The Postgraduate Review

Institute of Physics response to a Department for Business, Innovation and Skills review

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17 December 2009
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Professor Adrian Smith
Director General, Science and Research
Department for Business, Innovation and Skills
1 Victoria Street
London SW1H 0ET

Dear Professor Smith

The Postgraduate Review

The Institute of Physics is a scientific charity devoted to increasing the practice, understanding and application of physics. It has a worldwide membership of over 36,000 and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

The Institute welcomes the opportunity to respond to the Department for Business, Innovation and Skills’ Postgraduate Review.

The attached annex details comments we have received from the Institute’s Science Board and Business & Innovation Board, and from the heads of UK physics departments.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours sincerely

Professor Peter Main
Director, Education and Science
The Postgraduate Review

Theme 1: International

The UK needs to remain internationally competitive in both attracting overseas students and in the prospects of UK postgraduates in the global employment market. International students provide a crucial fee income for many institutions, as well as enriching the UK’s international networks.

- How can the UK remain an attractive place for postgraduate study?

The Bologna Process:

A key issue, and one which the Institute has been concerned about for many years, is the Bologna Process for the reform of higher education in Europe, which poses potential problems for the international recognition of UK Masters level degrees. One of the key Bologna objectives is the adoption of a system essentially based on two main cycles, undergraduate (i.e. Bachelors) and graduate (i.e. Masters), which has led to the implementation in the physical sciences and engineering of a 3+2 (+3 for doctoral studies) standard higher education model across Europe.

This development has led to the UK not being compatible with other European countries in higher education, which is a major ongoing issue for subjects, like physics, that have four-year integrated Masters courses for those students that wish to undertake further study and/or follow a STEM career. European universities do not consider our Masters courses to be at a level comparable to their own.

UK students will be less able to find jobs abroad and it is possible that UK employers will also preferentially recruit the better-trained overseas candidates. Such a perturbation of the career prospects of UK STEM graduates would be regrettable to say the least but, despite the best efforts of the professional bodies, the government has refused to address the issue. There are also connotations for the recruitment of overseas students, as the UK’s lack of compatibility may deter prospective postgraduate students.

In the continued absence of any sort of UK leadership on the Bologna Process, there will be no analysis of the potential issues. By the time the problems of employability and, possibly, the reduced attractiveness of our programmes to overseas students are realised, it will be too late. It is important that our concerns relating to the Bologna Process are recognised and addressed by the government.

Funding for overseas students:

The UK system is not competitive in attracting the best overseas students. Many US universities offer a large number of fully funded bursaries. These attract the very best international students. A number of European countries offer free tuition so even they are more competitive than the UK. Research council rules limiting studentships to UK applicants rule out a large proportion of the best applicants. This is a major problem for the research projects that these positions are there to support.
In addition, the decision by HEFCE to withdraw funding by 2011 for the Overseas Research Students Awards Scheme, which is an important stream of funding for universities to teach postgraduate students, will hinder the ability of UK universities to attract the best students from abroad. We hope that one of the recommendations of the Postgraduate Review will be to ask HEFCE to reconsider its decision, or to fund an alternative scheme. Otherwise, the UK will be a less attractive place for overseas postgraduate students compared to its leading international competitor nations.

Visas for overseas students:

The cost of visas and the hurdles put in the way for overseas students to obtain them are detrimental to attracting the best scientists to the UK. One issue that may not be appreciated is that UK-international collaborations often have graduate student exchanges. These are a valuable way to pursue international research and can often act as pump-priming for a fully funded degree-level student later. But getting a visa for a visiting student who is not undertaking a degree is currently extremely difficult. It is also important to be able to get visas for visiting academics to support the visiting students – this has also proved difficult recently with some excellent cases being refused for no apparent reason.

- **How can those who have studied in the UK continue to be competitive in the international marketplace for talent?**

As mentioned in response to the previous question, the Bologna Process has serious implications for the employability of UK students both at home and abroad, as in the international context, there is a general feeling that UK postgraduates are 1-2 years behind their counterparts in other major competitor countries. While much of the evidence for this is anecdotal, in the last 5-10 years there has been an ongoing and dramatic shift towards the employment of overseas research assistants instead of those trained in the UK. This shift has almost certainly improved the quality of UK research but it does raise some concerns about future leadership in the UK if these people choose not to stay after completing their projects.

- **Does the proportion of UK domiciled students in the UK PG population matter?**

The number of UK domiciled students is important as they will fuel our employment structure (i.e. some UK-based companies do not employ overseas nationals easily so require a stream of good home-grown students).

There will be internal pressures on HEIs to offer places to overseas students, who represent a significant source of fees income, possibly at the expense of UK students. But the companionship of highly educated and motivated overseas students impacts very positively on UK students. If their presence does not mean a curtailment of places for UK students then the number of overseas students can continue to be high and even rise.
Theme 2: Value of PG

The highly skilled postgraduates that the UK produces power our research base and drive our innovative businesses. Undertaking postgraduate education provides individuals with pathways into a wide range of careers.

- **What are the benefits of postgraduate education, to the individual, to HEIs, to businesses and to the wider economy and society?**

  Individuals: Gain unique experiences of leading-edge science and to how to think originally and present ideas and results in a scholarly manner. All research postgraduates learn to manage their own time and also to communicate, which are important skills as well as increasing their knowledge base. Postgraduate education also opens up a broader, more lucrative job market.

  HEIs: Get the first stages of career development for their establishments under way thus leading to new cohorts of postdoctoral students (who are the workforce that help PIs undertake research), lecturers and professors.

  Businesses: Have access to a range of highly skilled (and motivated) individuals capable of thinking outside of the box, especially physics-trained postgraduates due to the highly-numerate, analytical and problem solving skills that are acquired during their training.

  Wider economy: Without such an output of highly qualified people the economy would not grow. The UK depends on 'ideas' to keep abreast of its competitors.

  Society: It is essential for a healthy society that we nurture 'thinkers' who can translate ideas into products/services.

- **Is there an optimal number of taught / research postgraduates studying in the UK?**

  Difficult to say, but the fact that PhD graduates tend to do better than first-degree graduates would appear to indicate that the market is not saturated. However, a key limiting factor could be the number of academics available – given multiple other commitments – to provide postgraduate supervision at internationally competitive quality levels.

  An issue of concern is that there are only a few taught MSc programmes being offered by physics departments primarily due to the fact that it is difficult to get sufficient funding to cover the costs. However, a report into the finances of physics departments commissioned by the Institute revealed that, of those that have specialist taught MSc programmes, the courses can contribute significantly to the financial health of a department. The report recommended that physics departments need to examine their scope for running niche postgraduate taught programmes that may be able to command high fees from both home (sponsored) and overseas students, with appropriate support from the research councils.

  In particular, there is a need for the research councils to support and expand the provision for taught courses for postgraduates training for employment in the energy sector, especially in light of the UK’s potential new nuclear build programme.

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1 Study of the Finances of Physics Departments in English Universities, July 2006; http://www.iop.org/activity/policy/Publications/page_29802.html
Currently, there is no funding mechanism to support MSc courses in nuclear technology. We understand that the research councils are working towards a solution to this problem by the spring of 2010, and we support their efforts, as a funding mechanism needs to be in place by then in order to ensure support for candidates entering courses in the summer of next year. There is already interest in expanding provision, for example, the University of Surrey is considering new provision in nuclear engineering to sit alongside its suite of MSc courses based on nuclear physics.

In addition, the recent announcement by STFC that it will reduce the number of PhD studentships in 2010-11 by 25% is deeply regrettable. We sincerely hope that this is just a short-term decision and that STFC will be able to return to its pre-2009 capacity before any lasting damage is done to the UK’s ability to attract the best students from both home and abroad to study at a higher level.

**Theme 3: Business, Employment and Skills**

Postgraduates have the higher-level skills required in key sectors of the economy, in particular in the growth industries identified by the Government in *New Industry, New Jobs*. Many employers and professions require postgraduate qualifications for entry or offer postgraduate-level continued professional development.

- **Are postgraduates equipped with the right skills, experience and knowledge to progress in employment and get significant value from the investment in their education?**

  It depends on the sector in which they are employed, but there is always room for improvement. More training is needed in areas outside of their specialised research areas, for example: communications skills; the effective use of IT; societal impact; business and commercialisation, etc.

- **Do businesses in the UK make good use of the experience and skills that postgraduates can offer?**

  Some do, in the technical sense, and some recognise that they are taking on people that can adapt and ‘think’ outside of their original subject area and that are also highly numerate and analytical.

- **How can postgraduate provision in the UK better respond to the needs of business, especially new and emerging industries?**

  This is an area where the Department for Business, Innovation and Skills needs to work with the research councils to ensure that new topics are well supported at the research level, for example, nanotechnology, and synthetic biology. Furthermore, there needs to be a boost to the doctoral training centres that EPSRC is funding. These incorporate many of the training aspects outside of the immediate research topic.

  There may also be scope for more industrial CASE awards, which are funded by the research councils, with opportunities for SME involvement. However, CASE awards can be confusing to those not familiar with them, and they differ in detail across the
research councils. The scheme should be made more transparent and, ideally, council-independent.

Theme 4: Participation

The recent report *Higher Ambitions* states the Government’s continuing commitment to widening participation in Higher Education. Although much is known about the make-up of the undergraduate population, more information is required about those undertaking postgraduate study.

- **What factors affect decisions of individuals as to whether or not to undertake postgraduate study?**

  Generally, people do PhDs out of enthusiasm for the subject. They may possibly want a career in academia. For a Masters degree, there may be a specific topic area they wish to specialise in, which is linked to a chosen profession.

  Anecdotally, one of the biggest disincentives to postgraduate study is the level of debt accumulated from undergraduate study. This impacts most on students who come from lower socio-economic groups. Many undergraduates have worked part-time during their undergraduate course – it is not clear whether they can continue this as postgraduates. In addition, it is almost impossible to study for a research degree in physics on a part-time basis – particularly in experimental science.

  Debt burden may play an even bigger part in the future and there is a need to monitor this now as the first £3,000 tuition fee paying students are reaching postgraduate level.

  In addition, a statistical study commissioned by the Institute (jointly with the Royal Society of Chemistry) of the representation of ethnic groups in physics and chemistry\(^2\) revealed that among students who achieve high standards at undergraduate level, ethnic-minority students are less inclined to study physics or chemistry at PhD level than their white counterparts. In contrast, ethnic-minority graduates in physics and chemistry are significantly more likely to go on to further study than their white counterparts. From this it can be inferred that they tend to study subjects outside of physics and chemistry at postgraduate level; this apparent drift away from physics and chemistry presents an interesting avenue for further research in order to ascertain whether they become disillusioned with physical sciences during their undergraduate studies or whether they show a more general preference, say, towards postgraduate programmes that they perceive to be more vocational.

- **How important are alternative models of postgraduate provision (e.g. part-time, distance learning) in supporting expanding and widening participation?**

  On scientific courses, especially those that are experimentally based, part-time and distance learning presents serious challenges in terms of access to facilities, coupled with students losing out on the benefits of team work, etc.

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However, some university physics departments run MSc courses in a number of modes, one of which is a two year part-time course aimed at those employed in industry, allowing them to complete the course over a longer period. This kind of course requires careful timetabling to make it work.

In addition, collaborative PhDs with industry are also a good option where an employee studies for a PhD on a project agreed by both parties. The PhD will be considered a success if industry accepts that the employee’s project is a worthwhile endeavour and if the university ensures there is proper supervision of the employee.

**Theme 5: Fees and Funding**

The findings of this Review will inform the Independent Review of Higher Education Funding and Student Finance, which will consider the affordability of the current system and the link between financial support and the goal of widening participation.

- Is the current model of funding postgraduate provision sustainable, and does it offer the best possible value for money?

In physics the two main sources of funding are the EPSRC formula funding (for doctoral training) and project studentships. This works reasonably well as it has flexibility over the size of the stipend and the length of the award (3-4 years). However, there can be problems with project studentships matching the period of study with the grant.

- Are there models of providing postgraduate financial support that would be more efficient and productive?

In general, postgraduate researchers are poorly rewarded and this will threaten sustainability in the current climate of student debt.

It might be worth looking at some expansion of industrial CASE awards, so that a company does contribute a bit more towards the education/training. This should be widened to incorporate overseas (especially EU) companies.

- Are the current sources of financial support for postgraduate students widely understood by potential and existing students?

No, as it is a very confusing landscape for prospective students, particularly those from overseas. The application process needs to be simplified.

**Theme 6: The Student Experience**

The student experience is vitally important, and cuts across each of the other themes.

- What are the key elements of a high quality PG student experience?

Most students would regard the interaction with their supervisor as crucial. Other factors include working on current research in an intellectually stimulating environment, participating in international/industrial collaborations, collaborating
across disciplines and with other countries/cultures, good libraries, disinterested careers advice, access to world-class equipment and facilities, technical support, and being allowed to travel to conferences. In addition, many also value an introduction to teaching, which is important for their career development.

- Are there innovative delivery models or mechanisms that benefit the student experience, which could be applied more widely?

The quality and breadth of taught courses can be improved by pooling resources, which has been the case with the Scottish Universities Physics Alliance and the English physics regional alliances.
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