Imagining the Dissertation's Many Futures

In late January 2016, the Council of Graduate Schools (CGS) convened approximately 40 scholars and leaders in graduate education, scholarly publishing, academic libraries, and disciplinary associations for a high-level discussion on the future of the doctoral dissertation. Over a two-day workshop supported by ProQuest, the group considered how PhD dissertations are shaped by forces such as scholarly communication and presses, issues surrounding open access and emerging technologies, branching PhD career paths, and disciplinary cultures.

Papers prepared and circulated ahead of the workshop enabled the group to broaden its focus, and during the workshop a robust conversation emerged on Twitter (#DissFwd), engaging a number of interested parties not in the room, including additional graduate students, graduate deans, scholarly publishers, librarians, and others.

During her opening remarks, Dr. Suzanne Ortega (President, CGS) reminded those assembled that the dissertation is a relatively recent innovation and that it has changed considerably, even within the past 10 years (the shift from paper to digital submission, for example). Christopher Loss (Associate Professor of Public Policy and Higher Education, Associate Professor of History, Vanderbilt University) picked up this theme in the first presentation, sharing different ways the dissertation has evolved. The most arresting fact: Originally, dissertations were meant to be completed in "the greater part of an academic year!"[i] Keeping in mind the flexibility of the dissertation over time, workshop participants dived into a discussion of big-picture questions affecting the enterprises of scholarly communication and graduate education, including:

- What is a dissertation? What is its purpose? Who are its audiences and what are their needs?

- What skills are or might be gained as a result of writing a dissertation? What does completing a dissertation demonstrate?

- What formats besides the proto-monograph would support the desired purposes and results of a dissertation? Can nontraditional formats coexist with traditional ones?

- How should/could dissertation research be archived, accessed, and disseminated?

- What is the role of the dissertation in the employment marketplace?

- What cultural and disciplinary barriers exist to rethinking the dissertation?

It was clear from the workshop's outset that differing theories of the purpose of doctoral education would determine the answers to these questions in different ways. For example, if the goal of doctoral education is to educate researchers ready to embark on flexible career paths, the audience of the dissertation might include very different groups than if the goal is to educate the next generation of research faculty. Therefore the outcomes of doctoral education figured heavily into the discussion, albeit often implicitly.

What does a dissertation exist to do? Whom does the dissertation serve?

A wide range of purposes of the dissertation were championed by workshop participants. The idea of the dissertation moving a student from a private to a public phase resurfaced repeatedly throughout the workshop. Dr. Loss defined the dissertation as a "major milestone marking the culmination of one private, cloistered phase of academic life and the start of a new, more public one." Lisa Schiff (Technical Lead, Access & Publishing Group, California Digital Library, University of California Office of the President) indicated that, alongside the scholar entering a public phase, the document itself does so as well when deposited with an institutional repository.

Carol Tenopir (Chancellor's Professor, School of Information Sciences, University of Tennessee, Knoxville) raised the issue of audience, asserting that the primary audience of a dissertation is the committee, but a secondary audience, one with differing needs, comes into play when the dissertation is made public through a repository or posting online. The needs of this audience are less well-defined and sometimes considered suspect or threatening.

Writers who perceive their content both as their intellectual property and as raw material for career advancement have recently sought out dissertation embargos to keep their work from this public sphere. A lively discussion about embargos and international plagiarism ensued; most participants found embargos

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counterproductive when not for specific reasons such as confidentiality of human subjects, funding agency requirements, or pending patent or publication strictures. Attitudes on embargos varied greatly by discipline.

Another important audience for the dissertation emerged throughout the conversation: the student-author herself. For the student, the dissertation is an opportunity to build skills, demonstrate expertise, and earn a credential. Gregory Britton (Editorial Director, Johns Hopkins University Press) quoted William Germano's apt advice in *From Dissertation to Book* (2005): "The purpose of a dissertation is to learn something, and the purpose of the book is to teach something." ii If the dissertation is viewed through the lens of an opportunity for skill-building, then students should avail themselves of innovative formats and platforms. Using these forward-thinking methods and materials will position them well for adapting to change. This is particularly important if, as Tom Rudin (Director, Board on Higher Education and Workforce (BHEW), National Academies of Sciences, Engineering, and Medicine) suggested, students are to "enter the workforce as deep thinkers but also agile and adaptable learners."

At the most fundamental level, the dissertation process builds skills. It shows that students can make proposals, apply successfully for grants, articulate a research program (Alan Leshner, CEO Emeritus, AAAS); it offers an opportunity to develop intellectual skills and habits of mind which have broad utility (Ortega); and it allows them to demonstrate at least some of the five authorship tasks identified by Cassidy Sugimoto (Associate Professor of Informatics, Indiana University): formulating a research question; structuring the experimental design for an experiment; conducting the research or contributing data; interpreting the results using scientific tools; and writing the results in appropriate academic form. Allowing students to work in collaborative environments and on group projects may help them articulate their learning and contributions in terms of these skills.

The dissertation serves other functions as well. It may document detailed results of a larger project that may be only summarized briefly in a published article (Karen Butler-Purry, Associate Provost for Graduate and Professional Studies, Texas A&M University). It can provide a credential for hiring decisions, inside and outside of academe. It can serve

as a shorthand for the successful acquisition of skills in planning, carrying out, and presenting research (John Sherer, Spangler Family Director, UNC Press). It may be, in rare instances, a first draft of a book, but should not be written toward that end (Britton).

For others, the main audience of the dissertation is the student's committee or the disciplinary community. It is a demonstration of skills verified by these groups for the discipline. It is "the very beginning of a long-term project on which you build an academic career" (Britton). It shows you can "create original work, give attribution to others, make unique contributions, and operate within the norms of your discipline" (Tenopir). It enhances the profession (Loss), proves mastery of the conventions and tools of the discipline (Ortega), and displays expertise in content (Ortega). The dissertation reveals that you understand and can do science (Leshner), can ask a relevant question (Ortega), that you have an independent research program and will be a good scholar throughout your subsequent career (Leshner).

Still others suggested that the dissertation ideally contributes something of value to society at large. It should contribute to the larger community (Ortega), demonstrate the policy implications of one's work (Rudin; Ortega), and/or increase the number of candidates who finish the PhD, and thus the number of public intellectuals who can contribute to public policy, science, and the general welfare (Loss).

The format of the dissertation as a long-form proto-monograph in the humanities and some social sciences faced special criticism. Sugimoto asserted that the academic book was a dying form, reflected in the decline of academic book publication and drastically reduced library acquisitions. University press editors explained that too many young scholars and their mentors make unrealistic plans about the dissertation as a future book publication. Today only a slim percentage of all submitted manuscripts are accepted and marketed by university presses; even fewer of those are revised dissertations. If revised, the new book manuscript is often 90% rewritten or augmented with broader research. Since academic book publication now loses money (one estimate was $10,000-15,000 per book), presses and libraries need to find a new mode of electronic-first book dissemination for academic specialty topics.

In some fields, PhD candidates have been bundling published and/or co-authored

journal articles into dissertations for at least 40 years. But in the humanities, some social sciences, and even some STEM fields, these options were seen as radical departures from the traditional long-form dissertation.

Innovative formats

Beyond the current functions of the dissertation, some participants were concerned about needed changes in doctoral education and the dissertation in particular. The ecosystem of the dissertation is changing, as it is for scholarship in general, including the ubiquity of big data, wide and instantaneous dissemination of research, and shifting funding models. The dissertation needs to be subjected to "backward design" from the actual anticipated needs of the student, the workplace, and society. Participants suggested changing the mentoring and research process (broadening input beyond the major professor), accepting new formats, and tailoring dissertations to specific student career and research needs. The unresolved question(s) from this segment of the discussion was what are the best methods for implementing these changes.

New formats bring new challenges. The professoriate does not in many cases have technical expertise in new platforms, digital data management, and new genres. Since many platforms and programs are ephemeral, maintaining a continuing archive of research is proving challenging for librarians. Libraries are stressed by budget constraints, the need for technological redundancy, and demands of the faculty to keep older forms available. Librarians and others described the ongoing challenge of preserving scientific research for the future, through library consortia, shared "dark archives" infrastructure, and proprietary services.

Discipline specific challenges

The traditional American scientific dissertation was likened to the internal combustion engine. It has served us well for generations. Innovative and revolutionary in its beginnings, a powerful force for scientific research and industrialization from 1860 to this day, it is being overtaken by other energy sources. Since the future of most scientific research will be in large collaborative, multiphase projects, students should be challenged to demonstrate that they can perform in this environment. That means the research skills they master may be differentiated: gathering and preparation of data, for example, experimental design, or

statistical analysis of results. No one person will be able to master all research skills equally. Their mastery and their specific contribution should also be part of the archived record.

There was a call for acceptance of truly collaborative science dissertations in which students can avail themselves of the expertise of others. While group laboratory research work is already the norm in most STEM disciplines, much of that work derives from the hypotheses and research goals of a major professor's research funding. Thus, there was concern that for a significant number of doctoral students, the dissertation does not allow much creativity, independence, and innovation by the student. To be flexible for changing STEM innovation, academics must offer alternatives to the laboratory model limited to a major professor and one discipline.

Jennifer Hochschild (LaBarre Professor of African and African American Studies, Harvard University) expressed concern about publication norms in the social sciences that have implications for dissertations. Not only are dissertations more public in the digital age, the data on which they are based are increasingly required to be publicly accessible. She noted pressures in social science publications and associations toward data transparency and replicability, or in her term, interpretability. While sharing of data sources and openness are clearly positive science values, she fears that this pressure could have a chilling effect on qualitative methods in the social sciences.

There was general consensus among the discipline experts in the Social Sciences and Humanities that substantial widening of accepted dissertation types and formats should be the future. These included an ambitious range of substitutions for the social science dissertation, including community projects, articles, and reviews (Virginia Dominguez, Gutsgsell Professor of Anthropology, Jewish Studies, Middle Eastern Studies, Global Studies, and Caribbean Studies, University of Illinois Urbana-Champaign); acceptance of a suite of essays, ensemble dissertations, capstones with community-based projects, highlighting teaching innovation, public scholarship, translation, visual mapping, curation, and tool building, among other possibilities (Sidonie Smith, Croushore Professor of the Humanities, University of Michigan). Canadian scholars such as Paul Yachnin, Professor of English and Director of the Future Humanities Project at McGill

University, have already advanced a White Paper to revise the definition of a thesis to "a coherent ensemble of projects, which can include single-author and collaborative essays, electronic archives or other kinds of digital scholarly resources, editions, translations, works of scholarship in a range of forms and oriented toward multiple audiences." Smith gave a spirited refutation of the dissertation as proto-monograph in the humanities: "it is exhausted; it is exhausting; it has run its course; it is no longer tenable in terms of student interests and prospects."

The faculty: the engine which should drive change

Almost all participants were in agreement that dissertations should be more flexible in format, more adaptable to student needs, and have repetitive hurdles removed. Above all, the process needs to move at a quicker pace, because knowledge is changing at an exponential rate and students are languishing too long in candidacy. Although several disciplinary associations have sought to address transformation in doctoral education, change is slow.

It appears that breaking the expectation of the traditional long-form dissertation will require significant time. While many faculty members do see the need, they fear that modifications at the most vulnerable part of the academic food chain – the finishing doctoral student's project – could endanger the academic ecosystem and their students' subsequent careers, a point of view recently reaffirmed in a *Chronicle of Higher Education* article on the topic.[iii] The disciplines won't change, faculty mentors tell us, until university hiring decisions, promotion and tenure expectations, and program requirements evolve. In this context, presenters asked what role can and should deans and forward-thinking faculty play to foster more innovative approaches to both the dissertation and scholarly communication, writ large.

Smith told the participants that deans and forward-thinking faculty must refute the arguments that change must start among top-25 doctoral institutions. In fact, these universities are largely cushioned from the impact of shrinking tenure track faculty positions and constriction in academic book publishing. The reputations of these institutions will allow them to maintain the status quo much longer than the rest of doctoral-producing institutions. Less prominent institutions, therefore, are more likely to have the incentive and the

wherewithal to lead. Deans and graduate faculties must alter their own hiring practices and promotion and tenure standards, in addition to encouraging innovation in graduate training and dissertation requirements.

The greatest tasks for graduate deans will be to lead a thoughtful, sincere, and inclusive faculty debate on the future of the dissertation at each university; to advocate for possible revision to academic hiring practices, including those for contingent faculty; to explain changing values and innovations within disciplines to promotion and tenure committees; and to ensure that the graduate school is ready to embrace high quality innovation and experimentation in its policies and exceptions.

In her closing remarks, Suzanne Ortega shared her view that the goal of graduate education is to educate "individuals who can ask and answer questions of importance." For Dr. Ortega, the dissertation represents "demonstration of the capacity to utilize the tools (theoretical, methodological) of the discipline to identify and address a relevant question" and a tool for preparing the next generation of scholars and experts who will guide scientific inquiry, policy, and constitute the intellectual infrastructure of the future.

Proceedings may be accessed at http://cgsnet.org/cgs-future-dissertation-workshop and the parallel conversation that emerged on Twitter may be found at #DissFwd. This event was the capstone of a ProQuest-supported CGS Best Practice project on the Future of the Doctoral Dissertation.

Contact: Maureen McCarthy, Assistant Director of Advancement and Best Practices, Council of Graduate Schools

End Notes
[i]Higham, J. (1979). The Matrix of Specialization. *In The Organization of Knowledge in Modern America, 1860–1920*. Alexandra Oleson and John Voss, Ed. Baltimore, MD: Johns Hopkins University Press, p. 11.

[ii]Germano, W. (2005). From dissertation to book. Chicago, IL: University of Chicago Press.

[iii]Patel, V. (2016). "PhDs Embrace Alternative Dissertations. The Job Market May Not." *Chronicle of Higher Education*, (February 28).

Data Sources: Key Takeaways from the 2014 Survey of Earned Doctorates

As researchers, entrepreneurs, inventors, and more, graduate students and graduate degree holders contribute to the resolution of complex social problems and advancement of our society. Thus, a robust growth of graduate education and the number of advanced degree holders in our nation's labor force is essential to economic prosperity and continued global leadership of the United States. The most recent *Survey of Earned Doctorates* (SED:14), an annual census of research doctorate recipients conducted by the National Science Foundation (NSF), reported that a total of 54,070 individuals earned a research doctorate at 426 US academic institutions between July 1, 2013 and June 30, 2014. This represents both the highest number in the survey's history since 1957 and positive growth of earned doctorates for the fourth year in a row. Detailed characteristics of the doctoral recipients can be found in the recently released NSF report on SED:14, "Doctorate Recipients from US Universities: 2014,"and this article summarizes some key takeaways for graduate deans.

Citizenship

International graduate students continue to increase in their share of US earned doctorates. Nearly three out of ten (29%) doctoral recipients were temporary visa holders in 2014, compared to 22% a decade ago. Their presence is particularly robust in science and engineering (S&E) fields, as 40% of S&E doctorates were conferred to international students in 2014. However, their countries of origin are not as diverse; only three countries—China, India, and South Korea—accounted for more than one-half of all doctorates earned by international students in 2014. Moreover, the top ten sending countries constituted 70% of the doctorates earned (See Table 1).

The robust representation and continued growth of international graduate students does not come as a surprise, and will likely continue as pointed out in recent CGS reports on enrollment trends of international graduate students. Most of the recent growth in first-time graduate enrollment was driven by international students, with a particularly high concentration of them enrolled in S&E fields (Allum & Okahana, 2015). China and India continue to hold the largest shares of international graduate enrollment in the United States, and the largest share of South Korean students (47%) pursued doctorates (Okahana & Allum, 2015). While these statistics demonstrate the consistent appeal and desirability of US doctoral programs (Okahana & Allum, 2015), heavy reliance on a few selected countries of origin may pose vulnerability for long-term and sustainable enrollment planning for graduate institutions. Given the volatility of changes in first-time graduate enrollment seen in the results from the past *CGS International Graduate Admissions Surveys*, international recruitment strategies should look to diverse sets of countries.

Race/Ethnicity

International graduate students were not the only ones who increased their shares of US earned doctorates. Traditionally underrepresented minority (URM) students made gains in their attainment of research doctorates. Between 1994 and 2014, the proportion of doctorates awarded to Blacks/African Americans rose from 4.1% to 6.4%, while the proportion for Hispanics/Latinos nearly doubled, from 3.3% to 6.5% during the same time period (See Table 2). We anticipate this growth trend to continue, as first-time graduate enrollment of both Hispanic/Latino and Black/African American students are on the rise. According to the most recent *CGS/GRE Survey of Graduate Enrollment and Degrees* (GE&D), first-time graduate enrollment of Hispanic/Latino students and Black/African American students grew on average 6.0% and 5.2%, respectively, each year between 2004 and 2014 (Allum & Okahana, 2015).

However, not all URM populations gain their ground. According to the SED:14, there was no growth in the number of earned doctorates between Fall 2004 and Fall 2014 among American Indian/Alaska Native students (See Table 2). They were also the only ethnic and racial group that did not experience a decline in the number of doctorate holders who were also first-generation students between 1994 and 2014. This is consistent with the enrollment trend in the most recent GE&D report, which showed first-time graduate enrollment of American Indian/Alaska Native students declined by -0.6% annually between Fall 2004 and Fall 2014 (Allum & Okahana, 2015).

Country or economy of origin	Doctorate recipients	%
All temporary visa holders (158 countries or economies)[a]	15,742	100%
Top 10 countries or economies of origin	11,293	72%
1. China[b]	4,983	32%
2. India	2,312	15%
3. South Korea	1,286	8%
4. Taiwan	668	4%
5. Canada	484	3%
6. Iran	482	3%
7. Turkey	427	3%
8. Thailand	232	1%
9. Colombia	216	1%
10. Germany	203	1%

[a] Excludes cases with unknown country or economy of origin.

[b] Includes Hong Kong.

Data Source: National Science Foundation, Survey of Earned Doctorates, 2014, Table 25. Top 40 countries or economies of origin of temporary visa holders earning doctorates at U.S. colleges and universities, ranked by number of doctorate recipients, 2014

The challenges that impact the enrollment and completion of doctoral education by American Indian/Alaska Native students are worth further exploration.

Gender and Field of Study

Over the past 20 years, the growth in the number of women awarded S&E doctorates has exceeded the growth in males earning S&E doctorates, as reported in the 2014 SED. Between 1994 and 2014, the number of men awarded S&E doctorates increased by 26% (nearly 5,000 more doctorates) while the number for female S&E doctorates increased by nearly 50% (at least 8,500 more doctorates). The fastest growing subfields of doctoral study for women over the past decade, according to the SED:14, were the physical sciences field with computer and information sciences as lead subfield, and engineering with materials science engineering as lead subfield. Though the gap between men and women in these two fields is still substantial (See Figure 1), this is an encouraging sign. The enrollment trends of women in these two fields also shed some positive light, as the average annual percent changes between 2009 and 2014, for first-time enrollment of women in engineering (2.6%) and mathematics and computer sciences (3.5%) surpassed that of men (1.7% and 1.8%, respectively) (Allum & Okahana, 2015).

Summary

The average annual growth in the number of doctorates awarded between 1957 and 2014 was 3.4%, a strong upward trend in spite of periods of slow growth and decline. The increase in earned research doctorates by individuals with traditionally underrepresented backgrounds is impressive and an encouraging and critical step in our pursuit of a more diverse, educated, and skilled workforce that is better prepared for a competitive global economy. However, there is still work to be done as attainment gaps between men and women, URMs and non-URMs, and within URM students persist. In the meantime, the NSF report, "Doctorate Recipients from US Universities: 2014," offers other interesting insights about the most recent cohort of doctoral recipients, and we encourage you to explore the data.

By Hironao Okahana, Director, Statistical Analysis & Policy Research and Keonna Feaster, Program Manager, Best Practices, Council of Graduate Schools

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Table 2: U.S. citizen and permanent resident doctorate recipients by race/ethnicity, 1994, 2004 and 2014

	1994	2004	2014
Total	30,904	28,039	34,005
Hispanic or Latino	1,031	1,301	2,196
	3.3%	4.6%	6.5%
Not Hispanic or Latino			
American Indian or Alaska Native	142	125	103
	0.5%	0.4%	0.3%
Asian[a]	3,534	2,022	2,883
	11.4%	7.2%	8.5%
Black or African American	1,277	1,897	2,167
	4.1%	6.8%	6.4%
White	24,574	21,011	24,824
	79.5%	74.9%	73.0%
More than one race	na	386	876
		1.4%	2.6%
Other race or race not reported[b]	114	402	272
Ethnicity not reported	232	895	684

[a] Includes Native Hawaiians or Other Pacific Islanders who are not Hispanic through 2000, but excludes them since 2001.

[b] Before 2001, category included respondents who selected more than one race; Native Hawaiians or Other Pacific Islanders who are not Hispanic were included in the category Asian. Since 2001, category has included Native Hawaiians or Other Pacific Islanders who are not Hispanic.

Data Source: National Science Foundation, Survey of Earned Doctorates, 2014, Table 23. U.S. citizen and permanent resident doctorate recipients, by ethnicity, race, and broad field of study, Selected years, 1994-2014

Figure 1: Number of earned doctorates in select fields of study by gender, 1994 and 2014
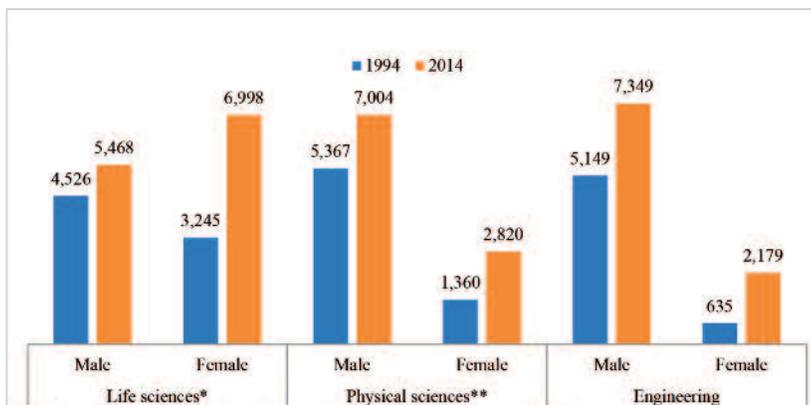
* Includes agricultural sciences and natural resources, biological, biomedical sciences, and health sciences.
** Includes mathematics and computer and information sciences.
Data Source: National Science Foundation, Survey of Earned Doctorates, 2014, Table 14. Doctorate recipients, by sex and broad field of study, Selected years, 1984-2014

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