Improving Professional Development at the Graduate Level of the Natural Sciences

Brandy Todd, University of Oregon

Introduction & Goal

The PhD is a research degree. Doctoral training in the natural sciences is designed to teach students how to construct and execute experiments, and how to gather the data from those experiments. However, PhD students are also the pool from which society draws its future teachers and administrators. Amazingly, little to no training in teaching pedagogy takes place in most graduate programs in the sciences (Gold and Dord, 2004). Professional careers in science require not only an understanding of research but also skills in teaching, administration and community service. University faculty (the gold standard for PhD careers) spend on average 59% of their time teaching and 23% on administration and service. Only 18% of faculty time is spent in research (Gold, 2004). Careers in industry also require these skills (Smith, 2002). Increasingly employers and students are demanding a more rounded graduate education in the sciences (NAGPS, 2001; McAlpine, 2006). Careers in science require the ability not only to conduct high quality research, but also to teach an increasingly diverse undergraduate population, to communicate research to a broad audience, and to function in a complex administrative environment (Henderson, 2004; Gonzalez, 2001).

At the same time, institutional funds are growing slower and funding rates from external sponsors of research are going down. Increasingly, young faculty and staff scientists are required to pursue research funding even before they start their new positions. Few graduate programs prepare students for all the duties they will assume as independent researchers.

The goal of this project is to develop a program for improving professional development for doctoral students in the natural sciences so that University of Oregon graduates are better prepared for research careers and are more competitive in the job market.

Strategy and Implementation

This project proposes to develop a graduate level course in proposal development for students in the natural sciences. Research proposal development is a number of benefits to students and their departments and is less complicated/controversial than service and teaching options. If timed correctly, training in proposal can be put to use by encouraging students to apply for paid research fellowships during their first 18 months of study. Research fellowships make students self-sustaining, which means they have more prestige and have more options in which research groups to work with. They benefit departments by reducing the amount of research teaching appointments needed.

The process is expected to take 18 months for full implementation. A timeline of major milestones is available below.

The first major project goal is to offer a number of voluntary proposal development workshops (4-6 1-hour sessions) in the Spring of 2013. These workshops will be targeted at 1st year graduates in the natural sciences. Students who participate in the workshops will have the option of developing a proposal for submission to the National Science Foundation Graduate Research Fellowship program (GRFP).

In the second year, workshops will become part of a 2-credit professional development workshop. The workshop will be mandatory for first year students in participating departments. During the course students will develop a proposal for submission to the GRFP or another suitable program. Over the summer a panel of previous workshop participants, chaired by a faculty member, will review proposals. This review process will give students useful feedback on their proposals and provide the volunteers with valuable insight into the review process.

If it is found to be valuable, this 1-term course could be expanded to a 3-term professional issue course which would encompass the teaching and service elements of science careers.

Options for Intervention

A review of the literature yields three productive possibilities for improving professional development which correspond to the three primary roles professional scientists fill: providing students with a chance to take on faculty roles through service in committees and teams, providing opportunities for students to meaningfully and progressively develop their research and teaching skills and providing students with meaningful, progressively responsible teaching experience, and providing experiential training in proposal development. None of these options is part of standard graduate training in the sciences. Each of these options is summarized and reviewed below.

Resources & Budget

The project will require coordination between several departments, faculty, staff and students. Tangible resources for this project include:

• One faculty member to take lead in instructing the course
• Two to five guest lecturers (faculty & research administrators)
• Advertising & recruiting for the voluntary workshops.

Intangible resources include:

• Champions within departments to support the course
• Coordination of course requirements across departments
• Good will from department heads

One existing resource is the curriculum developed for a previous voluntary workshop series that was held in the physics department in 2010 & 2011. The voluntary workshops were popular and generated good will toward the idea. They have been on hiatus due to the busy schedules of the faculty and staff who organized the original workshops.

Workshop Topics

<table>
<thead>
<tr>
<th>Workshop Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Knowledge</td>
</tr>
<tr>
<td>Functional Understanding</td>
</tr>
<tr>
<td>Foundational Skills</td>
</tr>
<tr>
<td>Outlining a Work Plan</td>
</tr>
<tr>
<td>Identifying the Research Problem</td>
</tr>
<tr>
<td>Articulating the Research Question</td>
</tr>
<tr>
<td>Writing the Proposal Form of a Proposal</td>
</tr>
<tr>
<td>Budgets &amp; Compliance</td>
</tr>
<tr>
<td>Peer-Review</td>
</tr>
</tbody>
</table>

References


References


Total Cost $2850

Budget

<table>
<thead>
<tr>
<th>Budget</th>
<th>Supplies</th>
<th>$150</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Staff Salary</td>
<td>$1200</td>
</tr>
<tr>
<td></td>
<td>Faculty Stipend</td>
<td>$1500</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>$2850</td>
</tr>
</tbody>
</table>

Timeline

Winter 2013 | Spring 2013 | Fall 2013 | Winter 2014 | Summer 2014 | Fall 2014

Planning & Recruitment | Proposal Writing | NSF GRFP Proposals Due | Peer Review | Summer Course Listed | Peer Review

Voluntary Workshops

10 Week Research Proposal Development Workshop

Support will be required for a stipend for the lead instructor, salary for an administrative staff member to coordinate the workshops, and for supplies such as binders and printouts.

Costs are estimates for the initial voluntary workshops. Budgets for the for-credit course will be higher, but offset by tuition.

Taking on Faculty Roles

Meaningful Teaching Experience

Writing Research Proposals

Planning & Recruitment

Proposed Writing

NSF GRFP Proposals Due

Peer Review

Summer Course Listed

Peer Review

Resources & Budget

References


