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# Higher and Higher in Education

By Simon Boxall

Some of you reading this article will have been frantically searching for references for that essay on Gulf Stream variability due tomorrow, and of course, where better to find those key papers than in *Oceanography*? But what next? When you have your undergraduate degree in marine sciences, will you aim higher? Alternatively, it may be that your first degree is in physics and, having read about the excitement of oceanography, you want to change career direction—a perfectly understandable career shift.

There are many more reasons for taking a higher degree today than in the past, and the higher education (HE) business has changed beyond recognition. The US National Center for Education Statistics database (<https://nces.ed.gov>) shows that in the United States in 1950 there were 1,851 HE institutes and that in 2013 the number stood at 4,726—an increase that outstrips the doubling of population in the same period. In the UK, there are 163 universities (Higher Education Statistics Agency; <https://www.hesa.ac.uk>), proportionately fewer per head than in the US, but most have doubled their intake in the past 25 years. In 1980, 5% of the US and UK populations went to university to study for a first degree; in 2013, 33% of US and nearly 47% of UK secondary school graduates went on to HE. In Canada, which tops the world's HE league table, the figure sits at 55%. So one good reason for thinking of doing a master's or PhD is to set your self aside from the rest of the field. In 1980, about 1% of the population studied for a master's degree, and the numbers for a PhD were well below 0.1%. Today, those figures have increased tenfold.

Could a master's be seen as the new undergraduate degree and the PhD the new master's in terms of numbers and skills? Do you need to do either? What are the benefits? Financially, there are measurable benefits. Casey (2009) showed that compared with those without a degree, someone with a bachelor's degree (BSc) earns 14% more on average, a master's 23%, and a PhD 26%. The addition of a PhD is less impressive, adding just another 3%, but financially the MSc would appear to be a good investment.

Then, there is getting into the job market. Forty years ago, relatively few careers required a degree, and unless you were going into research or academia, a higher degree was often seen as an over qualification. Today, most science careers start at the graduate level, and more require yet higher qualifications. One of the other reasons students pursue a master's in oceanography or marine biology is as a transfer degree. Relatively few universities provide undergraduate degrees in our subject, with many focusing on postgraduate qualifications. The master's year is spent getting students with core science backgrounds to convert their skills to the various marine sciences. This has always left a problem for any student with a first degree in oceanography, as the master's will, to all intents and purposes, be a potent (condensed) version of the BSc. In the UK, there is a further issue that because the BSc is a three-year course, it may not be recognized for entry into a PhD program in many countries where the first degree takes longer. As a result, we have seen the introduction of the “bundled” master's, which adds a year to the BSc and takes the student to a higher level, with

the fourth year being 50% research, much like a one-year master's. Students can also opt for specialized masters' degrees in narrow subjects as varied as coastal zone management, tropical marine ecology, and marine renewable energy. These degrees are well suited to oceanographers and those with core science degrees alike. There is the further option in the UK of undertaking a master of research degree (master of science in the United States). Here, of course, the emphasis is on research training, and although students do sit some taught courses, the majority of the degree focuses on an original research study—a good precursor to a doctorate if the student already has an oceanographic background.

For many government agencies around the globe, the job specifications demand a postgraduate qualification in a relevant subject. In senior roles in both government and academia, the lack of a PhD can lead to a relatively low career ceiling. Whilst the expense of a further three to four years studying for a doctorate may seem a luxury, the transferable skills are hard to acquire in the same period in other ways. In addition, PhDs are usually funded—rarely the case for either BSc or master's courses. In the UK, PhD grants are untaxed (the US is more complex), and many students will undertake some paid teaching work within faculty as well. These two income streams mean that an average PhD can earn as much as someone starting off as a paid research assistant or working in industry. There is also the option of doing a part-time PhD or master's while holding a daytime job, though this can double the time it takes.

So—job prospects and money are two

good reasons why a postgraduate degree could be useful, but is that it? After all, Bill Gates may have started his studies at Harvard but never completed them (like almost a quarter of all US undergraduates) and seems to have done reasonably well. Equally, Ingvar Kamprad, owner of IKEA, left high school at 17 and set up a match selling business, which has grown quite successfully...

Postgraduate study does bring new light to a subject, a chance to study a topic in greater depth. When I completed my BSc, I went out into the world thinking I knew all there was to know about oceanography until I started my PhD, at which point I realized I knew little and understood less. After earning my PhD, I really started to understand how very little I understood, but it set me up to learn my subject. As an associate professor, I find that teaching is the best way to learn, so my advice is to grab all the chances you can to teach as part of your postgraduate position. If you want to really enjoy your subject, then a postgraduate degree is one way to follow your dream. Working after your first degree is good too: you will develop excellent skills on the job, but you won't have quite so much time for that blue skies thinking that creating a master's or PhD thesis will give you.

There has also been an increase in people at the other end of their career paths taking postgraduate degrees. I now see more mature students either working for a master's in oceanography as a mid-life change or doing a PhD for their own satisfaction. My father was a medical pathologist who started work as an apprentice in a hospital laboratory. He worked his way up the system, as was the pathway then, to eventually run his own pathology lab and publish in international research journals. At the end of his career, all the staff he employed needed BSc degrees, and most had master's or doctoral qualifications. As he retired, he decided he should be capable of getting a PhD, and

four years he later achieved this. I have supervised a PhD for a retired colleague in a similar position, and also one for a colleague in the midst of a very successful oceanographic career. In the latter case, it was the first PhD student I have come across who already had a record of over 50 first-author papers. Needless to say, that PhD was completed in record time, but finding an external examiner who knew as much as the student did was a challenge!

So, whether for money, job progression, or just for the enjoyment, there are many good reasons to consider postgraduate degrees, and students can choose from a wealth of subjects offered by that growing number of HE institutes. While postgraduate learning was more esoteric in nature in the past, today industry has become more involved in working with universities to ensure that there are also a broad range of applied master's and industrial studentships. In the UK, the CASE (Collaborative Awards in Science and Engineering) program offers students opportunities to spend part of their time with the partner company. The work often focuses on an area of research of mutual benefit to both the university and the partner organization (government laboratory or industry). These awards often carry slightly higher financial support for the student as well as access to facilities within the partner's organization. In other countries, studentships funded by industry are fairly widespread and carry the same benefits.

So—how do you apply? All individual faculties within universities tend to control their own admissions. Master's level courses are a bit of a buyers' market at the moment—so as long as you hold a relevant first degree in science, at a B (GPA 3) or above, 2:1 in the UK, and can spell oceanography, then you are pretty much in. However, getting that elusive grant does depend on being at the top of the entrant pile, and also on interviewing well.

PhDs are far more competitive, with success rates as low as 1 in 30 in some places. For most programs, a master's (one-year classroom or research, or four-year bundled) is essential, with only the very brightest graduates achieving direct entry. Not only is the entry bar set high, the pressure to ensure you complete the degree is strong, so you need to demonstrate commitment as well as a capacity for research. The days are gone when a PhD student met his or her supervisor on day one, and then again three years later, both with the faint hope that they will have gone off and done good things in the meantime. The process now involves regular meetings, milestones, and a panel of supervisors. This does mean, however, that the pile of dusty PhD theses sitting on shelves that are “only a few weeks or so off completion” are diminishing, and the completion rates far exceed those of undergraduates.

So...now that you have read this article, get back to that search for Gulf Stream variability (hint: have a look at some of Harry Bryden's papers), get a good grade, and start planning your next move—after that essay is complete, of course. I wouldn't want you to procrastinate further! 📧

#### REFERENCE

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