# Royal Society of Chemistry's response to the BIS consultation on support for postgraduate study

May 2015

STEM postgraduate studentships are a key component of training a highly-skilled UK workforce in science, technology and beyond, as well as a crucial strategic mechanism to enable the delivery of team research projects and programmes. STEM postgraduate students play an essential role in the UK innovation system as well as the wider economy.

**Current sources of funding for chemistry postgraduates are vital to the supply chain and must be maintained**. Whilst the Royal Society of Chemistry welcomes, in principle, the introduction of loans to support postgraduate programmes, it is essential that this would be **in addition to existing mechanisms of support** that currently ensure a vital supply of high quality postgraduate students in the chemical sciences.

The number of postgraduate taught masters programmes in the chemical sciences is currently small because it is more common for students to undertake a four year integrated masters degree at undergraduate level (leading to an MChem degree), than a separate postgraduate masters course. In contrast, numbers of chemistry postgraduate research students are significant (over 1,000 enrolments per year) and have been growing steadily over the past five years. Our consultation is therefore focused at the PhD level.

**Q1. How can we broaden and strengthen support for postgraduate research students and excellent postgraduate research?**

***The diverse portfolio of STEM postgraduate training options currently offered in the UK must be maintained to ensure high quality postgraduate students that support the UK's broad science research base.*** There are many models for the provision of postgraduate student training that ensure the quality of the student experience, but the needs of research groups and related industries are not standard across the sector and must be catered for.

The Research Council-funded centres of doctoral training (CDTs) provide broad doctoral training in both research and transferable skills and are an effective mechanism for supporting interdisciplinary research. For example, CDTs funded by the Engineering and Physical Sciences Research Council (EPSRC) have leveraged almost £500m from industry and public bodies, and CDTs funded by other research councils have been similarly successful in leveraging funding that benefits the STEM subjects. [1]

Other models, such as industrial CASE (iCASE) studentships, doctoral training partnerships (DTPs) and project studentships, provide more specialised doctoral training and support research on individual projects in collaboration with industry or directly within a researcher's laboratory. These mechanisms provide more flexibility and agility, as well as leveraging additional funding from non-Research Council sources. This helps maintain a range of research topic choices for students and provides vital support for early career researchers setting up their first research group or laboratory.

[1] http://www.rsc.org/chemistryworld/2015/01/research-council-head-closer-engagement-research-community

The diversity of Research Council-funded training routes balances capability across the sciences by supporting areas of national and strategic importance as well as existing excellence. Given the strengths of these different training routes, it is important to retain a range of funding mechanisms for postgraduate students,[2] striking a balance between concentration and breadth to support a range of student and researcher needs.

To build upon existing strengths, support should target:

- Newly appointed academics who will be the research leaders of the future. They are unlikely to be involved with a CDT, and may have difficulty funding individual project students if research council funding cannot be used to support them.
- Smaller research groups at universities without a CDT in their field, to ensure they are able to continue to operate.
- SMEs (and some larger companies), who are often unable to commit to long periods of large investment, or are only able to when supporting specific projects. Ensuring that they are able to part-fund postgraduate students through mechanisms such as iCASE[3] would help alleviate this.

Alongside Research Council funding, university chemistry support PhD students from income they receive through the funding councils (Higher Education Funding Councils for England and Wales, Scottish Funding Council and Higher Education Authority in Ireland) by leveraging funding from industry (outside of CDTs and iCASE awards), and by attracting income from overseas governments and other overseas organisations, as well as other sources such as charities, EU funding and scholarships.

**Q2. Is there unmet demand for postgraduate research skills and qualifications amongst employers and potential students?**

***Employer demand for highly trained STEM professionals is high.*** The UK's industrial sector is expected to need 1.28 million STEM professionals and technicians by 2020.[4] The CBI's *Education and Skills Survey* shows that 39% of companies "are struggling to recruit workers with the advanced, technical STEM skills they need", with more than half (53%) expecting the recruitment market to become much more difficult in the years ahead as the economic recovery gathers momentum.[5] At the postgraduate level specifically, the percentage of firms expecting recruitment problems has doubled (from 12% in 2013 to 25% in 2014).

In the next three to five years, employer demand for more people with higher level skills is expected to be particularly strong in those sectors that should lead the rebalancing of the economy, such as manufacturing, engineering and construction. A fifth of chemistry PhD graduates entered the manufacturing sector in 2013,[6] and with demand for higher level skills from this sector anticipated to increase by 76% over the next 3-5 years,[4] more highly skilled chemical scientists will be needed.

***Student demand for funded PhD places is high, but tuition costs are only one of many important factors affecting availability of opportunities.*** Graduates of all of the science subjects

[2] House of Lords Science and Technology Select Committee, Higher Education in STEM Subjects (2012) http://www.publications.parliament.uk/pa/ld201213/ldselect/ldsctech/37/37.pdf
[3] https://www.epsrc.ac.uk/skills/students/coll/icase/
[4] http://www.raeng.org.uk/news/news-releases/2013/September/engineering-diversity-concordat
[5] http://www.cbi.org.uk/media/2807987/gateway-to-growth.pdf
[6] HESA student records (http://www.hesa.ac.uk/)

are more likely than average to continue studying, with 33% of chemistry graduates continuing on to further study compared to 12% of all graduates. Nearly two thirds (63%) of chemistry graduates who go on to postgraduate study are most likely to undertake a PhD. The relatively low proportion of graduates going on to study separate taught or research masters courses in chemistry is in part due to the more usual practice of completing an integrated undergraduate masters degree in the subject.[7]

UK universities generally report no or few difficulties in getting sufficiently highly-qualified applications where there is funding in place.[8] Supply and demand is predominantly driven by the availability of funding, particularly for UK postgraduate researchers. Competition is strong for funded places and scholarships, and is expected to increase further as institutions struggle to maintain their scholarship programmes.[9]

At present the demand for self-funded PhDs in chemistry is low, accounting for only 7% of PhD enrolments over the past three years, with 70% of these from outside the EU.[10] This low level in part reflects the fact that the costs of a PhD student are broader than just tuition and living costs. To ensure quality of experience there is also a financial implication to the host institution in terms of additional supervisory capacity. In addition STEM postgraduate research training generally incurs additional costs above and beyond those for most other subjects, due to requirements of laboratory space, equipment and consumables.[11]

***Researcher demand for postgraduate students is high.*** A recent survey of Heads of UK university chemistry departments (50 responses) highlighted the importance of accessing funding for chemistry PhD students given the integral role they play within research teams and the focus on generating world-leading research. Many universities also depend on the contribution PhD students make to teaching undergraduates through tutorials, classes and supervising undergraduate teaching laboratories and several smaller chemistry departments have highlighted the limited availability of funding for PhDs as a constraint on their ability to teach undergraduate students.[9]

**Q3.How can we attract and retain top research talent in the UK?**

***The UK must support needs of researchers and provide access to excellent research training to attract and retain the best research talent.*** Both newly appointed and more established researchers utilise PhD students as an essential and integral part of a research team. As highlighted in our response to Question 1, it is essential to ensure the breadth of postgraduate training mechanisms is retained.

***The highest quality support for students is to treat them as employees, including affording them holiday and maternity leave.*** Countries including Denmark, Norway, Sweden and the Netherlands[12] demonstrate best practice in this area by treating PhD students as employees. In the UK, postgraduate researchers are termed 'students' but the benefits of the programme are returned not only to the student, but also to the research institution, the UK science base and the country

[7] http://www.hecsu.ac.uk/assets/assets/documents/wdgd_september_2014.pdf
[8] http://www.hefce.ac.uk/pubs/rereports/year/2014/pgrrecruitment/
[9] http://www.hefce.ac.uk/pubs/rereports/year/2014/pgrrecruitment/
[10] Based on data collected from 50 Heads of UK university Chemistry Departments, Royal Society of Chemistry
[11] The Finances of Chemistry and Physics Departments in UK Universities: third review, Royal Society of Chemistry and Institute of Physics, 2015
[12] http://www.newscientist.com/blogs/bigwideworld/2012/03/make-phds-employees-not-students.html

more widely. When undertaking a PhD, the student becomes a primary researcher and a vital component of a research group, often supervising less experienced researchers and undertaking a great deal of independent work. They also contribute to supporting undergraduate teaching (see Question 2). Requiring that students take a loan and pay to do this work, which has many wider benefits, could be off-putting and risks harming the diversity of the research workforce.

***Attracting top research talent requires both excellent support mechanisms and a welcoming immigration system.*** Attracting world-class researchers to the UK is essential to maintaining the UK's reputation as the best place to do science, yet since the 2010 changes to UK immigration law many universities have described administrative and logistical problems with arranging conference visits by foreign academics, difficulties retaining postgraduate students in the absence of a competitive post-study work visa, and the closure of postgraduate courses aimed at the international market.

There is increasingly strong competition for the most highly-qualified postgraduate research students from quicker and more competitive offers from the US and Canada, growth in European postgraduate research provision in English, and a fear that the UK is perceived as less welcoming to international students due to current immigration policy and visa processes.

**Q4. How can we ensure loans complement existing funding mechanisms, maintaining a focus on the most excellent research and on linking with external funding?**

***Current sources of funding for chemistry postgraduates are vital to the supply chain and* must *be maintained.*** PhD students have a valuable role as primary researchers, bringing many wider benefits to the UK economy and society. Reducing the number of funded PhD students would lead to a drop in the number of primary researchers, decreasing the amount of world-class research performed in the UK. The Research Councils have a vital role in ensuring the supply of postgraduate research students and the quality of their training.

Whilst the Royal Society of Chemistry welcomes, in principle, the introduction of loans to support postgraduate programmes, it is essential that this would have to be ***in addition*** to existing mechanisms of support. Currently the Research Councils (and, most prominently, the EPSRC) play a significant role in funding chemistry PhD students, supporting around a third of all PhD students enrolling onto chemistry programmes over the past three years, and around 50% of UK-domiciled chemistry students.[11]

***The impact of postgraduate masters loans on the choice of undergraduate chemistry degree type is unclear and should be monitored, particularly in relation to its effect on the income of chemistry departments.*** Many chemistry undergraduates currently choose to undertake a four year integrated masters degree at undergraduate level (leading to an MChem degree). It is not currently clear what impact the proposed introduction of postgraduate loans will have on balance of students selecting three year undergraduate degrees (leading to a BSc) – followed by a postgraduate masters course – over four year MChem courses. A shift in this balance will affect the amount of tuition fee income for chemical science undergraduate programmes, which may reduce the income to university chemistry departments. Conversely, if the proposed loans generate increased demand for chemistry postgraduate masters courses, there may be an opportunity for chemistry departments to establish new programmes which could be a valuable source of revenue.

Since many chemistry departments currently operate a deficit on their teaching activities,[13] this situation must be carefully monitored.

**Q5. Would the availability of a £25,000 loan influence a student's decision to pursue postgraduate research study or the location of study?**

As the chemistry PhD postgraduate research system is currently dominated by fully funded PhD studentships it is difficult to answer. However, the full cost of an RCUK-funded PhD studentship in chemistry includes annual tuition fees of £4052 and a tax-free stipend towards living costs of £14,057 (2015/16), amounting to more than £72,000 for a typical 4-year studentship. Therefore, even ignoring additional costs connected to the university and research system (see Question 2), a £25,000 loan would only cover around a third of the cost of a chemistry PhD.

## Contact

The Royal Society of Chemistry would be happy to discuss any of the issues raised in our response in more detail. Any questions should be directed to **Dr Izzie Radford,** radfordi@rsc.org, 01223 432234.

## About us

With over 51,000 members and a knowledge business that spans the globe, the Royal Society of Chemistry is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world.

A not-for-profit organisation with a heritage that spans 170 years, we invest in educating future generations of scientists, we raise and maintain standards and work with industry and academia to promote collaboration and innovation. We advise governments on policy and we promote the talent, information and ideas that lead to great advances in science.

This response has been prepared in consultation and discussion with members of the chemical sciences community, including members of the Heads of Chemistry UK group.

[13] The finances of chemistry and physics departments in UK Universities: third review