

Postgraduate Education

A response from the Society of Biology to the HE Commission

2nd April 2012

The Society of Biology is a single unified voice for Biology: advising Government and influencing policy; advancing education and professional development; supporting our members, and engaging and encouraging public interest in the life sciences. The Society represents a diverse membership of over 80,000 - including practising scientists, students and interested non-professionals - as individuals, or through the learned societies and other organisations listed below.

The Society of Biology welcomes the opportunity afforded by this inquiry. The views presented have been gathered by consultation with members and member organisations and collated with support from the Biochemical Society (see acknowledgments at end of response).

Response

Q1: How well does the current postgraduate system meet the needs of businesses? How can the system become more responsive?

Science, and in particular bioscience, is an important area both for growth and tackling the great challenges facing the modern world, including climate change, food security and energy security. Biosciences therefore have the potential to deliver important near-term societal and economic benefits¹. To realise this potential, there is an allied need for well-trained bioscience postgraduates to lead in academia, industry and government. Trained scientists are of critical value to a range of research and non-research activities.

A recent report from the Science Council highlighted the importance of scientific training to the workforce and analysed sector employment of scientists within traditional and less obvious roles². There appears to be high demand for applicants with a scientific background even for non-research-based roles. Postgraduate study doubtlessly provides students with transferrable skills – analytical skills, critical abilities, time management and teamwork among them – that are relevant across a wide spectrum of careers, including those in business. Recent surveys^{3,4,5} of large

¹ *Innovation and research strategy for growth*, Department for Business Innovation and Skills, Dec 2011 (www.bis.gov.uk/assets/biscore/innovation/docs/i/11-1387-innovation-and-research-strategy-for-growth.pdf)

² *The current and future UK science workforce*, the Science Council, Sep 2011 (www.sciencecouncil.org/sites/default/files/UK_Science_Workforce_FinalReport_TBR_2011.pdf)

³ *Talent fishing: what businesses want from postgraduates*, a CIHE report for the Department of Business Innovation and Skills, Mar 2010 (www.cihe.co.uk/talent-fishing-what-businesses-want-from-postgraduates/)

⁴ EMPRESS: *Employers perceptions of recruiting research staff and students*, Careers Centre, University of Leeds, Nov 2005 (www3.imperial.ac.uk/pls/portallive/docs/1/45265697.PDF)

companies identified specialist subject knowledge, research expertise and analytical thinking as being significant qualities sought in PhD-qualified candidates.

The Higher Education White Paper⁶ has indicated that high quality postgraduates should be equipped with a portable skill set of value to employers. A question that remains is whether the natural gain of generic skills during doctoral study is sufficient. A recent Vitae study⁷ indicates that in the biological sciences, just 23% of doctoral researchers aim to continue in academia after attaining their doctorate. Those seeking careers outside academia may need to rely to a greater extent on the transferrable skills they have gained during their postgraduate studies when applying for jobs. There is some concern expressed that because PhDs are highly specialised, graduates may lack a more rounded training. There can be pressure on students to spend as much time as possible on primary research, with training seen as a diversion by some supervisors.

Although academically capable, post-graduates recruited for non-bioscience roles in industry are reported as lacking basic project management skills (many are extremely good at organising their own requirements but lack the exposure or experience required to organise others); basic business finance (most have been screened from these activities by their research supervisors); commercial skills for dealing with suppliers; and a lack of interpersonal skills (an ability to understand how individuals come across to others and how to deal with different people is essential in the industrial and business environment). Conversely, it is often the case that PhD graduates are over-qualified for the positions they fill, which is a poor use of human resource and is often associated with unsatisfactorily high turnover rates, and there is evidence that employers often try but fail to employ graduates for these roles.⁸

To target this, many organisations are developing specific courses in such transferrable skills to accompany PhD work. This has been pioneered by the Open University, which requires all its registered PhD students to develop a portfolio of transferable skills alongside their specialist research topic. **We recommend examining these models to identify a suitable strategy.** More widespread placements could help with regards to employability. For PhD candidates in the biosciences, **we recommend analysis of the compulsory 'Professional Internships for PhD students' component of the new BBSRC Doctoral Training Partnership (DTP) scheme (beginning in 2012)**⁹.

Further improvements could be made by encouraging companies to increase their engagement with students and academia. Employers should play a key role in promoting the study of STEM subjects and careers at all levels through training funds, bursaries, academic prizes and CASE studentships (*Collaborative Awards in Science and Engineering*, which allow students to receive research training in collaboration with an industrial partner). **There should be an increase in the number of student placements offered – and integration of these opportunities into degree programmes – highlighting the potential vocational nature of STEM subject degrees.**

The availability of these courses encourages students to develop new skills outside of their day-to-day research activities. These could be tailored towards external employment if the training were designed by industry and business to their standards, providing a standardised quality. With 'employability' an increasingly important factor in students' decisions, such verification would presumably be attractive from their perspective too. **Gaining skills, whether through this type of scheme or otherwise, should be recognised and rewarded.**

⁵ *Recruiting researchers: survey of employer practice 2009*, Vitae, 2010

(www.vitae.ac.uk/CMS/files/upload/Recruiting_researchers_employer_survey_2009.pdf)

⁶ *Students at the Heart of the System*, Department for Business Innovation & Skills, Jun 2011

(www.bis.gov.uk/assets/biscore/higher-education/docs/h/11-944-higher-education-students-at-heart-of-system.pdf)

⁷ *What do researchers want to do? The career intentions of doctoral researchers*, Vitae, 2012

(www.vitae.ac.uk/CMS/files/upload/WDRWTD-The-career-intentions-of-doctoral-graduates-Feb12.pdf)

⁸ *Report of the 2010 Industry Survey on bioscience graduates*, The Society of Biology, 2010

<http://www.societyofbiology.org/documents/view/832>

⁹ *Role of employer engagement, employability and impact: Professional Internships for PhD Students (PIPS)*, BBSRC, Sep 2011

(www.cogent-ssc.com/industry/life_sciences/LSAC/VitaeConference-EmployabilityPlacementsAndPIPS-6Sept11.pdf)

After recommendations from a report by Sir Gareth Roberts¹⁰, extra funding was provided to RCUK to aid researchers' professional and personal development. A report by The 1994 Group on the impact of the funding¹¹ found that 'as a result of this funding, skills training and related support for early career researchers are now firmly embedded within institutions... the amount, range, and quality of training and other support has improved considerably'. The recent Hodge Review¹² of 'Roberts funding' also notes that the progress made by research organisations in providing support and training for researchers is encouraging. There is a clear message in the Review that both funders of research and research organisations should continue to stimulate and reinforce skills and career development opportunities.

Roberts funding ended in March 2011, and has been replaced by a lower level of funding from RCUK in the form of grants. This places greater responsibility on research organisations for funding decisions and researcher development activities. **The effects of this reduced level of funding are not yet apparent, but we believe it is vital to continue to support Universities in providing transferrable skills training for postgraduates, and to ensure that the excellent developments in this area are not lost.**

The Higher Education White Paper also suggests that institutions offering taught and research courses to post-graduates should be aware of trends in the biotechnology and pharmaceutical industries, to meet emerging capability gaps and to equip students to enter the workplace. **Closer university-industry collaboration would be helpful to meet this requirement, as this responsibility depends on both sides.** This reinforces our point that it makes sense to enhance contact between academia and industry as much as possible so the two might learn from each other.

Clear and concise career information should be provided to postgraduates (online or within their parent institution) that clearly sets out relevant opportunities. Even more helpful would be regular careers workshops allowing direct interaction with people who occupy positions outside academia. Personal connections are often vital to developing future career prospects. Knowledge Transfer Partnerships should be encouraged, as they not only involve postgraduates directly with research and development in industry but also forge important and potentially long-lasting links between academic and industry professionals. Networking opportunities are also vital for this, such as conferences and workshops involving academia and industry, providing important forums in which links can be made. Learned Societies can support new behaviours through arranging joint meetings and interest groups and involving commercial contacts.

Perhaps, (in a similar manner to the STEMNET programme that supports public engagement with science) a directory of individuals (with a scientific background) involved in various employment niches could be developed allowing them to be enlisted for careers presentations nationally.

Regarding postgraduate taught Master's courses, we worry that institutions will be unable to sustain demand once the realities of the new fee regime hit home. Even now, students are reluctant to take on further debt by pursuing such courses, so the result when those who pay £9000 tuition fees per year for their undergraduate degree graduate could be very damaging for this sector. We highlight this risk in our responses to subsequent questions. Businesses could become more responsive to this need by sponsoring Master's students. Their input into student development would help to produce more individuals that better meet their needs, thus helping to produce a more sustainable cycle. On the whole, there need to be more opportunities for students to gain business and workplace experience. However, within science and technology, the needs of business are not always paramount as training in skills that apply specifically to business is not always compatible with academic pursuit. A PhD needs to involve intellectual development and not just the pursuit of a practical goal, with the making of a unique contribution to scholarship being the basis for assessment that must not be lost sight of. Therefore not all CASE funded studentships make good thesis

¹⁰ *SET for success*, HM Treasury, Apr 2002 (http://www.hm-treasury.gov.uk/d/robertsreview_introch1.pdf)

¹¹ *Survey of the Impact of the Roberts funds at 1994 group institutions*, The 1994 Group, 2008 (Neiland, Reddy & Winn)

¹² *Review of progress in implementing the recommendations of Sir Gareth Roberts, regarding employability and career development of PhD students and research staff*, RCUK, Oct 2010 (www.rcuk.ac.uk/documents/researchcareers/RobertReport2011.pdf)

material even though they may be ideal business training. Furthermore, many areas of bioscience are not of near-commercial interest.

We agree with the key messages of the Wilson Review¹³: that our objective should be to attain world leadership in business–university collaboration, and that to that end status improvements should be made in the supply chain. Postgraduates need to have an awareness of business and a supportive and flexible environment in which to collaborate. Tim Wilson’s call for universities to show ‘responsiveness to business’ starts with their role in providing education and producing readily employable graduates.

The uncertainty around the future of UK immigration policy is a barrier as business, industry and indeed academia need to be able to choose the best students as they see fit, not be restricted in their recruitment by real and perceived difficulties in non-EU students obtaining visas.

Q2a: What is required for the UK to maintain its ability to attract and retain high-quality international students and international researchers?

International students bring significant benefits to the academy and economy, helping the UK to remain a renowned centre for excellence in the biosciences¹⁴. Fundamentally, an open borders policy for education and research is required. The Government has given indications that they recognise this, but it will take time for our reputation as welcoming to international researchers to be recovered following recent discussions around visa policy. **The rules on Tier 4 student visas should be reconsidered, in order to avoid damage to the postgraduate education market.** The current visa system should be simplified to align it with the realities of science (low salaries, personal fellowships and a necessity for mobility, amongst other things). We need to be seen as a dynamic, research-friendly country. The uncertainty around the future of UK immigration policy is a barrier to business, industry and academia, as all three need to be able to choose the best graduates as they see fit, not be restricted in their recruitment by real and perceived difficulties in non-EU students obtaining visas.

Apart from this barrier, the key factor is research quality and for the UK to continue to punch above its weight internationally. The excellence of UK research should be underpinned by support to ensure that this can be continuous, for example by creating permanent technical posts in research laboratories. There should be a high level of practical support to ensure there is efficient mentoring of researchers and a sense of community. For researchers, a high quality research environment with a strong interdisciplinary mix is vital; with adequate funding, good infrastructure and good students. An attractive research climate will also help encourage and support UK students and researchers. The key current problems are the short-termism of research tenures, the difficulties of obtaining funding and the lack of jobs available¹⁵.

Highlighting the outputs of scientific research in the UK, through high quality publications, scientific meetings, public engagement at all levels (and for all ages) and the media, all contribute to attracting high-quality international students and researchers to the UK. Professional societies have a primary role in this by providing the fora for such meetings, publications and networking opportunities that connect people of similar professional interests on both a national and international scale. Additionally, by increasing students’ awareness of opportunities in academia and in industry through society-sponsored meetings, learned societies, help those students to be appropriately trained and equipped to find relevant employment.

¹³ *A Review of Business–University Collaboration*, Department for Business Innovation & Skills, Feb 2012

(www.bis.gov.uk/assets/biscore/further-education-skills/docs/w/12-610-wilson-review-business-university-collaboration)

¹⁴ *International Comparative Performance of the UK Research Base – 2011*, Department for Business Innovation and Skills, 2011 (www.bis.gov.uk/assets/biscore/science/docs/i/11-p123-international-comparative-performance-uk-research-base-2011)

¹⁵ *Careering Out of Control: A Crisis in the UK Science Profession?*, Science is Vital, Oct 2011 (www.scienceisvital.org.uk/data/ScienceCareersreportWEB.pdf)

Good quality research should also be accompanied by well delivered education, and teaching should be recognised as a vital component of the job of academic staff members. Research-informed teaching is crucial in order to produce STEM graduates with the high level skills required for employment. The current focus of the Research Excellence Framework does not incentivise or recognize teaching and will lead to the emergence of further divisions between academics who focus on research and those with teaching responsibility. The decrease in HEFCE teaching funding¹⁶ will create a serious funding shortfall for laboratory subjects, such as the biosciences, which are costly to teach. The new level of HEFCE funding is wholly inadequate and we fear that some HEIs may see science programmes as unaffordable under the new funding regime.

Flexibility over fees is a key issue. In the case of PhD students, our ability to offer discounted or waived fees has allowed us to expand our international portfolio – for example, via the China Scholarship Commission, CAPES studentships within the Science without Borders Programme, and self-funded students. Anecdotally, an approach that is also thought to be reaping benefits for universities is that of sending ‘ambassadors’ to countries like China to advertise the benefits of a postgraduate education in the UK University.

Greater preparation for business and industry, as set out in Q1, would increase the employability of UK-trained post-graduates and postdoctoral researchers, increasing the appeal of such courses to international students and researchers.

In a wider sense, perhaps what also needs to be considered is what else makes the UK research community distinct and attractive, even when positions in places such as the US are far more financially lucrative. This may be partially explained by the rich scientific heritage, but there may be other reasons. **We suggest that a poll of international researchers could be conducted to establish why they came to the UK – and why they have chosen to stay, enabling a strategy to be developed.** This may help to identify those aspects of the UK research community that need to be celebrated, highlighted and amplified.

Q2b: What are the long-term implications of the postgraduate sector’s dependence on international students?

The funding routes available to students who wish to take a taught Master’s after an undergraduate degree are limited, and success in receiving loans, for example through the Professional and Development Loan Scheme is by no means guaranteed., also fees for these courses are likely to escalate because they are funded from the teaching component of the HEFCE grant, which has recently been reduced¹⁷. As a result, there is a risk that UK students will be priced out of the market and these courses will die out or be taken up exclusively by overseas students.

The HE White Paper indicates that tuition fees for international students have subsidised the universities to the extent that some courses, particularly taught Master’s courses, are reliant on international income for financial sustainability. We need to attract home and EU students to keep the cohort of students mixed, avoiding an outright dependence on international students. International students contribute greatly to research output in the UK. Depletion in the long-term would erode our academic standing and the role we play in the international community, including the contributions we make on matters of global significance.

If overseas students are reduced in the UK by immigration issues, the market cannot support a home/EU market on current funding models without dramatic change to style, delivery and resourcing. It is not clear whether the numbers of overseas students seeking post-graduate training will diminish from its current high level, but the threat of this is real and of concern. The increasing standards of higher education in developing countries such as India and China also increases this threat. Innovative solutions are required and there may be further scope for UK university contributions

¹⁶ *Decisions on HEFCE funding for higher education 2012-13*, HEFCE, Feb 2011, (www.hefce.ac.uk/news/hefce/2012/funding.htm)

¹⁷ *Decisions on HEFCE funding for higher education 2012-13*, HEFCE, Feb 2011, (www.hefce.ac.uk/news/hefce/2012/funding.htm)

to e-learning programmes, and partnering arrangements with overseas universities. One example of this from a research perspective is the **BBSRC Partnering Awards scheme**. Professional societies could play a role in influencing the development and possible brokering of such programmes.

On the whole, if the flow of international students to the UK was threatened it could have a detrimental effect on research output. However, a swing too far towards recruiting from overseas may risk losing local talent. For example, a lack of funding for UK students will result in the UK postgraduate research body consisting of excellent international scientists only, with the UK research community at greater risk of suffering 'brain drain'. It could also send poor signals globally about how the UK values science and the UK talent pool. Loss of talent would be detrimental to the UK in terms of innovation, translation and the economy as whole, as we have discussed in Q1.

On the positive side, the UK attracts excellent students who themselves become excellent ambassadors for the UK and their university. Movement of postgraduate students across the globe is essential for knowledge exchange and sharing of best practice, and the UK must seek to remain a destination that is in demand. The key is maintaining balance. **We recommend that the impact of visa restrictions and new fee structure on numbers of UK and overseas students recruited to taught Master's courses be monitored.**

Q2c: How might UK-domiciled students be encouraged to engage in doctoral study?

In an ideal world, more academic jobs would be available with better pay and permanence and with more opportunities for funding and sponsorship. Until absorptive capacity like this increases, we are not certain that there is automatically a need for more students, as the capacity of the system to absorb them is not necessarily there¹⁸. In the case of PhD students, the numbers are largely set by the numbers of studentships available. This highlights the distinction between postgraduate research as a means of providing training in research and as an engine of research. Many laboratories rely on students to generate research and many major advances arise through research performed by research students, whose work is often less restricted than that of postdoctoral researchers tied to particular project grants. Therefore, departments and supervisors are generally in favour of more studentships.

A critical issue in making doctoral study attractive is funding. Students leaving university have large debts. Many universities now require a Master's degree to embark on a PhD and Master's students do not have access to the student loan scheme. The mechanisms for the future funding of Master's courses is opaque but it is likely there will be a need for a substantive rise in fees for universities to make ends meet; it is unclear who can pay for this. The '1 + 3' year scholarships provided by, for example, the Research Councils and Wellcome Trust, are attractive to students because their stipends and fees are paid. However, universities receive HEFCE funding for only 3 of those 4 years and most come without sufficient funds to support the consumables budget for the projects. This can mean the students have a poor experience and hence make the programmes unattractive to those who research them properly. Students will be attracted to well-funded studentships/projects. The current uncertainty around the future of university funding is also off-putting.

Opportunities for mobility of researchers are good, but the prevalence of short-term contracts means that this mobility serves to mask the instability to an extent, which is a particular problem for students with dependents. **There should be a career structure in which skills can be continually gained, which also allows for researchers to make the transition between industry and academia if they so wish.** This would make doctoral study more attractive and also potentially bring benefits to the economy, making collaborations between industry, business, SMEs and academia easier and more natural.

¹⁸ *The scientific century: securing our future prosperity*, The Royal Society, Mar 2010
(www.royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2010/4294970126.pdf)

It would be much easier to engage UK students in doctoral study if there were better prospects for a career in science in the UK. **We would welcome consideration of a move towards early stage researchers, including PhD students, being considered professional scientists.** In Norway, Croatia and the Netherlands, over 90% of doctoral candidates surveyed by the Eurodoc Survey (2011)¹⁹ were on employment contracts. The widespread belief that a PhD is likely to lead to better career prospects in non-research careers would also be an encouragement. Some of the ideas we present in Q1 would help make this a reality. Life as an academic is not the only opening for a PhD student on graduation, indeed, the number of postdoctoral positions, lectureships and higher positions decreases dramatically as you go up the 'career ladder'. There needs to be increased awareness of the demand for PhDs in industry, with more details available on what careers in this sector involve; more information should be provided to undergraduates.

Learned societies contribute to the promotion of doctoral study through demonstrations of the many applications of the fields they represent, and providing opportunities to engage in research and study. Other incentives would also be helpful. **One suggestion is the suspension of interest on student loans while students study for higher degrees. We recommend that the practicalities of this are investigated.**

Q2d: In what areas can UK postgraduate provision be considered outstanding internationally?

UK postgraduate provision is of a high standard, which is why we continue to attract significant numbers of international students. The key to this is research excellence. Outstanding postgraduate provision in sciences, including the life sciences, stems from the UK's research excellence in these areas. This is despite the fact that the budget is small compared to that of the USA, for example (only 1.8% of the UK's GDP in 2008 was spent on research and development (R&D). This compares to 2.1% for France, 2.7% for Germany, and 2.8% for the USA²⁰).

The UK is internationally outstanding in many areas of biological research. Historically, great successes in the biological sciences have arisen, and continue to arise, from UK research. These include the discovery of DNA, the development of genetic fingerprinting, the animal cloning technology (e.g. Dolly the sheep), and human *in vitro* fertilisation (IVF). We also benefit from being excellent in engineering and the natural sciences and hence are well positioned to succeed in the interdisciplinary research that is essential to address the key global challenges.

Our postgraduate system offers access to the subjects that students desire, links to outstanding research, good quality infrastructure and well-developed programmes of pastoral support provided by faculties, students' unions and welfare offices.

The UK is also internationally recognised as leading the development of transferable skills training and research career development. The Hodge Review²¹ noted that 'moves to embed researcher skills development as a core part of the UK PhD have commanded international respect'. The decrease in funding for postgraduate training detailed in Q1 may negatively impact upon the future provision of these schemes and courses.

Q3: How well does current practice support smooth transitions from postgraduate education into industry and academia?

¹⁹ Eurodoc Survey I: *The First Eurodoc Survey on Doctoral Candidates in Twelve European Countries*, EuroDoc, Sep 2011 (www.eurodoc.net/workgroups/surveys/)

²⁰ *SET Statistics: Science, engineering and technology indicators*, Department for Business Innovation and Skills, 2011 (www.bis.gov.uk/policies/science/science-funding/set-stats)

²¹ *Review of progress in implementing the recommendations of Sir Gareth Roberts, regarding employability and career development of PhD students and research staff*, Oct 2010 (www.rcuk.ac.uk/documents/researchcareers/RobertReport2011.pdf)

Current practice within HEIs prepares students primarily for research academia, but not necessarily for the wider elements of life in academia. The teaching component, in particular, is often insufficient or missed. This varies between HEIs. Progression from taught Master's degrees can work better as they are less academically focussed and often more vocational.

This response has already touched on the lack of coordination between academia and industry. Industrial placements and industry-linked research funding provide greater preparation for industry; however, the current availability of these opportunities is insufficient and existing industry-academia links are not strong enough to provide comparable levels of preparation to traditional academic routes. This is reflected all through British science, with business investment in R&D (as a percentage of GDP) decreasing in the UK since the mid-1980s²². A report from the Higher Education Statistics Agency, 'HE Finance Plus'²³, has indicated that only 1.1 per cent of the total income to universities comes from industry, down from 1.4 per cent five years ago. There is much scope for improvement both on the universities' and industry's side. Despite the availability of several excellent resources for postgraduate researchers such as the Vitae website, not all early career researchers are aware of the diverse range of careers facilitated by research; in some situations the advice and resources offered during this training lag behind.

Graduates need to understand the drivers in the business world, especially given the current financial and employment squeeze. **Postgraduates would benefit from tailored career advice given by subject specialists and not just university careers services (which vary hugely in subject expertise). This also applies to helping them plan their careers and obtain the broader experience and skills they need to succeed in whatever type of career they choose to follow. The advice must remain current with the rapidly changing employment market, and be accessible to as many people as possible.**

A report from the Council for Science and Technology²⁴ expressed serious concern that 'much needs to be done to realise the vision that Sir Gareth Roberts had for researchers in his report 'SET for success', and... many of the issues that he raised still need to be addressed'. Specifically, the implementation of a career development framework, greater independence of young researchers, and meaningful links between postgraduate researchers and industry are still lacking.

Vitae have produced a number of publications on the employability of postgraduates. 'What do researchers want to do'²⁵ indicates that doctoral researchers often have little idea of how they will progress their career (only around a third of respondents had definite ideas about their future careers, and about a fifth had little or no idea). Furthermore, just under one third of final-year doctoral researchers had used their institutional careers service as postgraduates. Only a minority of respondents from biological sciences claimed to have postgraduate work experience related to their doctoral study. Fundamentally, these findings indicate a significant deficit in candidates' preparation for employment and backs up our recommendation for closer relationships with business and industry.

Across Europe, it is concerning that the majority of PhD candidates are not involved in decision processes away from their own specific project, with the majority not involved in choosing collaborators, writing grant proposals, determining authorship, organising panels/conferences or having a say in institutional policies²⁶. Although the UK did not take part in this survey, the trends suggest that the same is likely to be the case here. This indicates that readily available

²² *SET Statistics: Science, engineering and technology indicators*, Department for Business Innovation and Skills, 2011 (www.bis.gov.uk/policies/science/science-funding/set-stats)

²³ *2010/11 HE finance plus*, Higher Education Statistics Agency, Mar 2012 (www.hesa.ac.uk/index.php?option=com_pubs&task=show_pub_detail&pubid=1710&Itemid=286)

²⁴ *Pathways to the future: the early careers of researchers in the UK*, Council for Science and Technology, Oct 2007 (www.cst.gov.uk/reports/files/science-government/cst_pathways.pdf)

²⁵ *What do researchers want to do? The career intentions of doctoral researchers*, Vitae, 2012 (www.vitae.ac.uk/CMS/files/upload/WDRWTD-The-career-intentions-of-doctoral-graduates-Feb12.pdf)

²⁶ *Eurodoc Survey I: The First Eurodoc Survey on Doctoral Candidates in Twelve European Countries*, EuroDoc, Sep 2011 (www.eurodoc.net/workgroups/surveys/)

opportunities for students to gain experience and transferrable skills are not being taken or made available to these individuals. With research being conducted in an increasingly competitive environment, supervisors commonly view student participation in these activities as a diversion away from research, or an inefficient use of their time. These conflicts (students needing to gain transferrable skills, and supervisors wishing to maximise research productivity) may be alleviated by Research Councils and other funding bodies promoting the importance of postgraduate training.

Support does come from learned societies. In the biosciences, many societies run career development workshops; award travel grants to allow conference attendance and broader professional experiences; provide grants for other activities such as outreach, conference organisation lab-based studentships; organise workshops on communication and policy engagement; and organise mentoring schemes and a variety of competitions. Support from within institutions is also received, but reports of the availability of this are that this remains inconsistent.

Other bodies also give support to enable transitions. For example, Vitae supports early career scientists through the UK Research Staff Association (UKRSA)²⁷ and funding councils such as the BBSRC offer development support, for example through Biotechnology YES²⁸. Postdoctoral and postgraduate candidates also get Europe-wide support from organisations outside of the UK, such as the European Molecular Biology Organization (EMBO). Many (but not all) UK universities are in the European Universities Association that has within it the EUA Council for Doctoral Education²⁹, which advises on the development of doctoral education in universities.

There is some concern about the relative length of UK doctoral studentships by comparison with some other countries, and that the reduced scope that this leaves to achieve robust research and transferrable skills training could place doctoral graduates at a relative disadvantage.

It would be easier to integrate supportive practice into postgraduate education if undergraduates were better prepared for life as a PhD student. Laboratory and field placements need to be facilitated for undergraduates, which will require greater investment in university science education for universities to deliver quality programmes. Extensive comment suggests that new postgraduate students from UK universities need significant training in practical research skills, unless they have done a relevant Masters course. A greater number of four-year PhD would also contribute to a more ideal scenario.

Q4: How can postgraduate provision in the UK be made more accessible for students from less advantaged backgrounds?

The primary task is to even out access to higher education in general, by encouraging wider participation at school and undergraduate level. The current danger is that increased fees for undergraduate courses will diminish the uptake of these courses by young people from less advantaged backgrounds.

Beyond this, **obvious mechanisms include more grants and sponsorship opportunities for low income students, either from industry, business or the government. Alternatively, greater help could be provided in paying off student debts already accrued.** Those without private means might also feel reluctant to continue into postgraduate education, being keen to start working for salaries. Attempts to increase the number of home-domiciled PhD and other postgraduate students might necessitate an increasing amount of fees for postgraduate education being paid by the students themselves. To allow students to afford this, **a loan scheme similar to the undergraduate loans system would need to be contemplated, including generous grants and bursaries for disadvantaged applicants.**

²⁷ UK Research Staff Association (www.vitae.ac.uk/researchers/205761/UK-Research-Staff-Association.html)

²⁸ Biotechnology YES (www.biotechnologyyes.co.uk/)

²⁹ EUA Council for Doctoral Education (www.eua.be/cde/Home.aspx)

The provision of courses with direct relevance to employers, or the clear link demonstrated, would be helpful, so that the student's investment in terms of finances and time is rewarded with a real prospect of employment. This links back to our call for a closer relationship between academia, business and industry. Completing postgraduate study needs to be worth the effort in the long run. However, business might only be involved if they are sure of a return, and identifying ideal candidates may not be straightforward. Also, an individual's interests may change over the course of their education (such is the nature of academic freedom) and they may not want to be tied to a particular arrangement if it is too restrictive. Therefore any new schemes to support closer collaboration would need to be carefully thought out.

Increased flexibility could also have a positive effect. Increased part-time provision – including vacation opportunities – could make postgraduate education more accessible. **We recommend that such possibilities are explored.**

Q5: What impact will the changes to undergraduate provision outlined in the recent Higher Education White Paper have on the postgraduate sector?

The impact of students graduating with large debt from their student loans, coupled with the lack of clarity on the future plans for the funding of postgraduate study, is likely to have an unsettling impact on the postgraduate sector. The HE White Paper was remarkably silent on this very important issue, as have many other recent government papers – including the Innovation and Research Strategy for Growth, despite research postgraduates doing much of the work on which our international reputation for research excellence is built. Previous administrations have also tended to ignore postgraduate provision. By focusing completely on undergraduate teaching and funding issues, the HE White Paper neglects the complex inter-relationship between undergraduate teaching, postgraduate teaching and research in many universities.

The likelihood is that these changes will have a very negative effect on taught Master's courses as fees will have to increase. If students continue to see a career value, then they will continue to invest, but that link is not clear. If loans are difficult to come by, there is a risk that they will not engage at all. In turn this will have a negative impact on the sector, potentially with Master's level courses closing, having a knock on effect on further study. The 1994 group have made it clear that Research Council funding must continue for postgraduate students to avoid creating insurmountable barriers³⁰. Although postgraduate education was given barely a passing mention in the Browne review³¹, this point was acknowledged there too. **If HEIs are to remain active in research and teaching in the sciences, then they will require undergraduate and postgraduate teaching income in order to sustain these subjects.**

If students realise that undergraduate debts accrued have to be paid back above an earning threshold that won't impact on PhD income, it is possible that more students will be interested in doing a PhD than currently, as this may eventually lead to a better paid job and therefore allow students to more easily pay off their loans. **We recommend better and clearer information is more widely distributed, in order to counter any misconceptions arising from the Government's initial communication regarding the changes to the fee regime.**

In the longer term, the HE White Paper proposals to free up student number controls and enable a wider choice of undergraduate course providers may result in more students applying for postgraduate courses from more diverse backgrounds.

All of these potential outcomes – particularly on the transition from undergraduate to postgraduate study and how disadvantaged groups in particular are being affected – will have to be monitored closely by the Government so that the system can respond.

³⁰ *The postgraduate crisis*, 1994 Group, Feb 2012 (www.1994group.ac.uk/documents/120215_PostgraduateCrisis.pdf)

³¹ *Securing a sustainable future for higher education*, Independent Review of Higher Education & Student Finance in England, Oct 2012 (www.bis.gov.uk/assets/biscore/corporate/docs/s/10-1208-securing-sustainable-higher-education-browne-report.pdf)

Q6: How should postgraduate education be funded?

Postgraduate taught Master's courses can reasonably be seen as an extension of undergraduate specialisation, or change of direction, so there is an argument that financial support should be similar. Institutions should not be suffering a withdrawal of teaching funding and students could be supported through a sustainable student loans system. We welcome the fact that postgraduate funding is being addressed in the current HEFCE consultation on higher education funding³². We also note that Master's courses must be a meaningful addition, and not simply taken by students as they are unsure of what to do next in their career, and again stress the importance of relevant careers advice.

More studentships for PhD students should be available in non-targeted areas. We are currently seeing a greater emphasis on 'priority areas' and a decline in the numbers of studentships elsewhere. This is having a detrimental impact on creativity and discovery. Funding should be available for all legitimate fields of scientific enquiry, and 'blue-skies' research should continue to be supported.

Business and industry could do more to support education, especially given that they receive much of the benefit. In the case of industry, this could be almost in the manner of an apprenticeship, with the subsequent requirement that the individual work for the supporting company for a set period post-education. However, identifying the best candidates for such support may not be straightforward, and this wouldn't be appropriate across the board.

We recommend that a system of loans should be available to support students undertaking Master's level qualifications, though, although not at the expense of PhD funding. Government should work with the private sector to ensure the needs of the future workforce are met, and continue to fuel research in the UK. PhD students work as part of research groups on professional activities, and should be paid for doing so. Stipends from funding bodies differ (with the Research Councils being amongst the least generous) but students cannot usually be too fussy as there are very limited opportunities, especially in specific subject areas. Given the general shortage of funding opportunities, it is important that charities continue to fund individuals too.

Shared supervisory support for post-graduates (by academics with allied interests) both extends contacts for the student and also spreads the cost of supervision. Collaboration with colleagues in allied fields – with commercial interests – could also enrich studies.

The UK risks losing students abroad if the uncertainty remains and support is not forthcoming. This applies to UK-domiciled students as well as the international students we aim to attract.

Q7: Are you aware of any distinctive models of delivering postgraduate education which have been deployed with success in other countries?

The French system for postgraduate education involves internal competition from undergraduate to postgraduate via MSc lab projects, which enables the best students to be identified by group leaders and introduces a competitive incentive for students to do their best from day one.

A specific example of good practice in the delivery of careers advice is the University of Melbourne, where each graduate school offers access to career support, internships and mentoring programs. This helps students to build their professional capabilities and develop career strategies before graduation.

³² *Student number controls and teaching funding: consultation on changes for 2013-14 and beyond*, HEFCE, Feb 2012 (<http://www.hefce.ac.uk/news/hefce/2012/xfund.htm>)

Many European countries fund students by employing them as teaching assistants during their PhD. This not only helps with practical teaching of undergraduates, but also allows the postgraduate students to develop valuable teaching experience and skills. However, it does make the PhD take longer. To facilitate this possibility, we suggest that there should be more flexibility in submission deadlines that are often a precondition for funding. A further argument for such relaxation is that these also applied without regard to extenuating circumstances or decisions beyond the control of PhD supervisors.

As mentioned in Q3, in comparison to other European students, UK-based students are much less exposed to genuine science and are much less technically qualified than their European counterparts when *starting* a MSc or a PhD. To match up to this it would be helpful to have more practical scientific training during the undergraduate curriculum and encourage students to take research internships where available.

Q8: How effective are quality assurance and student feedback mechanisms for postgraduate provision?

Mechanisms for student feedback vary widely between institutions. Feedback and QA are probably least effective where universities have lots of small programmes with relatively few students on each (this is not uncommon), making this much more difficult. However, the most important thing is to have an engaged tutor. Making the process excessively bureaucratic could be detrimental as it risks time being wasted.

In general, there is much better feedback to students than in the past and this has been helped by a general awareness of its importance. There is a genuine desire amongst staff to improve programmes and provide maximum benefit to students.

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The Society of Biology is pleased for this response to be publically available.

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