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Preparing Our Graduate Students for a New World

Studies and opinions on the future of higher education in the United States have become a true cottage industry. A new book or a new policy proposal seems to appear every week. Most of the attention has focused on the undergraduate experience, especially in regard to costs, content, delivery, and outcomes. For example, outstanding student loans total roughly \$1 trillion, and federal grants have increased from \$6.4 billion in 1981 to \$49 billion today. Despite this massive increase in federal support, the costs of higher education have increased at a rapid pace, making it beyond the reach of many middle class families without financial aid and loans. Given the high costs, students, families, and employers are beginning to question the value of many courses and degrees. Are graduates prepared to be good citizens as well as to be employable? The opportunity for disruption is now apparent, as both students and employers pursue new education delivery systems, such as massively open online courses. Although the initial frenzy for these courses may have abated, the “unbundling” of the residential college experience is well underway as students combine various offerings from different sources into a personalized education and universities struggle to respond.

As part of this ongoing debate, both the White House and Congress are proposing more mandates for the higher education system. Some are relatively straightforward, such as publishing the economic performance of graduates, and others are more proscriptive. It has been proposed that federal aid be limited to schools the government thinks are providing the best educational value or requiring that universities receiving federal research awards be required to improve the performance of undergraduates in the STEM (science, technology, engineering, mathematics) disciplines.

Throughout these debates, the role of graduate education has been generally avoided as a subject. However, there are emerging issues both on a broad scale and within the ocean sciences. Although the costs of a graduate education generally rely on extramural and university sources (e.g., research grants, fellowships, teaching assistantships), the delivery costs are often high, especially as more and more highly specialized courses are delivered to small numbers of students. The content of many oceanography graduate programs still resembles the Sverdrup, Johnson, and Fleming model of 1942. If our science is becoming more interdisciplinary, is this still the right model for our

core curriculum? If data-intensive tools are becoming more pervasive, should we add them as well as other approaches to “computational thinking” to our core? Should we add social sciences to help our students engage in broader impacts?

Along with content, there are broader issues about how we as a community of faculty and institutions deliver our curricula. Should institutions think about mechanisms for delivering specialized courses in a collaborative manner to a larger number of students? For example, if a data assimilation course can only attract two to three students at one institution, could it increase its enrollment if it were shared among several institutions? If our science is intensely collaborative, what is the role of the single author doctoral dissertation?

Lastly, there are even more profound issues for us to consider in regard to graduate education. As Allison Miller and Russ McDuff showed at the Ocean Sciences meeting in 2012, just over one-third of degree recipients become academics. Moreover, the number of tenure-track positions in universities has been relatively constant, with the bulk of the growth in faculty positions being fixed-term or part-time instructorships. An analysis of German universities showed that time between the PhD and the first professorship had increased from about eight years in the 1970s to nearly 13 years in the 1990s. Are we heading in the same direction?

And so we come back to the state of undergraduate education. The forces buffeting the undergraduate system (e.g., the need to lower costs, improve performance) will confront our graduate students who choose to enter the academic world. Are we preparing them for this new and uncertain world? How will they cope with a system where there may be a small cadre of permanent, tenured faculty, surrounded by a much larger workforce of freelance instructors at universities and online education providers? Will an increasing proportion of our students pursue careers outside academia? How should we educate and mentor all of our students, no matter what path they pursue?

Let’s start this discussion here in The Oceanography Society’s publication, *Oceanography*. Send your thoughts to magazine@tos.org.

Sincerely,



Mark R. Abbott, TOS President