

A national online platform for STEM graduate student career exploration and professional development

**ISSUE**

The realities of STEM graduate student career outcomes must be addressed. While graduate programs prepare students for the academic research track, in 2006 fewer than 15% of STEM PhDs attained a tenure track position within 5-6 years of graduating, a significant decrease from 55% in 1973 (1). Given that graduate student enrollment increased 50% between 2000 and 2010 (2), while tenure availability decreased (3), this trend is likely to continue.

These statistics reflect not only the increasing difficulty of attaining academic positions, but also students' declining interest in pursuing this path. A recent large scale cross sectional survey of STEM PhD students at tier-one universities found that the share of students who consider a faculty research career "unattractive" or "extremely unattractive" doubles between early (pre-qualifying exam) and late (on the job market) PhD stages, reaching as high as 38% of late stage chemistry students (4).

A recent survey of UCSF graduate students reported a similar pattern. Interestingly, when asked why their career goals have shifted away from academic research, students overwhelmingly cite negative associations with the PI track, rather than a positive reason for change, like new knowledge of career options or the development of personal skills and interests (5).

Together, these findings reveal the core of the problem: graduate students increasingly view academic research careers as unattainable or undesirable, yet graduate programs do little to prepare students for career alternatives (4, 5, 6).

This problem is compounded by a two-pronged information asymmetry, in which students are provided little or no credible information about career outcomes, and policy makers know little about how or why students make career decisions. Indeed, a working group recently convened by the NIH to study career pathways of biomedical science students lamented the lack of comprehensive, longitudinal data needed to better guide policy decisions about graduate education (6).

### **SOLUTION**

A solution is needed to address both the lack of resources for career development, as well as the shortage of data about STEM student career pathways. A national online platform for STEM graduate students could achieve both of these objectives, while also creating a collaborative, interdisciplinary community for nationwide graduate student support.

The online platform, accessible to STEM graduate students enrolled at accredited US universities, will pursue four objectives:

#### 1) Facilitate the identification of personal strengths, interests and career values

The first step in selecting a well matched career is understanding these personal factors, yet graduate schools currently offer little to no support for this process. This module will provide assessments like the Myers-Briggs Type Indicator, Strong Interest Inventory, and Dependable Strengths Articulation Process, each of which has been employed with great success in career counseling (7, 8). An algorithm will transform the results from these assessments into personalized suggested career paths for students to explore.

#### 2) Provide comprehensive information about career options

There is currently no centralized source for information about career choices after graduate school. Useful resources do exist online, but they are scattered across a number of websites. This module of the platform will collect the best resources into an interactive database consisting of career profiles, guides to entering various fields, and video talks from successful professionals. By also supplying statistics about employment trends, this module of the platform will attempt to correct the information asymmetry in which students know little about career prospects in today's job market.

### 3) Offer resources for the development of professional skills

After guiding students to identify and research potential career paths, the platform will then aid in the development of appropriate professional skills. Providing quality professional development training to graduate students nationwide through traditional university programs would be a difficult and costly undertaking. However, with the extraordinary recent rise of Massive Online Open Courses (MOOCs) and other scalable online education platforms, it is now possible to provide high quality content to a large number of users at low overhead cost (9). This module will feature online classes, taken at students' convenience, in widely applicable soft skills like communication, leadership, negotiation and conflict resolution, while also offering career specific courses like fundamentals of project management, entrepreneurship, business development, and more. As an added incentive, universities may consider offering credit for the successful completion of career development courses, a strategy recently employed at the University of Pittsburgh (10).

### 4) Collect, analyze and share anonymized data about students' career decision making patterns

The platform will also serve as an extensive repository of data on the career planning process of STEM graduate students nationwide. Through the regular

administration of surveys, beginning on initial registration and continuing regularly through students' transition to the job market, the platform will collect much needed individual, longitudinal records. Furthermore, these data will be available to students and advisors to better inform career planning. For example, a biochemistry student may search the database for the career outcomes of former biochemistry students with similar strengths and interests, gaining valuable insight into tailored career possibilities.

Notably, the first two objectives of this platform have recently been pursued by an online tool called my Individual Development Plan (myIDP), produced for *Science Careers*. The publicly accessible myIDP offers self assessments on skills, interests, and values, results from which are used to suggest potential career matches. The site also offers resources for career exploration, goal setting, and mentorships. Since its launch in the fall of 2012, the site has registered over 25,000 users (11), and anecdotal evidence suggests students find the tool valuable.

This proposed platform will innovate on myIDP in a number of ways, including online classes in professional development and the continual collection and sharing of aggregate data. Perhaps most significantly, through its incorporation of social engagement, the platform will also promote interdisciplinary connections, community support networks, and sustained participation in the career development process.

The platform will feature sharable personal profiles, community groups organized by common goals or professional interests, and peer-moderated discussion boards. Students enrolled in online professional development classes can break off into video supported small group meetings, where skills like networking, mentoring, and leadership can be practiced live from the convenience of the students' desks. Students who identify as a particular Myers-Briggs Type, for example, can strategize in online forums about how to best tailor a job search to their personality profile.

By harnessing the incredible energy of social networks, this online platform will galvanize students to take an active role in career planning and development.

### **IMPACT**

It is clear that resources like those proposed here are essential to better support STEM graduate student career outcomes. However, it would be both inefficient and unreasonable to expect each university to develop its own set of top-quality, comprehensive career development resources. Instead, this proposal offers a better solution: curate and collect only the best resources into a single, centralized platform accessible to students from all universities.

This platform will benefit all parties involved. For students, career planning will become an engaging process aided by social support and a centralized resource bank. The connections students forge through the platform's forums, small groups, and video meetings will cross disciplines, universities, and personal backgrounds. No longer will a student be limited by the lack of resources or support networks available at their university. Instead, all students will have access to the very best resources.

Universities will benefit when their students are motivated to pursue career goals. Graduates entering the job market with clear visions and professional skills will become more satisfied, better paid alumni. Additionally, centralizing resources to a web platform will ease the burden on university career centers.

When scientifically minded graduates are inspired to bring their talents to diverse professional fields, national economies will benefit (12). Some students, after the careful reflection encouraged by this platform, will and should choose to pursue tenure track positions. However, the number of PhDs seeking academic positions may drop to a level better supported by market demand.

Finally, national agencies and administrators who oversee graduate education will have the information they need to identify trends and make well informed decisions. By implementing an innovative program like the one proposed here, leaders in graduate education will demonstrate a commitment to the success of STEM graduate students.

## References

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