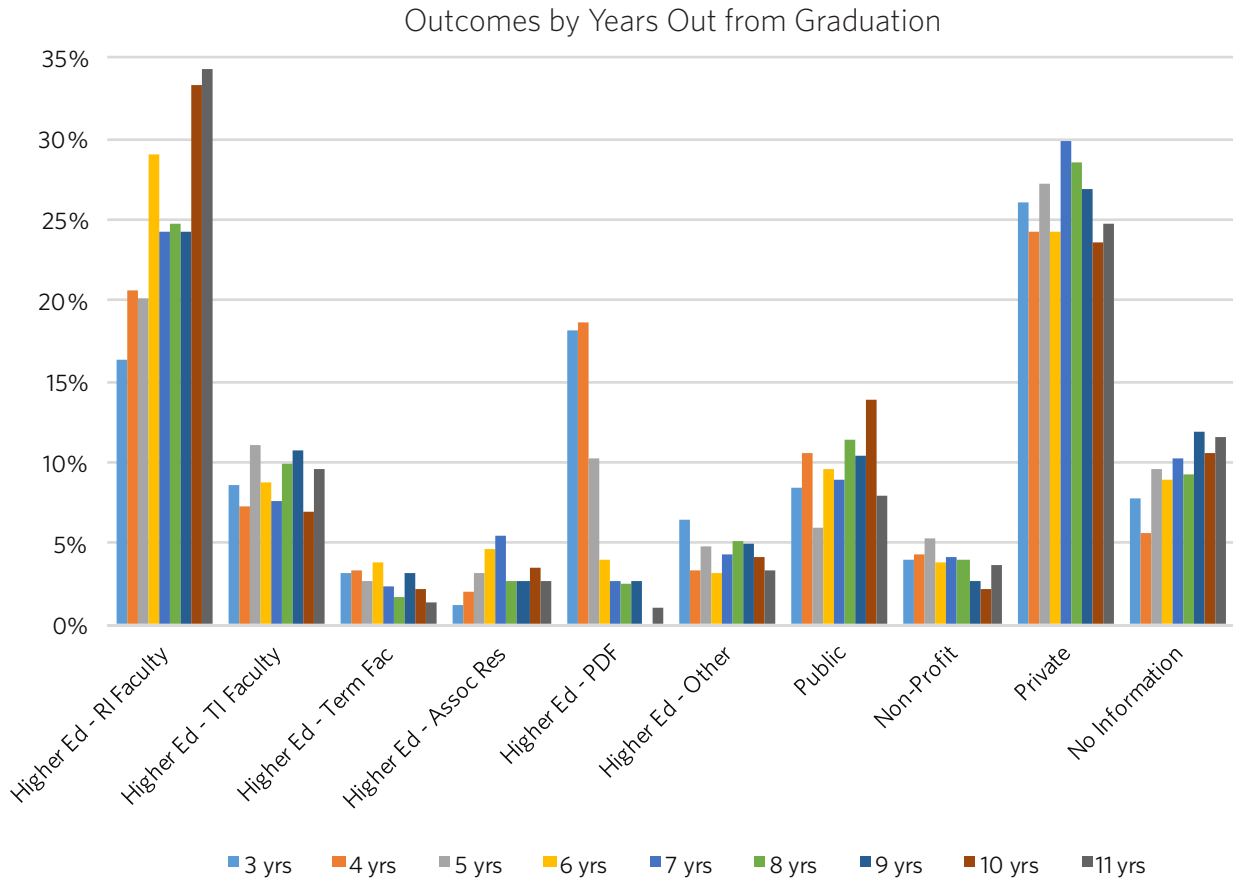
*Identified primarily through the survey

Employment Outcomes, 3-7 Years Out



Employment Outcomes, 8-11 Years Out





Alumni Profile: Stephen Ney
(PhD '10, English) Assistant Professor,
The University of the Gambia

Let me count the ways I'm doing what I've been wanting to: teaching at a small university [a] where I'm not pigeonholed but can cover areas right across the discipline of English literature; sometimes even dipping into academic writing, theology, or cultural studies; helping build a culture of research at an institution that's not been research focused; keeping my thinking sharp and acting on issues of global justice and (under)development by living and working in a poor country; helping guide students and

future leaders through the immense transitions associated with "modernization"; and generating and disseminating knowledge on literature and culture in an environment that's new to me.

[At UBC] my main supervisors guided me well, and I felt privileged to work on aspects of my PhD with several members of the English department who were not actually on my committee. I like teaching, and the department did a wonderful job of training us in pedagogy with a series of seminars, a variety of teaching assistantships, and even a pilot project whereby senior PhD students designed and taught their own courses.

www.grad.ubc.ca/alumni/profile/stephen-ney

Private sector employment is mainly in professional services and manufacturing industries

Within private sector employment other than self-employment, the two most prominent [North American Industry Classification System](#) industry sectors are manufacturing; and professional, scientific, and technical services. Together they employ two thirds of alumni. Manufacturing is primarily in the areas of biomedical products and computer/electronics technology; services are mostly related to computer system design, technical consulting, engineering, and research and development. Almost all alumni in the private sector are in professional or management positions. Thirteen per cent of position titles include “research” or “researcher”, and an additional 11% are “scientists”. About 15% are top-level senior management positions (president, principal, chief officer, etc.). Alumni with identical job titles sometimes differed in their opinions on whether or not they use their PhD-gained knowledge and abilities.

At least 60 graduates have started their own companies, mostly in B.C.

The entrepreneurial spirit is very much in evidence. Although it’s difficult to determine accurately, at least 60 alumni have founded companies¹⁴ (not

including graduates identified as self-employed consultants but without an associated company name). These graduates are from all disciplines, creating both manufacturing and service companies in areas including natural resources and the environment, health, information and communication technologies, engineering, education, and First Nations communities. Over 80% of these companies are located in Canada, with 64% overall in British Columbia. About one third were started by international student graduates, and half of their companies are located in Canada.

Among the other self-employed graduates are professionals, consultants, authors, and independent scholars. The vast majority of these are located in Canada.

Most public sector employment is in health and public administration

For the 323 graduates (excluding postdocs) employed in the public sector, the major employers are from the health and public administration sectors, employing 33% and 44% of the graduates, respectively. About half of those in public administration work for either the Canadian or BC government. Graduates in the public sector are primarily employed in professional or research positions, with about 20% in managerial positions.

Alumni Profile: Andrew S. Bamber

(PhD '08, MMPE), Founder and CTO, MineSense, a mining technology company

Minesense is a company I started myself based on PhD research I completed at UBC. As a company, we’ve gone through several key startup phases, initially in the labs at UBC, to a bona fide garage stage in Kitsilano (with 4 people), to our first commercial premises in the Harbourside area of North Vancouver (approx. 7 people), to the present 20,000ft location on Marine Drive with nearly 40 employees and more than \$20 million in investment to commercialize our technology.

¹⁴ Includes individuals who indicated as such in their survey comments (including those who said they were a self-employed “President” or “CEO”) or who were publicly identified as an “owner” or “founder”. Unclear information was verified as much as possible through publicly available information.

Alumni Profile: David Asgeirsson

(PhD '11, Physics), Manager, Technology and Venture Development (Cleantech), MaRS Innovation

I was originally planning to do just a master's degree. After a year, I went temporarily insane and signed up for a PhD. I was in love with the subject—trying to understand the universe at a fundamental level.

Part-way through, I realized the job prospects were slim. There are only a few positions, scattered around the world, and you have to postdoc for a long time. I didn't want to work as a postdoc, because I would have made even less than after my bachelor's.

I moved to Ontario for family. After a while, through networking and serendipity, I focused on university knowledge transfer with MaRS Innovation. I work at the interface between intellectual research and technical production, helping researchers turn their ideas into businesses. I have to understand the pure science, but I'm not in the lab. I'm looking at scientists' results, and helping shape the next steps: building the business plan and the nuts and bolts of a company.

A PhD was the first requirement of my job. It raises my stature when talking to academics and researchers, and helps me understand the academic culture. Also, at a high level, my PhD gives me the ability to apply analytical methods to technical problems, even ones that I don't have expertise in.

Ultimately, our economy and all industries are becoming knowledge-based. A PhD is the highest level of training that you can get in analysis, in how to draw insights out of data. Those are fundamental skills to drive all businesses in the future, and a PhD is the highest level of preparation for the intellectual processes you need.

Of the education graduates within the public sector, over 60% work in schools, mainly as teachers, principals and psychologists, with the rest mostly in government health authorities, as researchers, psychologists, and program leads.

The single largest employer for engineering graduates in the public sector is BC Hydro (with graduates working mostly as specialist engineers). The rest work mostly in government research institutes or city governments (the latter mostly in management positions).

I am happy being [a government research organization] employee. After my graduation from UBC I have been working on [clean energy and energy conversion technologies]. The Canadian government has

supported these research activities for decades. Recent transition of NRC drives the researchers closer to the industrial needs.

- Engineering PhD, government research organization

In the health sciences, the vast majority work in health care institutions or associated research centres, as health professionals (some of whom are also likely independent scientists), researchers (principal investigators and research associates), and managerial staff. The remainder work in government agencies as researchers, professionals, analysts, and managers.

Top employers, public sector:

- Local health authorities and associated research institutes (81)
- Government of Canada (44)
- Government of BC (20)
- BC Hydro (12)
- BC School Districts (7)

Common Public Sector Position Titles:

- Senior analyst
- Psychologist
- Principal advisor
- Research associate
- Research coordinator
- Scientist

In all sectors and disciplines (especially in the health sciences, engineering, and education), a good proportion of graduates enter or continue in professional occupations not requiring a PhD. However, these graduates often express appreciation for the experience of the PhD, and feel they use the expertise gained.

I have maintained the same full-time employment throughout my PhD and after completion. I continue in self-funded research, working to translate our work from bench to clinical.

- Health sciences PhD (health professional), public sector

The 124 sciences graduates in the public sector work in comparable numbers for the Canadian

government or its agencies (e.g., Environment and Climate Change Canada, Fisheries and Oceans Canada), for foreign governments or institutions, in health care institutions or associated research centres, and in provincial governments and their agencies. They work mostly as scientists and analysts, with a significant number working in management (directors, project leaders, etc.).

From the social sciences and humanities, about half (and almost all public sector employed graduates from psychology and interdisciplinary studies) work in the health sector, generally as professionals, consultants, and administrative leaders. The remaining work mostly as analysts, advisors, and administrative leads in a variety of sectors, including finance, public administration and First Nations communities.

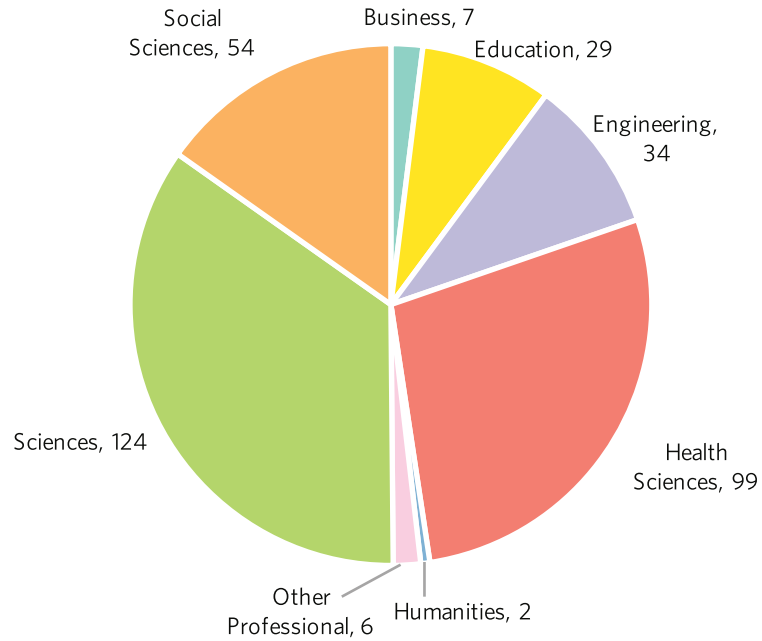
Graduates in the not-for-profit sector are predominantly in research institutes and healthcare facilities

A vast diversity of not-for-profit groups or institutions employ the 143 graduates in this sector. Health science graduates work mainly in healthcare institutions and research institutes, mostly as scientists, postdoctoral fellows, and managers of research, development or educational operations. Among the employers of graduates from other disciplines are research centres, sustainability NGOs, healthcare institutions, scientific publishing offices, museums, and First Nations organizations.

Sample Non-Profit Employers

- Centre for Drug Research and Development
- Canadian Science and Technology Museums Corporation
- Global Crop Diversity Trust
- Mayo Clinic
- Da Vinci Science Center
- Genome B.C.
- MaRS Innovation
- NATO
- Stó:lō Research and Resource Management Centre
- Scripps Research Institute
- Allen Institute for Brain Science

Public Sector Employment by Graduating Discipline



Alumni Profile: Lauren Hunter
(PhD '07, GRSJ), Head, IN.spire Innovation Hub

When I came to take my PhD, the supervisor I wanted said he wouldn't take me on unless I committed to using my education for the public good. He wasn't interested in training me for the sake of my own edification. So coming out of university I had a passion for new ideas, grounded in delivering real value for real people.

By title, I'm the head of the first innovation hub in the Government of Canada. But in practice, I am a professional troublemaker motivated by advancing innovation for the sake of the public good. I lead a team of mavericks who were hand-picked for their ability to look at the same system everyone else looks at and see something completely different—a chance for a paradigm shift towards a new iteration of the Public Service, optimized for a digital age.

If I say, "Does my job look like what I expected or planned?", then the answer is no. But if I answer, "Does my job give me what I wanted?", then the answer is yes. I'm in a position that I love and I am surrounded by a great team, where I'm continuously learning and I feel I'm making a contribution.

www.grad.ubc.ca/alumni/profile/lauren-hunter

They are employed mainly as scientists, specialists, and administrators (e.g., director of business development, director of programming, legislation and policy manager). Several founded their own non-profit companies.

Challenging and rewarding to be doing research and evaluation work that is actionable and used by stakeholders.

- Education PhD, not-for profit

One half of graduates working within higher education are research-intensive faculty; the percentage rises steadily by the number of years out

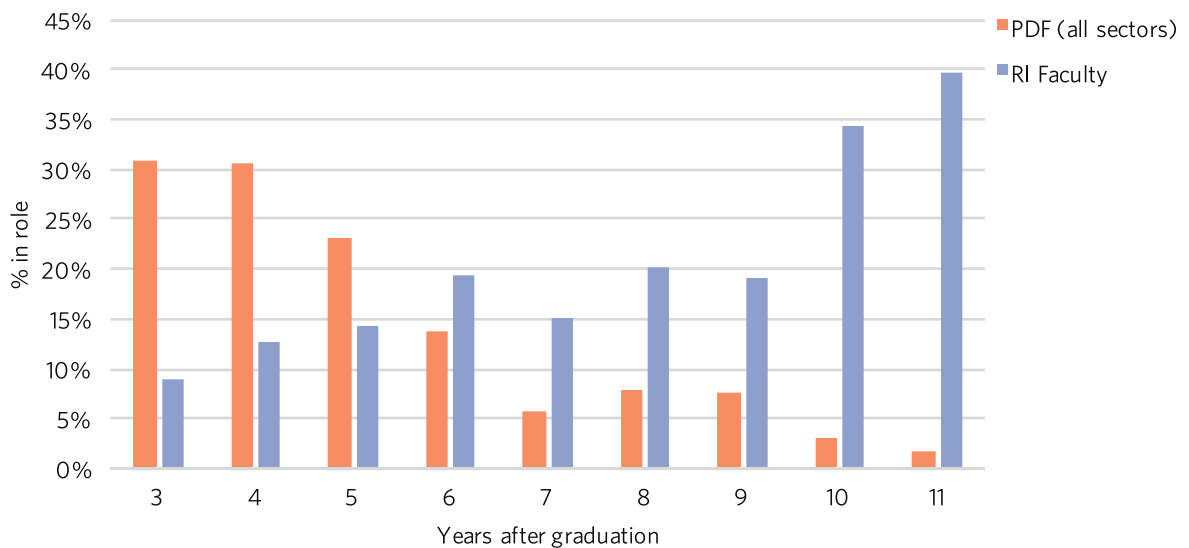
One half of all graduates are employed or doing postdoctoral fellowships in higher education. Over all years, the roles are divided as follows:

- 48% are in research-intensive faculty positions
- 17% are in teaching-intensive faculty positions

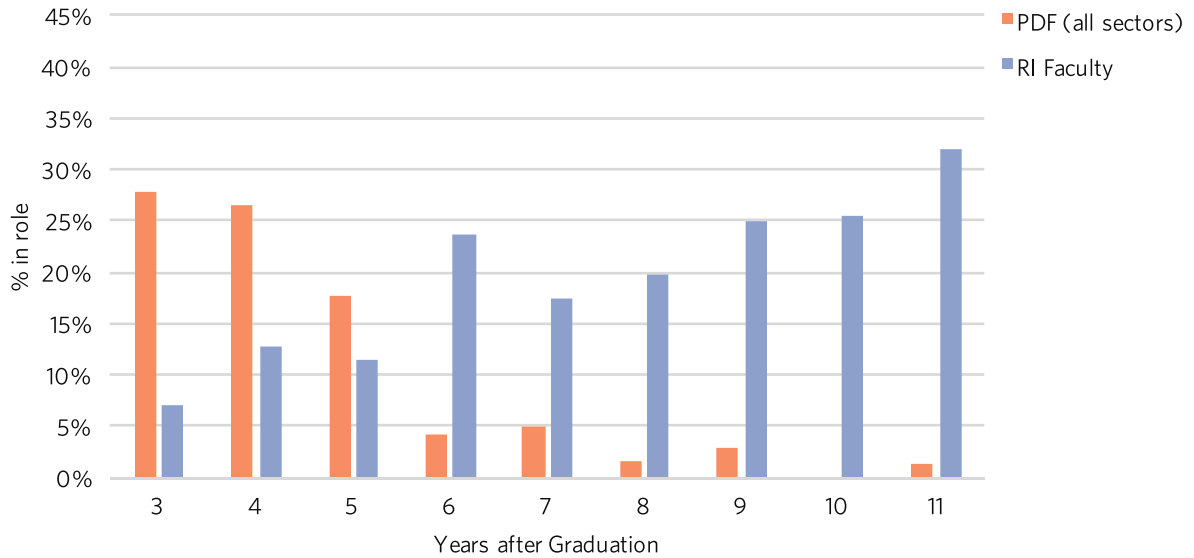
- 15% are doing postdocs
- 5% are in term faculty positions, and
- 15% are in other positions (in research or administration)

The proportion of graduates working as RI faculty among all graduates in all sectors is 24% (or 27% of all known, employed graduates). As mentioned above, the proportion of RI faculty increases as years to graduation increase, from 16% (3 years out) to 34% (11 years out). The long periods of time to reach an RI faculty position is observed most dramatically in the sciences and health sciences, where RI faculty comprise 7-9% of graduates of the 2013 cohort, but 32-40% of the 2005 cohort. As the study was not longitudinal, there may be other factors contributing to this trend (including the 2008 recession), but it is consistent with the typically lengthy periods of postdoctoral study in these disciplines.

Health Sciences - RI Faculty, PDFs by Years After Graduation



Sciences - RI Faculty, PDFs by Years After Graduation



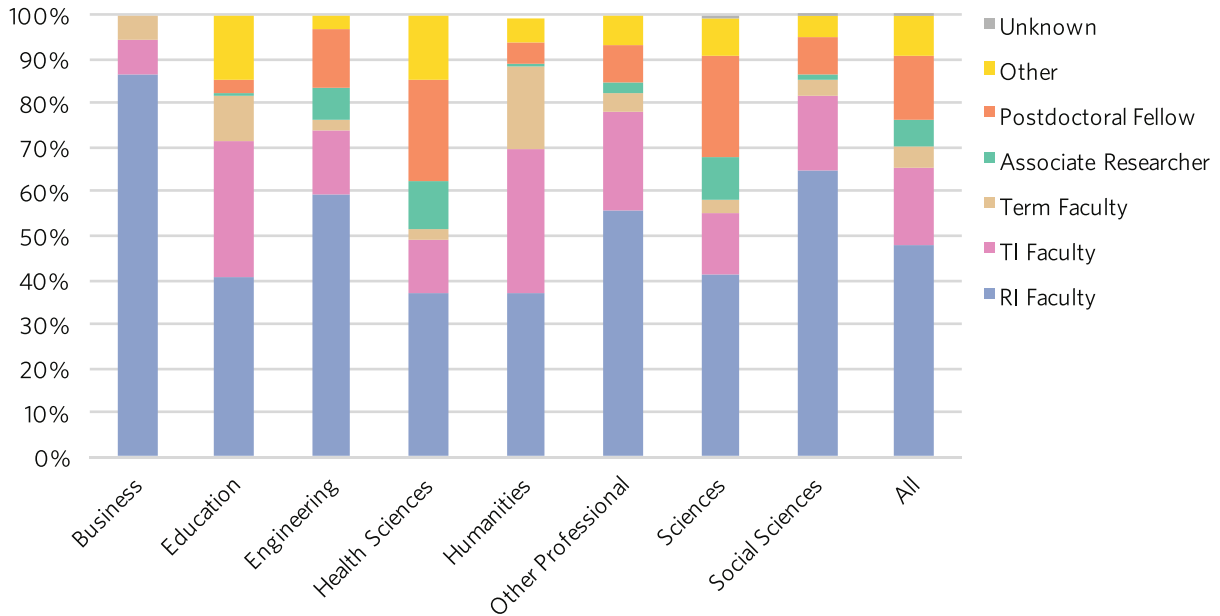
It is challenging to meaningfully compare these figures with other studies, as there are many differences in population, methodology, and definitions. As our definition of RI faculty is quite conservative, it likely underestimates the number in this group relative to other studies. That said, our percentages in RI faculty positions are in line with almost all those found elsewhere. At 6 years after graduation, 29% of our graduates are in RI faculty positions, identical to the percent of “university professors” in the equivalent cohort of the HEQCO study. Forty-one per cent of UBC graduates in this cohort are in some form of university teaching position, compared to 35% of the Ontario graduates. At 10 years after graduation, 29% of Stanford graduates were in tenure-track positions in the US, whereas 33% of our graduates are in those positions at 10 years. For science, engineering and health disciplines, the NSF found 19% in tenure-track positions at 3-5 years after graduation; our equivalent proportion is 13%.

The humanities is one discipline that is distinctly different in Canada from the US in terms of

proportions in various academic positions. The Modern Language Association, the American History Association, and the Stanford (humanities) studies found tenure-track employment in the range of 50% by 2, 4 or 5 years after graduation, whereas the MLA study of Canadian universities found 26% of modern language PhD graduates in tenure-track positions. Our equivalent proportion for all humanities was 28%. This may be partly due to the greater diversity of higher education institutions in the US, with related differences in the definitions of faculty roles.

Within higher education, humanities graduates are the most likely to be engaged as term faculty (19% over all years); education and humanities graduates as teaching-intensive faculty (31% and 33%, respectively); and health sciences and sciences graduates as postdocs (23% each) and associate researchers (11% and 10%, respectively).

Positions within Higher Education, All Graduates 2005-2013



Faculty in research-intensive universities with the title assistant professor are sometimes in contractual, non-renewable positions. This is rarely, if ever, cited as such on websites, but happened to be mentioned by 10 surveyed assistant professors (of 344) in their comments. We don't know the actual proportion in this situation, but it does raise some concerns about a lengthening of the already long paths to permanent employment for some.

Most graduates are employed in Canada

In this and the following sections on location, we will consider only the graduates who are employed (including postdoctoral fellows), and for whom employment information is known. Over all cohort years, about 60% of these graduates are located in Canada, and 41% overall in British Columbia. The proportion of those in Canada in earlier cohorts is slightly higher than those in later cohorts (ranging

from 63% in the earliest cohort to 59% in the latest), due possibly in part to some graduates returning to Canada after having completed post-docs or other employment away. These proportions are slightly lower than those found in either the McGill or HEQCO studies (64-66% at 5-6 years, relative to our 57-58% over the same years).

The most common destination after Canada is the US (21%), followed by Asia and then Europe. As might be expected, Canadian citizens are most likely to be located in Canada (75%); graduates who were permanent residents at admission are less likely to remain in Canada (55%), and international students are the least likely (38%). Very generally, about a third of international graduates reside in the geographic region of their citizenship, with the remaining mostly in Canada, and then the US. About 25% of graduates from the world's least-developed countries¹⁵ returned to their country of origin.

¹⁵ As defined by the UN Committee for Development Policy, 2016



Employment locations vary by sector and role

Research-intensive faculty are the least likely to be in Canada (47%), and term faculty the most likely (83%). This is similar to the HEQCO finding that tenure-track faculty were the most likely group to be located outside of Canada; and also with the American Historical Association, which found that faculty who remained in the same regions as their doctoral education were much more likely to be employed in non-tenure-track positions. Just over half of all university faculty are located in Canada, similar to the HEQCO findings.

Of those employed within the private sector, 66% are located in Canada, with 50% overall in B.C. Of the 23% located in the US, just over half (whose state location was known) are on the West Coast.

A number of respondents expressed disappointment that they felt they had to leave Canada to find suitable employment.

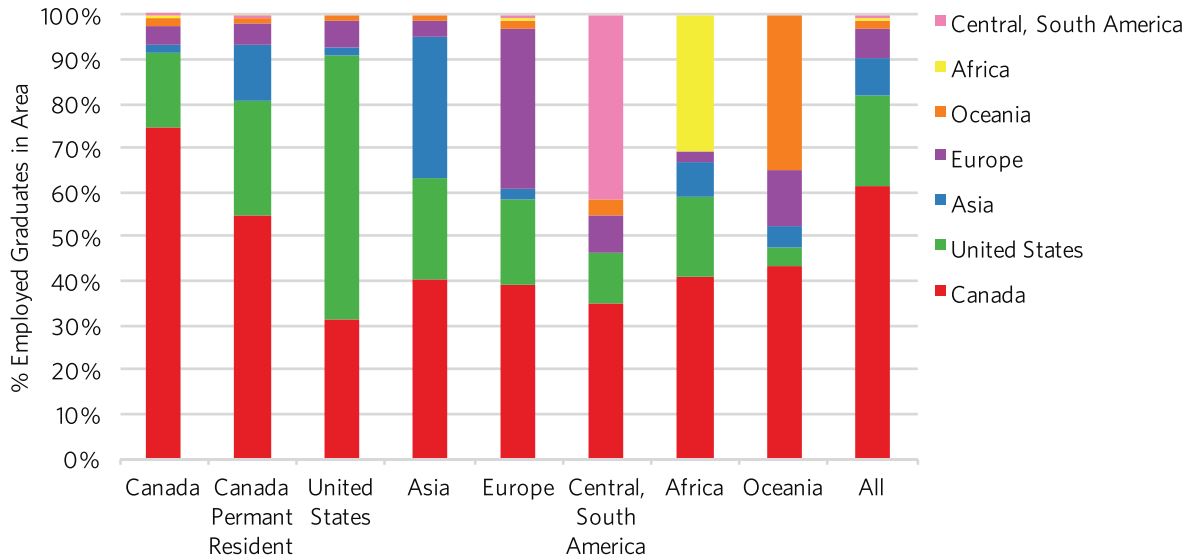
Although I would like to be employed in Canada, the science opportunities and the salaries in the US are much more reflective of the overall priority the US places on the value of science compared to previous Canadian governments and industry.

- Canadian health sciences PhD, not-for-profit sector

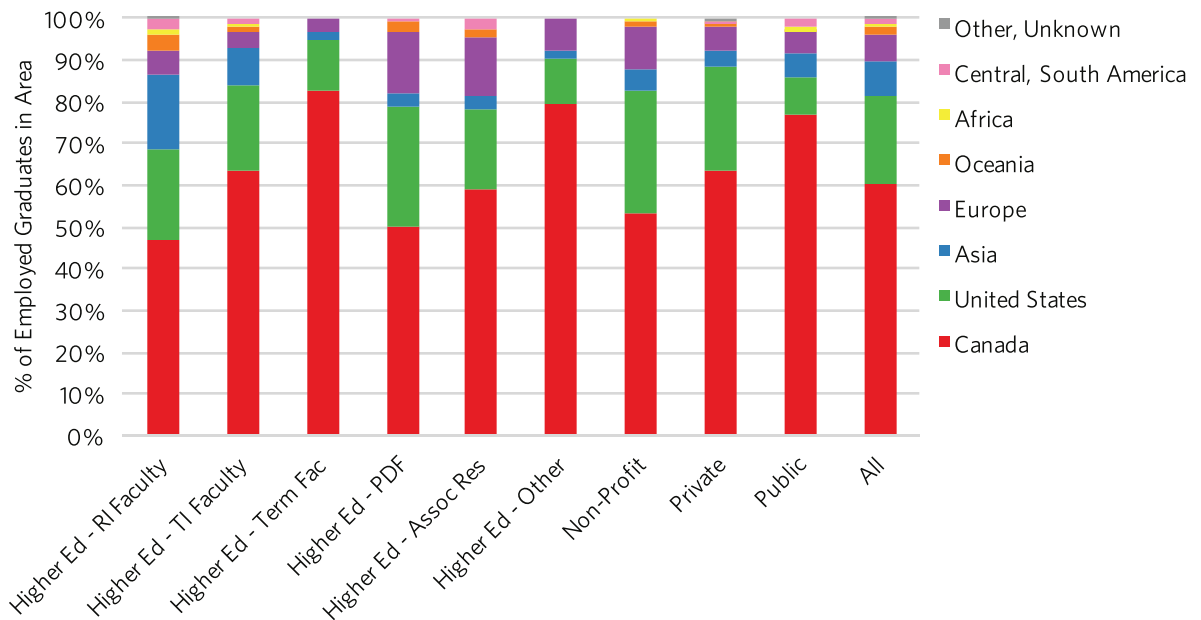
Although not directly comparable, a higher proportion of PhD graduates from US institutions have indicated their intent to stay at least part of the 10 years after graduation in the US (with 70% intending to stay only in the US, and an additional 27% intending to work both in the US and abroad)¹⁶. As in Canada, temporary visa holders were less likely to intend to stay, and women were more likely to intend to stay.

¹⁶ [Profile of Early Career Doctorates](#) (2015) National Science Foundation.

Current Location by Starting Citizenship/Visa



Current Location by Sector, Role





**Alumni Profile: Hannes Dempewolf
(PhD '12, Botany), Senior Scientist - Head of
Global Initiatives, Global Crop Diversity Trust**

To be able to feed an increasingly hot and crowded planet, farmers... need crops that are well adapted to the conditions agriculture is facing today and into the future. The foundation of crop improvement is the amazing array of biodiversity within the plants we cultivate and eat. Through my work at Crop Trust—whose mission is to conserve and make this crop diversity available—I feel I can contribute every day to solving one of the world’s greatest challenges. My work takes me from farmers’ fields in Ethiopia

to national parks in Costa Rica to the Svalbard Global Seed Vault in the Norwegian High Arctic.

I always envisioned working as a researcher either at a university or at an international research organization. The fact that I ended up managing projects as a job rather than carrying out field or lab research is something I very much enjoy but would not have necessarily predicted at the start of grad school.

My education at UBC has helped me understand how important it is to pay close attention to the science/policy interface. Little did I know when I first started grad school that I would enter a job in which I am confronted with navigating science/policy interface on a daily basis. It requires a lot of scientific background knowledge but also a sensitivity towards – and understanding of – multiculturalism, which certainly is something that my time at UBC has helped teach me.

www.grad.ubc.ca/alumni/profile/hannes-dempewolf

Women are less likely to leave Canada, to enter the private sector, and to have research-intensive faculty positions

Relative to men, a higher proportion of women enter careers in the public and not-for-profit sectors, with more men, proportionately, in the private sector. Within higher education, men are more likely to have research-intensive faculty positions, while women are more likely to have term positions and other careers within academia. These same trends are seen within almost all disciplines, and with both earlier (8-11 years out) and later (3-7

years out) cohorts, although within these smaller groups, the differences do not always reach statistical significance. The discrepancies are greater with international graduates relative to domestic graduates. These gender-related differences are consistent with what others have found, both in North America and Europe^{17, 18, 19, 20}.

We wondered whether disciplinary differences could contribute to some of this effect (e.g., if male-predominant disciplines had higher than average research-intensive outcomes or vice versa), but the difference holds when these are excluded in the analysis.

17 HEQCO, op.cit

18 Conti A and Visentin F (2015) *Science and Engineering PhD Students’ Career Outcomes, by Gender*. *PLoS ONE* 10(8): e133177

19 Shen H (2013) *Inequality quantified: Mind the gender gap*. *Nature* 495:22

20 *MLA Survey of Placement of 2006–07 Graduates from Doctoral Programs in the United States and Canada* (2011)

Sector Employment by Gender

Sector	% of all women	% of all men
Public	10.2	7.3
Private	19.7	30.9
Not-for-profit	4.4	2.6
Higher Education (HE) - all	44.8	42.2
HE - RI faculty	22.4	25.7
HE - TI faculty	9.7	8.2
HE - Term faculty	3.5	2.0
HE - Assoc Researcher	3.1	3.1
HE - other or unknown	6.1	3.2
Postdoctoral fellow	10.0	7.8
No information	10.1	8.5
From survey data only:		
Out of workforce	2.5	1.0
Seeking employment	1.6	1.6

Shaded cells denote statistically significant ($p < 0.05$) values higher than those for the other gender. Sector employment values exclude postdoctoral fellows, who are categorized separately.

The very large difference in social sciences RI faculty positions is influenced by the male predominance and high RI faculty rate (74%) of the economics department. The difference is smaller but still significant (10 percentage points rather than 15) when those data are excluded. Even though a relatively high proportion of women across all cohorts are doing postdoctoral fellowships in the sciences, the earlier cohort (8-11 years out), with almost no postdoctoral fellows, still had more men in tenure-track positions (26% vs. 22%). It is certainly possible that the larger proportion of female postdocs in their early years will translate to relatively more tenure-track women in the years to come.

While the gender-related differences in academic careers are not large, they are in line with the observation that, in most countries, women continue to be underrepresented in starting tenure-track positions relative to their proportion in graduating PhD cohorts. Many reasons have been proposed for this, including continuing bias in the academy, a lack of role models and mentors, and relatively inflexible working conditions (although much has been done in recent years to mitigate these challenges). Studies have shown somewhat less of an interest among women in research-intensive faculty careers, due in part to differing personal values and circumstances, including a feeling that such careers—in the current culture—are incompatible with raising a family^{21 22 23 24}.

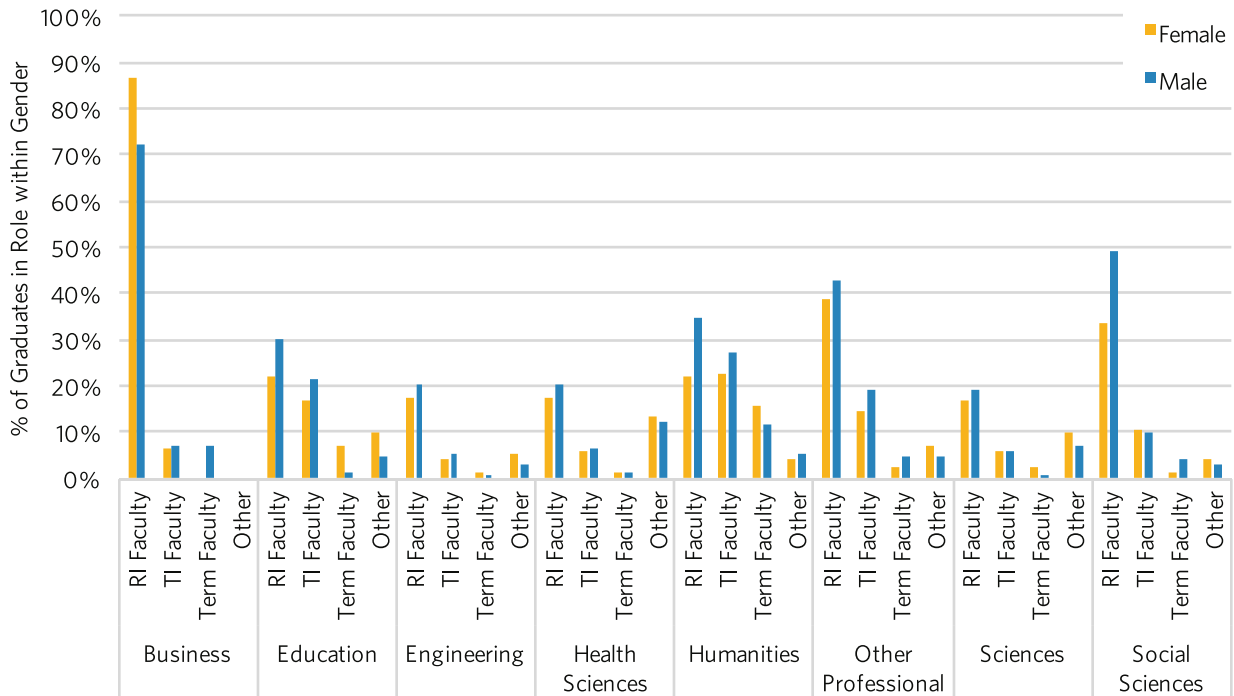
21 Shen H (2013) [Mind the Gender Gap](#). *Nature* 495:22-24.

22 Gibbs KD, Griffin KA (2013) [What Do I Want to Be with My PhD? The Roles of Personal Values and Structural Dynamics in Shaping the Career Interests of Recent Biomedical Science PhD Graduates](#). *CBE-Life Sciences Education* 12:711-723.

23 Gibbs KD, McGready J, Bennett JC, and Griffin K (2014) [Biomedical Science PhD Career Interest Patterns by Race/Ethnicity and Gender](#). *PLoS ONE* 9(12): e114736

24 [Change of Heart: Career Intentions and the Chemistry PhD](#) (2008) Royal Society of Chemistry (2008)

% of Graduates in Higher Education Positions by Gender (not including PDFs)



Many survey comments from women reflected these concerns and related obstacles. Two men described family considerations in their career choice (0.8% of men’s comments), but 18 women cited this as a factor (6.3% of women’s comments). No men indicated any dissatisfaction with an academic career, other than with the length of time getting there, whereas 5 of 20 women faculty who commented on career satisfaction expressed some dismay with the stresses of their position and its impact on their personal life.

After spending a few years at home with my children I was disappointed to find that it made me no longer eligible to receive postdoctoral funding in Canada due to the length of time since completing my PhD. So unless I leave the country I am not able to continue with my chosen career path²⁵.

- Woman, non-salaried

25 CIHR has since removed that restriction from postdoctoral fellowship eligibility criteria.

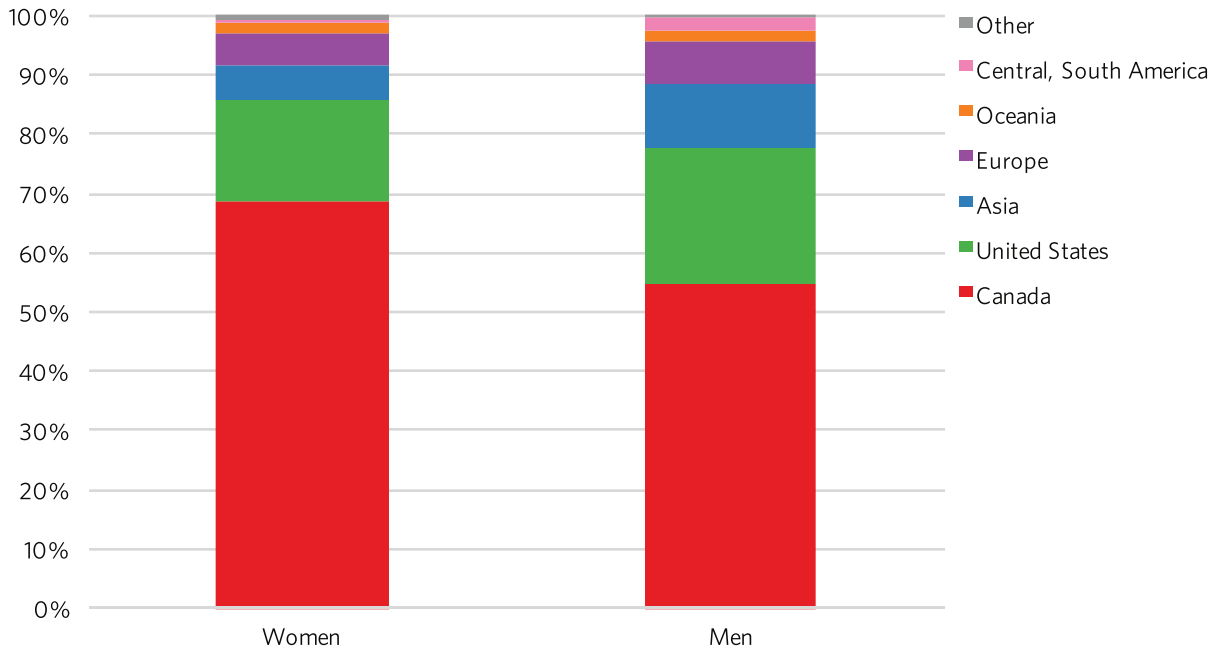
I have found that the field of science is not flexible in terms of family planning or part-time employment. Having a doctorate will hopefully be an asset as I look to retrain in the near future.

- Woman, non-salaried

I don't think I really understood that I would likely have to work far from family and friends after it was all over. There is much talk of work-life balance and very little evidence it is practiced or really supported by universities. This is unfortunate as it makes many of us less effective educators and terrible role models.

- Woman, tenure-track faculty

Current Location of Employed Graduates by Gender



A likely related finding among UBC graduates is that employed women are much more likely to stay in Canada than men (69% vs. 55%). This is true among Canadian citizens (81% women stayed vs. 69% of men) as well as permanent residents and non-Canadians. As there are many more top-ranked universities outside of Canada than within Canada, does this mean that women faculty are less likely to be employed by top institutions? We found, in fact, that women in research-intensive faculty positions are as likely as men to be employed by the 100 top-ranked universities (using the 2016 Times Higher Education rankings of world universities), whether they were Canadian or non-Canadian citizens at admission. Thirty per cent of Canadian women and 29% of Canadian men in tenure-track positions are employed by a top 100 university; the corresponding proportions for non-Canadians was 19% for both women and men.

91% of employed survey respondents (1644 out of 1800) agreed with the statement that their job was ‘a useful step along a desired career pathway’.

Those in RI faculty positions are most likely to feel that their job was a useful step in a desired career, and those in term faculty positions are least likely to feel that. Those who responded yes to the question often provided comments indicating a deep fulfillment in their chosen career, and appreciation of their education at UBC. Faculty members frequently indicated it had been their goal from the start, and included as key to their satisfaction “getting to do research”, teaching, and working in a dynamic environment.

Outside of academia, those engaged in research also spoke of their love of research. Many graduates in administrative leadership positions expressed great satisfaction with being able to use their analytical and creative skills to make a meaningful and immediate impact (their work is “fun”, “exciting”, “challenging”, “extremely rewarding”).

I am now a part of senior management at my company. I love the thrill of industrial research and the unique competitiveness of business, and the fact that my work has real impact on the world, right now.

– Sciences PhD, private sector

This is an absolute dream job. I am continuing the research that I started in my graduate studies. I am being groomed for a permanent position [in government] as the content expert in my field of research. I feel highly valued here.

– Health sciences PhD, public sector

Fantastic job. Graduate work at UBC was an excellent preparation for this fascinating career turn. The so-called ‘transferable skills’ are apparent every single day.

– Humanities PhD, academic administrator, higher education

Mission accomplished and living my dream. Thank you for making it happen.

– Business PhD, research-intensive faculty

It’s a great environment to be in when it’s such a fast-paced field. Working on different projects allows you to stay in the know on cutting edge tools and analysis.

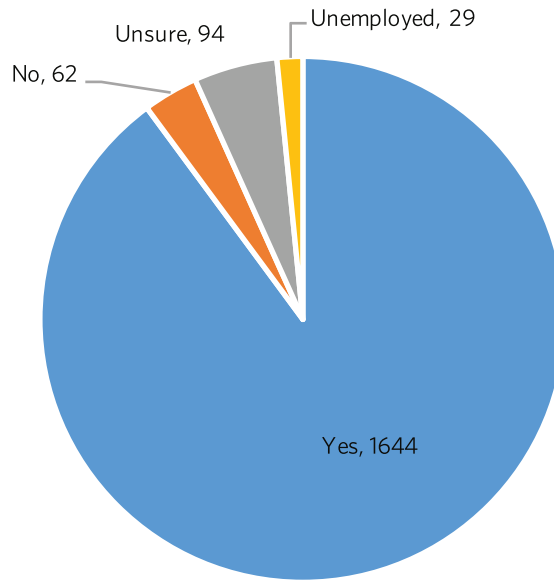
– Sciences PhD, university research associate

Most of those who had some dissatisfaction with their job had been unable to find a job in their field or desired career

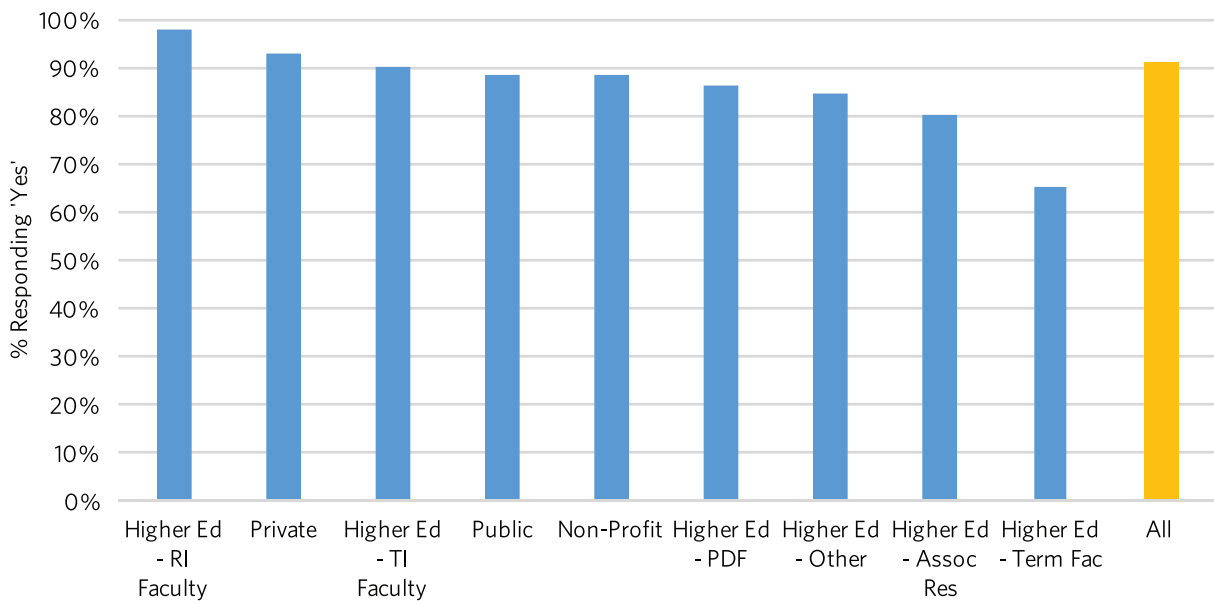
It was clear from many comments that the question of whether graduates’ jobs were a ‘useful step along a desired career pathway’ was not always easily answered. Of the graduates who answered yes and provided comments, about 15% described some dissatisfaction with their job or career. Because the direct question of career satisfaction was not asked, however, no quantifiable conclusions can be drawn from these comments. There were nevertheless common themes in the comments that are worth noting.

The vast majority of the 150 comments that indicated some degree of dissatisfaction with the respondents’ career trajectory referred to the poor job market. By the term ‘job’, many commentors seemed to refer only to tenure-track jobs, but a number also said they found it difficult to secure any job relevant to their PhD. It was clear that for many graduates, any career other than as a research professor was ‘Plan B’. Some were prepared for this and accepted it, others had a very challenging time. A number ended up in less desirable careers, and some felt they had to retrain or take further education in another area to improve their employability. Some felt overqualified in their jobs, including several who considered their PhD a disadvantage in the job market. Many said they felt misled about prospects for academic careers, and this seemed to be especially difficult for international students.

Is this job a useful step along a desired career pathway?



Is this job a useful step along a desired career pathway? (Sector, Role)



I believe that universities either need to come clean with would-be PhD applicants about the current dearth of jobs in academia (some of the jobs for which I applied had over 400 applicants) or they need to do a very good PR job of explaining to other sectors why employing a PhD in a non-teaching/research position would be beneficial to them. Most of the non-teaching/research jobs for which I apply perceive me to be overqualified, a threat or inaccessible because I have a PhD, and to require a large salary.

- Humanities PhD, higher education, non-faculty position

Self employment is NOT what I had imagined when I began in the PhD program, nor was it ever discussed as a viable option while I was in the program—in fact nothing except an academic career was discussed, and even then the realities of the current academic job market remained a complete mystery to me until after I had graduated which is too late.

- Professional discipline PhD, self-employed

Unfortunately there are very few academic/faculty positions available to me and my specialization. The dream of becoming a professor and developing my own research, teaching and mentoring programs appears to be somewhat out of reach as a result...I am forced to accept the reality that I will likely need to leave academics in order to pursue a career in industry.

- Sciences PhD, postdoctoral fellow

I tried so hard to stay in [the relevant] industry, applied for many academic and industry jobs (over 200) but didn't get the chance to find anything in my field of expertise and I had to switch to [another field] to find a job.

- Engineering PhD, private sector

A number criticized the dynamics of the current academic labour force, especially the use of contingent, rather than tenure-track faculty.

It is precarious, unsatisfactory and not conducive to advancement.

- Social Sciences PhD, term faculty

The tenure track world is growing ever smaller! We are organizing here to resist, but it is tough times...I find myself doing a good part of the research that would be expected of a tenure track job on top of a full teaching load designed for a teaching-only position.

Too many others are doing the same.

- Education PhD, teaching-intensive faculty

Faculty feel well-prepared for their careers; those outside the academy vary in their feeling of preparedness

Among the survey responses, there were expressions both of feeling well prepared for the career the graduate had entered, as well as of feeling unprepared. Virtually all faculty member respondents who provided comments about preparation expressed a feeling of being well-prepared for their jobs; those outside of academia gave varying comments about preparation. Graduates in non-traditional careers who felt well-prepared referred not only to the knowledge gained during their program but to their abilities and orientation to research. Some noted especially the value of having pursued research with non-academic partners, or having worked on interdisciplinary projects that broadened their thinking and experience. Others noted their transferable skills (communication, leadership, etc) gained through both experience and courses, and experiences and connections they had with individuals and external organizations during their degree.

Knowledge gained in my PhD years might not have direct impact to my job, but the skills gained, e.g., how to do research, how to solve a problem, the courage trying to solve a hard problem, is super important in gaining and doing my job well.

- Engineering PhD, private sector software engineer

My PhD...allowed me to focus my dissertation on philanthropy...which eventually led me to my career in...philanthropy. My PhD prepared me for the complexities of working within a dynamic organization undergoing profound funding and structural changes. As a result of completing a rigorous doctoral program, I am able to complement my practical profession with an academic paradigm in the emerging profession of [field-specific] philanthropy in Canada.

- Education PhD, not-for-profit sector

The current [field] provides a number of challenges for work in the private sector. My advanced education provided broad-based experience that equipped me to mitigate these challenges by expanding beyond traditional work in the private sector in to fields related to [societal issues, policy development] and other areas of the sector. Such diversification of the [program] should continue - not only to ensure that the sector fulfills its development potential - but to support quality employment of future graduates.

- Engineering PhD, private sector (whose dissertation research included work with communities, NGOs, and government organizations)

My PhD...experience at UBC supported an interdisciplinary and transdisciplinary approach which has enriched my capacities to bridge research and practice.

- Sciences PhD, not-for-profit sector (whose dissertation research included work with NGOs)

I have my dream job :) The networking opportunities I had throughout my PhD program and the training experiences I had were invaluable towards helping me secure my current employment.

- Education PhD, not-for-profit sector

Those who felt less prepared cited primarily a lack of understanding of career possibilities, as well as a lack of business skills, of applied knowledge, and of connections with the types of environments they could enter. It seems that many who described a lack of job prospects did not envision the possibility of career paths other than those in academia.

No luck with a tenure track position yet...It honestly feels terrible. I know my work in my current position is valued and that I can remain as a postdoc indefinitely. Moving on to a next step/something permanent seems out of reach.

- Professional field PhD, postdoctoral fellow

I've applied for literally hundreds of tenure track jobs and nothing...With governments cutting back hiring, universities cutting back hiring and switching to adjuncts in a big way many of us are left on the sidelines.

- Education PhD, self-employed/term faculty

A very prevalent sentiment was that UBC needs to do more to raise awareness and offer better preparation for non-academic careers. Suggestions provided by respondents include:

- Provide opportunities to develop business skills
- Offer more applied coursework
- Facilitate connections with other sectors
- Be more accepting of and transparent about non-academic careers
- Be proactive in educating about non-traditional careers
- Encourage expanded mentorship beyond that provided by the supervisor.

I think many of us would have benefited greatly from a much higher focus on the business elements of science, as well as alternative career paths in general.

-Health sciences PhD, private sector

[My] department at UBC could do a better job of preparing students for the job market outside academia... In particular, more diverse experiences, connections... especially with industry and non-profit organizations.

- Social sciences PhD, public sector

More focused technical courses in applied [field] would have helped prepare me for the jobs available outside academia. There is lots of work in applied [field] in BC right now, but UBC needs to develop an updated applied program to prepare its graduates to move into these positions.

- Social sciences PhD, public sector

I would love to see UBC (and funders) implement... policy changes...including: Incoming graduate students should be educated about career options and provided with career development advisors...Pls should be positively evaluated for diversity of successful career paths taken by their trainees, and not just on the number placed in research-track careers...include [career outcomes] on public websites for all grad programs;...make supervision of graduate students a more communal responsibility, less dependent on the judgment of a single faculty member

- Health sciences PhD, not-for-profit sector

Future engagement

We were delighted that over 900 survey respondents indicated they were interested in engaging with current students to share their career experiences.

If current PhD students find that what they truly love doing is teaching, I would be happy to talk with them and share my experiences with ultimately choosing a teaching career over a research career.

- Business PhD, teaching-intensive faculty

I would be happy to engage with any graduate students who are looking into ways to commercialize the subject of their academic research.

- Sciences PhD, not-for-profit sector

I had very few female role models who became a mother while also trying to secure a tenure-track position, so I'd be happy to share my experiences with current graduate students.

- Sciences PhD, tenure-track faculty

Limitations

We should note several limitations of this project. There are almost certainly inaccuracies in both the survey response data and the internet-retrieved information. It was particularly difficult at times to accurately categorize roles in higher education, the sector categorization was not always straightforward, and, for the internet searches, the information many not have been current, and links to the graduate may have been incorrect. We did make substantial efforts to minimize these potential errors, however, and have confidence in the data overall. Another issue is the lack of standardization of these types of studies, and the difficulty in making meaningful comparisons across institutions or regions.

WHAT UBC IS DOING NOW TO ENHANCE POST-GRADUATION PREPAREDNESS

Making career outcome data transparent

A repeated concern raised in this study and in our experience is a lack of awareness of the possible career paths available to students, and of the likelihood of an academic career. The completion of this report and its publicization are among the many ways the university is addressing this. We have distributed each program's alumni employment data to them, and have posted summarized data for each program on our website's [program listings](#) (in addition to other relevant data) to ensure prospective students have a good understanding of possible and likely career outcomes when they make their decisions to apply and enrol. We have also created an interactive website with the data from this survey. It can be viewed at: outcomes.grad.ubc.ca.

Providing opportunities to engage with and learn from PhD holders from outside academia

Many graduate programs and faculties host career events, often including doctoral alumni who have entered a variety of careers. The UBC Centre for Student Involvement and Careers (CSIC), often in partnership with G+PS and other units, also regularly hosts career events that are generally very well attended and received. The G+PS and CSIC websites post interviews and [profiles of alumni](#) in a diversity of careers, and this will be expanded. We encourage programs to use these profiles, in addition to those they have or will create themselves.

Providing opportunities to experience work environments outside of academia

Although many doctoral students have already engaged in careers outside of academia, many have not had the opportunity to do so. Or, if they have held jobs outside academia, those positions have not necessarily been at a level that uses their advanced knowledge and skills and facilitates the development of their broader competencies. Internships or co-op programs are excellent ways to do this. The national [Mitacs internship program](#) is well-used by UBC students, and there are several UBC-specific programs, including the English PhD [co-op program](#) and the UBC Biodiversity Research Centre's [internship program](#).

Providing curricular and extracurricular offerings to develop career-related skills

This has been a focus for UBC (and many universities) for several years. A suite of workshops and programs is offered by our [Graduate Pathways to Success](#) program, focusing on competencies relevant to both academic and other professional contexts. CSIC offers individual career advising services and career-building workshops, and both frequently work with academic units to offer contextualized programming. Increasingly, individual graduate programs are also embedding such discipline-specific learning opportunities in the curriculum.

Reimagining the PhD

The purposes and focus of the research PhD have arguably not changed fundamentally since it was developed in the early 19th century, primarily as a vocational degree for those entering professional careers. Although there has been much discussion and study of the issue over the last few decades, change has come very slowly. UBC is at the forefront of this rethinking. It is one of the few universities experimenting with a more capacious view of doctoral education that takes seriously the importance of the diverse forms of scholarship and capabilities our PhD graduates will need to make a difference in the world. The UBC [Public Scholars Initiative](#) (PSI) is a part of this experiment. The PSI is designed to support and encourage doctoral students to broaden their dissertation research in ways and with partnerships that are more directly relevant to the varieties of work they will undertake after graduation. Through the financial and academic support of the PSI, doctoral students are working with NGOs, governments, industry, and other partners to do research and scholarship that is beneficial to both the partner and the student/university. This work is not intended as an add-on to their 'real' dissertation research, but as integral to the work by which they are judged as having met the requirements of the degree.

This approach is similar to that taken by several of our surveyed alumni, who noted their research approaches and partnerships methods as tremendously helpful in their career development, and as critically important to the vitality of the academy. We agree, and view these extended forms of scholarship as central to the development of broad competencies in adaptability, creativity, leadership, and entrepreneurship—all necessary to realize Canada's innovation potential²⁶.

A report on this pilot project will soon be available at grad.ubc.ca/psi.

26. [Some Assembly Required: STEM Skills and Canada's Economic Productivity](#) (2015) The Expert Panel on STEM Skills for the Future, Council of Canadian Academies.

CONCLUDING REMARKS AND NEXT STEPS

The data presented here provide for the first time a comprehensive picture of career outcomes of UBC PhD graduates. This is overall good news: our graduates have very high employment rates, and are making diverse contributions within all sectors of society. They are researchers, analysts, administrative and scientific leaders, writers, professionals, and more in the private, public, and not-for-profit sectors. They are faculty, researchers, and administrators in higher education. They are consultants and entrepreneurs. They have made a remarkable impact, and many express deep fulfillment in being able to use their knowledge and abilities along their career paths.

It is urgent that departments and faculty members convey their support for the diverse career paths that students choose in a changing job market. The profession should endorse a shift from a narrative of replication to a narrative of transformation.

- Modern Language Association (2014), Report of the Task Force on Doctoral Study in Modern Language and Literature

But there are also some concerning findings. A not-insubstantial number have been unable to engage in the careers they had hoped for. Some felt they had to retrain, some are employed in positions for which they feel overqualified, and some feel they have no choice but to continue for many years in positions that provide little stability or advancement potential. In evaluating outcomes, it is also clear that many factors play into career choices, especially personal circumstances, location restrictions, and personal values.

Many of the comments and data reflect known concerns about the academic workforce, including the long periods of time needed to obtain permanent employment (especially in the sciences), the insecurity and low pay of term appointments, and the challenges of tenure-track faculty employment with respect to work-life balance and accommodation for parenting responsibilities. Many institutions, including UBC, have made concerted efforts to enhance the working conditions of term faculty and to better accommodate the realities of family life for all faculty. These are long-term issues, however, for which there are no easy solutions.

How shall we use this information? As discussed above, increased awareness of these outcomes is crucial, and we have plans to disseminate the information as widely as possible. We also know that students will learn much from the many alumni who volunteered to share their stories and advice, and we anticipate many fruitful interactions over the coming years.

Understanding the scope of careers, and what was or would have been helpful in graduates' career preparation, will inform programmatic and larger strategic directions. Some graduates suggested that more applied coursework would be useful, and several referred to the value of broadened experience and of forming connections to those outside of the academy. As described in the previous section, there is much already happening at UBC in this regard, but more could be done. As we continually re-examine the purposes of the PhD in the face of a changing world, we also need to re-examine the single 'master-apprentice' model of doctoral education. At the very least, students need to feel supported and encouraged by their programs and supervisors in their career exploration and preparation.

CONCLUDING REMARKS AND NEXT STEP

The survey used in this project was intentionally short, with little in-depth questioning about how graduates were using their skills and knowledge, or what was or would have been helpful to enhance their career paths. This was primarily to encourage an (achieved) high response rate. We also felt an online survey would have substantial limitations for these rather complex questions, and believe interviews and focus groups with the graduates (and potentially the major employers) would provide a much richer understanding. We will consider supporting such research over the coming years.

These data present the current state of doctoral employment, and not necessarily the full potential of career pathways. Receiving a PhD indicates the achievement of profound intellectual growth and abilities in critical and synthetic thinking, surely attributes essential for the 21st century knowledge economy. As we continue to watch carefully the ways in which doctoral graduates are contributing to society, and continue to reflect and act on ways to enhance their formation as scholars relevant to today's world, we can envision even more diverse and impactful outcomes in the future.

APPENDIX A – PROGRAMS BY DISCIPLINARY GROUP

Business

Business Administration

Education

Centre for Cross-Faculty Inquiry in Education;
Educational and Counselling Psychology and
Special Education; Curriculum and Pedagogy;
Educational Studies; Language and Literacy
Education

Engineering

Biomedical Engineering; Chemical and Biological
Engineering; Civil Engineering; Electrical and
Computer Engineering; Mechanical Engineering;
Mining Engineering; Materials Engineering

Health Sciences

Anatomy and Cell Biology; Audiology and
Speech Sciences; Biochemistry and Molecular
Biology; Bioinformatics; Dentistry; Genetics;
Kinesiology; MD/PhD Program; Medical Genetics;
Experimental Medicine; Neuroscience; Nursing;
Reproductive and Developmental Sciences;
Interdisciplinary Oncology; Pharmacology
and Therapeutics; Pathology and Laboratory
Medicine; Pharmaceutical Sciences; Physiology;
Rehabilitation Sciences; Population and Public
Health

Humanities

Art History, Visual Art and Theory; Asian Studies;
Classical, Near Eastern and Religious Studies;
Central, Eastern and North European Studies;
Comparative Literature; English; French, Hispanic
and Italian Studies; History; Linguistics; Music;
Philosophy; Theatre and Film

Sciences

Agricultural Sciences; Animal Science; Botany;
Cell and Developmental Biology; Chemistry;
Computer Science; Earth, Ocean and Atmospheric
Sciences; Food Science; Forestry; Human Nutrition;
Mathematics; Microbiology and Immunology;
Physics and Astronomy; Plant Science; Resources,
Environment and Sustainability; Soil Science;
Statistics; Zoology

Social Sciences

Anthropology; Economics; Geography;
Interdisciplinary Studies Graduate Program;
Political Science; Psychology; Sociology; Gender,
Race, Sexuality and Social Justice

Other Professional

Law; Library, Archival and Information Studies;
Community and Regional Planning; Social Work

APPENDIX B - MAJOR FINDINGS FROM OTHER STUDIES

Unemployment rates are low, but vary by discipline

The Canadian 2007 NGS found a 6% unemployment rate for doctoral graduates 2 years after graduation. Highest unemployment rates were found in the humanities (15%) and engineering (8%). The CDH study found about a 4% unemployment rate for doctorate holders within 5 years of graduation, and the NSF found about a 2% unemployment rate for recent graduates. It is likely that not all studies used the identical criteria for unemployment, and they may not be directly comparable.

About half of recent doctoral holders are employed in higher education

This varies significantly by discipline and country. Generally, humanities graduates are most likely to be employed in higher education, and engineering graduates the least: 77% and 34% of humanities and engineering graduates, respectively, are employed in educational services two years after graduation in the 2007 NGS; 72% and 26%, respectively, are in academia 5 years out from Stanford.

Within the professorial stream across Europe and North America, tenure-track position opportunities are falling, and term appointments are increasing

In 1981, 80% of faculty holding doctorates in Canadian universities held tenure-track appointments, compared to 70% in 2010. For faculty under 35, these values fell from 35% to 12%.²⁷

Appointment of recent doctoral recipients to tenure-track positions varies by discipline

Surveys have suggested that, currently, about 20-30% of all recent North American graduates are employed in tenure-track positions. Business, social sciences, and humanities graduates tend to have the highest rates of such appointments. The HEQCO study found 35-40% of humanities and social sciences in professorial appointments and 70% of business graduates 5 years out; for Stanford University graduates 10 years after graduation, tenure-track appointments constituted 54% of humanities outcomes, 41% for social sciences, and 53% for business²⁸. Professorial appointments in science and engineering disciplines have been found to range from 10% to 30%, depending on the discipline and length of time from degree. Biomedical science graduates tend to have the most protracted postdoctoral periods (up to a decade)²⁹ before permanent employment, and surveys conducted before that period may not capture the final employment outcome of these individuals.

²⁷ Desjardins L (2012). [Profile and Labour Market Outcomes of Doctoral Graduates from Ontario Universities](#) (Statistics Canada)

²⁸ These percentages reflect only those employed in tenure-track positions in the US. There were smaller numbers of graduates employed in higher education outside the US, some of whom would be in tenure-track positions.

²⁹ Alberts B, Kirschner MW, Tilghman S and Varmus H (2014) [Rescuing US biomedical research from its systemic flaws](#). *Proc. Natl. Acad. Sci.* 111:5777

About one third of graduates enter the private sector

According to the 2006 Canadian census, 33% of all full-time employed doctorate holders in Canada worked in the private sector. Among Ontario's recent graduates (HEQCO), 22% were employed outside of the public sector (27% of known employed graduates), whereas 34% of Stanford graduates were employed in 'business' 5 years after graduation (42% of known employed graduates).

Most graduates are employed in positions which require a PhD and are satisfied with their careers

Two years after graduation, 70% of Canadian NGS (2007) respondents were working in a job that required a PhD. There were lower percentages in the humanities, engineering, and education and other professional disciplines (66%, 58%, and 57% respectively). Overall, 19% felt overqualified in their job, with engineering graduates most likely to consider themselves overqualified (28%). In the McGill survey, 25% felt overqualified after two years, but at 5 years after graduation, this went down to 15%.

Although not directly comparable, the CDH career satisfaction data for European and American doctorate holders indicate that 85% are satisfied with the intellectual challenge of their employment, and 80% with their working conditions. In a recent survey of STEM PhD holders³⁰, 85% of tenure-track faculty indicated they were satisfied with their job, whereas 71% of faculty in non-tenure-track positions, and 81% in non-faculty positions were satisfied.

A significant minority of graduates from Canadian universities have left Canada by 5-6 years after graduation

A 2005 Statistics Canada survey of graduating Canadian doctoral students indicated that only 20% intended to leave Canada (and many intended to return), however 34-36% of 2008/09 graduates from the McGill and HEQCO studies were employed outside of Canada 5-6 years after graduation.

There are gender-specific trends in employment outcomes

Compared to men, women graduates across most disciplines and countries tend to be paid lower salaries, are more likely to work in part-time positions, and are less likely to have tenure-track appointments. Women are less likely to be employed in the private sector, (and more likely to be employed in the public sector), are less likely to work in research positions, and are less likely to be satisfied with their work. Women are also less likely to move from their country of doctoral education. These differences are not always large, but are consistent in direction.

30 Sinche M (2016) *Next Gen PhD*. Cambridge, Mass: Harvard University Press.

APPENDIX C - METHODOLOGY

Approach

Employment information was sought for all UBC PhD alumni who obtained their degree between 2005 and 2013 from UBC Vancouver. The study was designed to capture a snapshot of current employment information, and anticipated to be repeated at regular intervals (e.g., every 5 years) for the equivalent cohorts of graduates, i.e., 3 to 11 years after graduation.

Graduates were asked to complete an online survey, and internet searches were completed for all those who were not reached or did not respond to the survey. Data were collected in the spring of 2016, with the exception of those obtained through a pilot study in 2015 for the Interdisciplinary Studies Graduate Program (ISGP). Data for the philosophy and English programs were obtained through the national TRaCE project (with additional information sought for non-overlapping cohorts of the two studies) and were subject to the same data cleaning procedures outlined below.

The primary information sought was employment status, employer, job title, academic job category (if appropriate), and location. The survey allowed for both primary and secondary employers, and included the question: “Is your job a useful step along a desired career pathway?” with potential responses of yes, no, and unsure (leading to an answer field allowing free text). A final question asked for any additional comments, and allowed free text responses.

Survey population and response rates

Between 2005 and 2013, 3805 PhD degrees were granted by UBC. As data for the philosophy and English programs (72 graduates) were collected through the TRaCE project, the survey was

designed to reach 3733 alumni. Of the 3733 graduates in these cohorts, there were 139 for whom email addresses were unavailable, and 444 whose email addresses were reported by the survey tool as invalid. Of the unavailable emails, 58 were successfully obtained, and of the invalid emails, 145 addresses were obtained through other means.

Thus, 3,358 survey invitations were delivered to recipients. Response rates varied by program and invitation letter (see below), with an overall rate of 55.6% (1866 responses).

Survey design and implementation

In an attempt to maximize response rates, the survey was designed to minimize the time it would take to complete. The questions were purposely limited, the entire survey was branched on the same page to avoid page reloading delays, and the survey was optimized for mobile devices.

Invitations included a survey URL with an anonymized token that allowed data to be linked in the back end. Thus, we did not request information already in the UBC Student Information System. It should be noted that the Student Information System only allows students to identify as male or female.

The data linking was reviewed by the Privacy Office at UBC, and was determined to be appropriate for this purpose, given that the publicly released dataset would be anonymized. The UBC Behavioural Research Ethics Board concurred that the survey qualified as a quality assurance/improvement and program evaluation study and hence did not require review.

The survey questions can be viewed at outcomes.grad.ubc.ca/docs/2016-UBCPhDCareer-Survey.pdf and the following sample survey shows the branching: survey.ubc.ca/surveys/grad-school/phd-outcome-tracking-methodology-sample/

The survey for both the ISGP pilot and the main study were the same, and were conducted similarly, although the survey branching on the main study was slightly different, based on feedback we received.

Data collection

The survey was distributed through the UBC enterprise edition of FluidSurveys. Email addresses for all graduates were retrieved from the UBC Student Information System and the alumni database, with preference given to those in the alumni system. Graduates were grouped by program, with smaller programs within a faculty grouped together. Units with more than 35 graduates in the study time frame were invited to write a customized invitation to the survey (both text and sender name).

There were 52 separate invitations: 39 were customized by programs/faculties, and a generic group invitation was sent for the faculties of arts and medicine for very small programs. Otherwise, invitations came from the dean of Graduate and Postdoctoral Studies. The invitations were sent in phases over several months. The first survey (other than ISGP which opened on May 4, 2015) opened on February 16, 2016 and the last, on April 11, 2016. Depending on the wishes of departments, recipients were given deadlines of one to two weeks to complete the survey. However, deadlines were not strictly enforced, and surveys remained open even after the advertised deadline. Two to four days before each deadline, a reminder was sent to all those who had not yet completed the survey. Data collection concluded on April 20, 2016, and all surveys were taken offline at that time.

Internet research

For the second phase of the project (April 28 to June 27, 2016), two temporary staff conducted internet searches to retrieve employment position information for all graduates in the cohorts who

had not completed the survey (1900 records). Instructions were provided to the staff, and the results they obtained from one program each were reviewed by G+PS staff for accuracy and adherence to the instructions. A training session was held to address any questions and ensure consistency between their approaches before work resumed.

The researchers were asked to ensure as much as possible that the individual identified online was also identified as having a UBC PhD degree, and preferably also identified with the correct program. They were also instructed to seek an institutional source for information (e.g., university websites). When institutional sources were unavailable, other sources, such as LinkedIn, personal websites, or publications, were used. Confirmation that the identified individuals had been granted a UBC PhD was not always possible; in those cases other information was considered, such as field of study, linkage with UBC individuals, etc. The results were categorized by reliability: high (e.g., data from institutional websites, confirmation of UBC PhD degree), medium (e.g., no primary source confirmation, but multiple sources confirming the same details), low (e.g., LinkedIn or social media account only), and unsuccessful (no results or an unsatisfactory level of reliability). 1127 results were categorized as meeting a high level of reliability, 130 as medium, 221 as low, and 343 as unsuccessful.

Many graduates were employed in multiple institutions and activities. In these cases, a judgment was made to identify an appointment or activity as primary, generally using defined criteria as noted below.

Criteria for determining the primary employment

A consistent approach was sought for the determination of primary employment titles and employers for all graduates with multiple occupations, both for those surveyed and those identified through internet searches. Sessional faculty appointments were generally considered to be primary employment positions, with the exception of those for which there was evidence of substantial engagement in a different occupation (e.g., the primary employment of an individual employed as a nurse who also teaches one course as a sessional would be 'nurse'). A clinical faculty stream appointment was generally not considered to be the primary employment, as many or most such positions are non-salaried, and most clinical faculty are employed full-time as health professionals. Likewise, adjunct positions were not generally considered to be primary employment. If no significant alternate employment for clinical, adjunct, or other non-tenured faculty was identified, their primary appointment was considered a term faculty appointment.

Tenure-track and other apparently permanent academic appointments were always considered to be primary employment positions. For those with multiple occupations other than academic appointments, a judgment was made as to which was most likely the predominant one in terms of time and commitment. (For example, the primary employment of a graduate who worked both as a research manager and yoga instructor would be considered to be primarily employed as a research manager.)

The primary employment identified by survey respondents was normally left as such. Clarification was sometimes needed, and in those cases, internet searches were performed. A small number of changes were made for consistency

both within the survey and between the survey and internet search approaches. This was relevant for both primary job titles and categorization (sector, academic level), as described further below. For individuals who identified more than one primary job title, the above criteria were used to determine a single title.

TRaCE

Graduates from the philosophy and English programs were tracked through the national TRaCE project, which used internet searches only (with subsequent interviews of selected individuals, not included in this report). An overview of the project may be found at iplaitrace.com/about-trace/, and methodological details are included here: iplaitrace.com/wp-content/uploads/2017/01/Stage1_SUMMARY_final.pdf.

Statistical analyses

Statistical analyses were performed only where indicated, and used the Chi Square test, with a significance level of $p < 0.05$.

Data cleaning

All data, whether obtained through the survey or through internet searches, were reviewed by at least two people who had not participated in the retrieval of public data, and all were subject to the same data cleaning procedures. In addition to the identification of graduates' primary employment as described above, the main alterations were as follows:

- General:** Clarity was sought on all job titles and institutions, and attempts to obtain information missing from either the survey response or internet search were made. As an example of the former, the single word 'professor' was often used as a job title, and follow up searches on these were made to clarify the precise title and role.

- Sector: All employment data was categorized into one of four sectors as defined below. Some survey respondents were judged to have misclassified or inconsistently classified their sector (e.g., both 'public sector' and 'not-for-profit' sectors were selected among graduates working for local hospitals), and some sectors in the manually searched results were judged to have been misclassified. Also, the responses for sectors identified as 'other' or 'self-employed' (which shouldn't, in retrospect, have been offered as options) were categorized into one of the other sectors according to the criteria below and the comments provided by the respondents. Institutional attributes (e.g., whether publicly or privately owned) were identified through internet searches as necessary.
- Employer names: These were standardized as much as possible, using identical names for the same employer (e.g., Google Inc. standardized as Google), and decoding most acronyms. If submissions included specific units or affiliated entities to a parent employer, this information was rolled up into the parent employer and the original submission was kept as a secondary classification (e.g., Department of Physics at University X would have become University X with secondary entry as Department of Physics).
- Academic roles: There was substantial inconsistency in the assignment of academic roles to job titles, in data obtained both by survey and by internet search (including the TRaCE derived data). In retrospect, this was due, in part, to insufficiently clear definitions of roles provided to the respondents and researchers, and to the vast array of academic positions found world-wide. All academic roles were ultimately classified as consistently as possible after identifying further information on employer institutions as described in the Definitions section on page 6, and following the criteria and definitions listed there.
- Unusual or unexpected data (internet search only): The occasional highly unusual or unexpected result was identified (e.g., a graduate with no medical education identified as being a physician), and these were followed up and corrected as necessary through internet searches.
- Typographical errors: These were corrected.

Definitions

See page 6 for relevant definitions of sector and academic roles.

Notes

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