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Higher Education Analytics Center

Thoughts on the Future of Graduate Education

Career Pathways for Graduate Degree Holders: What Do We Know and Where Do We Go from Here

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INTRODUCTION

> *NORC at the University of Chicago, in partnership with the Council of Graduate Schools and with support from the Spencer Foundation, convened a workshop in July 2017 focused on conceptualizing and measuring graduate degree holders' career pathways. The workshop was particularly concerned with identifying research needs to inform decisions by those most directly connected with graduate degree programs: deans, department heads, faculty, and students. Participants included senior university*

> *administrators officially responsible for graduate education, researchers engaged with graduate education, leaders of organizations concerned with graduate education practice, and federal officials who fund graduate education or who serve as stewards of federal data sets that might inform the career pathways discussion. This Working Paper, prepared initially to frame workshop discussions, now is revised to incorporate observations and conclusions of participants. It is written to assist university officials as they attempt to better understand the career pathways of their graduates.*

BACKGROUND

I want to discuss two questions: First, What do we know about the careers of Doctors of Philosophy (PhDs) and how they have changed? Second, Does the PhD need reforming?
The growth of doctoral education is largely a post-World War II phenomenon. While the PhD had gradually become the teaching degree in universities before the war, the situation changed dramatically with the emergence of federal funding for research, especially that of the National Science Foundation (NSF) and the National Institutes of Health (NIH) as well as other agencies, particularly the Department of Defense. Government money funded not only faculty salaries, but also graduate student support, both directly in fellowships, and indirectly through graduate student

research assistantships. It also funded equipment, buildings, and more general support for universities through the payment of overhead costs.

During the 1960s and 1970s the dominant conception of the PhD was as a research degree preparing recipients for a career in a research university. While there was an expectation that these careers would be in regular faculty positions which would involve teaching, there was little preparation for the teaching role other than what was learned from being a teaching assistant. Success for PhD programs came to be measured by the success by which the programs were able to place their graduates in major research universities.

It helps in the understanding of our current situation to review what happened when there was a similar reduction in the available academic jobs. Research and development funding began to slow down, and even decline, in the 1970s. The decline in research funding led to a sharp reduction in faculty hiring and bleak employment prospects for new PhDs. While applications to doctoral programs declined sharply, the number of doctorates awarded did not decline but rather stabilized at between 31,000 and 33,000 a year between 1971 and 1988.
In light of this change in employment prospects for new PhDs there were calls for reforms of doctoral programs and even attempts to develop new degrees that differentiated the PhD from other types of doctoral degrees. Some changes were instituted, but they were generally modest and served to make the programs more flexible in terms of timing, and dropping requirements that were deemed as no longer important, most notably foreign language requirements. The biggest change was the expansion of post-doctoral programs, particularly in the biological sciences. At the time, this was viewed as a temporary expedient to “save a generation of researchers,” but it has turned out to be a permanent phenomenon.

The 1990s and early 2000s were again a period of great prosperity in the United States and much of the credit for the growth spurt was given to the large investment in science and engineering research in the so-called golden age of graduate education in the 60s and 70s. The federal government began again to increase the budgets of the research agencies. The NIH budget, already large, was doubled in 5 years. The NSF received generous budgetary increases and was promised a doubling also—although this has not yet been implemented. Retirements of faculty hired in the boom years were expected and the academic employment outlook again looked good. The number of degrees began to climb from around 34,000 in 1989 to around 42,000 in 1995 when it leveled off again. There have been some dips in the early part of this century, but it began to grow again in 2004 and has continued to grow to slightly over 55,000 in 2015. The number of doctoral granting institutions remained about the same at 420 over this period until 2013 when it began to grow again to 432 in 2015. The average number of doctorates per institution remained the same at about 100 per year until the last few years when it began to grow to about 120. (1)

THE CURRENT SITUATION

We can think of the past as a series cycles of growth and stasis, expansion of programs followed by concerns about overproduction of PhDs with consequent programmatic adjustments to adapt to the new world of employment opportunities. Where are we now in this cycle?

If we look at the difference in PhD production and employment in the last 20 years, we see two major changes. First, the number of PhDs graduated per year has grown by 31%; second the proportion

of all PhDs employed in post-secondary teaching is only 29%.[2] Reflect on these numbers for a moment. Do they surprise you as much as they did me when I first put them together? Note that the proportion with a post-secondary teaching occupation is virtually unchanged from 1995 to 2013. The overall proportion, of course, hides the considerable variation among fields. But only four major fields of doctoral study —humanities, mathematics, political science, and sociology—had over 50% of their PhDs with post-secondary teaching occupations. Humanities is the real outlier among the fields, with 60% employed in post-secondary teaching in 2013. [3]

I interpret these data to mean that, rather than being a recent phenomenon, employment in the non-academic sector has been substantial and for many fields, the major occupational destination for a long time. Attention has been focused on the fields that have traditionally shown the heaviest concentration in academic employment, although even among these fields it is only the humanities that has seen their graduates most heavily concentrated in academia.

This is not a new problem. Cycles in the academic job market have provoked some soul searching among graduate faculties in the past, but little has changed.

DOES THE PHD NEED REFORM

Much of the attention in proposed reforms in PhD programs has been focused on the high dropout rate and the time to degree. Relatively little is known about the reasons students drop out of

programs, at least before they reach the dissertation stage. In one survey (Nevill and Chen, 2007) a variety of reasons were given: change in family status was the most frequent reason given; others included conflict with a job or the military; financial reasons; a mismatch between the students' interests and those of the faculty in the department; discovery that they do not like or are unsuited for the types of careers they see ahead of them; unwillingness to undertake the long period of preparation before they can start their careers; the risk that they will not be able to have the career they want even after completion of the degree.

What evidence do we have that degree requirements need to be reshaped in fundamental ways? We know what an academic career in a research university is like, and we shape programs for that market. But we know little about what is needed in the wide array of alternative careers that graduates may pursue. Graduate training's comparative advantage is in teaching deep knowledge of a field and the research skills that are necessary to produce that knowledge. The requirements of particular jobs outside of academia may draw on that knowledge and those research skills but will entail much that is specific to the industry or job type. It is not obvious that the present programs are not preparing students well for the variety of career opportunities open to them other than academic ones. At present we know too little about these non-academic career trajectories to be confident about how to change our PhD programs to improve the long term career success of our graduates.

What strategies might be useful in the present state of knowledge to align the degree requirements with the realities of employment opportunities? The strategies currently being talked about are looking for ways to connect students with those in the non-academic world that employ PhDs in their field. These include seminars featuring alumni, or others with degrees in the field who work in non-academic settings, to introduce students to alternative careers where the expertise attained in the PhD program will be

applicable; internships in businesses or other organizations; and business/academic partnerships that provide pre-doctoral work experience for students. In a few fields, notably computer science, engineering, chemistry and bio-medical fields, the research of the faculty and their students have led to patents that are developed into products with the active participation of faculty members and their students.
The demands of the practical and especially the business world do not mix well with the practices of the academic world. Scholars work at their own pace and listen to their own muse. While there is competition among ideas in a field, and in some scientific fields there are rewards for being the first to discover something, the culture is more one of openness, cooperation and complementarity than of competition and confidentiality. The necessity of secrecy for the protection of ideas until patents have been obtained pits the openness and sharing of science against the ethics of confidentiality and secrecy of the business world.

There is some impetus for reform but there is no central authority to enforce change. The federal science funding agencies attempt through special funding opportunities to influence aspects of the system, such as time to degree, by increasing fellowship funding, or promoting interdisciplinary work through programs like NSF's Integrative Graduate Education Research Training (IGERT), but these efforts have limited reach. Some of these efforts, such as the NIH push toward post-docs, I would argue have in fact had a negative effect in that they have prolonged the training period significantly beyond the doctoral years and have increased the economic costs for those pursuing what is still thought of as a path to an academic career.

Disciplinary associations like the American Historical Association advocate for their members to pay more attention to preparing students for non-academic careers (Grafton and Grossman, 2011). Organizations such as the Council of Graduate Schools and ETS do

studies to provide information about the current state of graduate programs (The Path Forward, 2010; Pathways Through Graduate School and Into Careers, 2012). The Carnegie Foundation for the Advancement of Teaching had a five-year initiative on the doctorate (CID) that involved 84 PhD granting departments in 6 fields. The initiative encourages participating departments “to examine their own purposes and effectiveness, to implement changes in response to their findings, and to monitor the impact of those changes.” The CID staff worked with the departments, conducted surveys of faculty and students and produced several volumes that summarize the results of the initiative (Walker at al. 2008; Golde and Walker (eds.), 2006).

The net result of these and other efforts, are still to be seen. But clearly we need to understand better the variety of career trajectories in different fields where the opportunities for non-academic careers are well established and in fields, particularly the humanities, where there is less awareness of alternative career paths.

CONCLUSION

To sum up, PhDs have been going into non-academic careers for a long time, although that fact has not been as visible as it might have been except in a few fields, like chemistry and engineering, where non-academic careers have been the norm. It is pretty clear that the academic job market is not expanding and that we are producing many too many PhDs to be productively employed in academia. There are non-academic jobs that provide opportunities for new PhDs to use their skills, such as industrial, non-profit, and government research organizations. These seem to be expanding to

provide employment for the increasing number of new PhDs. In addition, some jobs that do not now require a PhD, such as managerial jobs in technical industries, museum curators, scientists in non-profit applied research firms, will come to expect a PhD as an entry qualification. The excess supply of PhDs will find employment not only in traditional jobs but will transform jobs that do not now require, although may welcome, PhDs. I think this will be particularly true for PhDs in fields that have traditionally been the heaviest suppliers to the academic job market such as math, social sciences other than psychology, and humanities. Employers will gradually come to expect that new hires will have PhDs. The supply may create its own demand.

With few exceptions, there are few incentives for universities to reduce the number of PhD students they admit each year. Only a reduction in research funding or a sharp reduction in undergraduate students would make it difficult for them to keep up PhD enrollments. Both of the changes, however, may be coming in the near future, at least temporarily.

I see little significant change in the structure of PhD programs. The requirements of the disciplines, particularly the kind of research and scholarship that is judged to be the highest in the field, exert a conservative force that discourages universities from making radical changes in their PhD programs. The ratings of departmental programs are based on the degree to which they embody the characteristics judged to be of value by their peers. It would be a brave, perhaps foolhardy, university that created a PhD program that did not look, at least superficially, like that of Harvard, Stanford or Chicago. For all the talk about preparing students for non-academic careers, there is little change that would clearly say: If you get a PhD degree from my university, you will get a job in industry or government, but you will not get a job in academia. No programs are judged on the basis of the success in placing their graduates in non-academic jobs, although success in placing students in good non-academic positions may make them more attractive to applicants.

Since there is no central authority that governs graduate education, change comes slowly and gradually. Funding organizations, notably the federal agencies that provide funding for graduate education, could play an important role, but their funds are limited, and they are constrained by the norms of the disciplines. They can point the way to change, but they cannot enforce it. The professional associations can also point the way to change, but they are the creations of their members, and cannot get too far ahead of their members. Prestige leaders like the National Academies could play a constructive role, but other than cries for more, they have not been leaders in envisioning a different future for PhD education. Their members are the leading figures in the disciplines and, in truth, they do not see the need for radical change in the way PhDs are trained. Until there is recognition by those who are in charge of doctoral education that there needs to be a radical change in the way programs are structured, we will see at most marginal changes in way PhDs are trained. And until we know more about the actual career trajectories of PhDs who do not go into academia, we will not know in which direction or even whether to change them. That is why we are here today at this important workshop.

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