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## **Title: Postdoctoral Research System in UK**

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### ***Abstract***

A postdoctoral researcher is a person who has obtained a Ph.D. and is professionally conducting research or/and teaching. In the United Kingdom, 25% of doctors in the natural sciences continue to undertake postdoctoral research. Postdoctoral researchers play an important role in carrying on research in the universities, industry and institutes. The article is aimed to introduce UK postdoc system. It is intended to compare postdoc system between UK and China as a guide for improving future postdoc system and for those who are thinking of a career in UK academic science, so there are also some suggestions and advice for opportunities of joint postdoc programme.

There is growing pressure for postdocs because of increasing number of postdocs and few places of academia available in UK. For stepping stone on the pathway to an academic career which is a more stable academic position, postdocs must produce a solid set of publications, obtain excellent experience and skills to find opportunities and often secure research funding of their own. In addition, it will be useful if postdoc researchers can build a new network of scientific colleagues and friends that will support you for the rest of your career. In recent years, some UK universities have explored more opportunities for supporting postdoc research, such as, joint Postdoc scheme with Chinese Institutions and postdoc posts funded by university and industry.

### ***Introduction***

The UK education system is among the best in the world, recognised internationally for its excellence in education and training. The UK has an outstanding reputation for the quality of its higher education, with the Quacquarelli Symonds (QS) world rankings placing four UK universities in the world's top ten in 2016 (<http://www.topuniversities.com/>). With world-class academician at the forefront of a wide range of research-related areas, UK has long held a leading position in the global excellent research as well as the strength of the UK's world class research base with activity (as

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indicated by article outputs) and multidisciplinary competencies across all major research fields. The UK's field-weighted citation impact continues to rise (and now ranks 1st amongst the comparator countries) and high field-weighted download impact across these fields, the UK also demonstrates excellence in diverse research domains. Taken together, these factors may serve to reinforce the UK's central position in the global collaboration network and also make the UK an attractive destination for researchers from other countries.

The UK education system is divided into four main parts: primary education, secondary education, further education (FE) and higher education (HE). FE and HE are not compulsory. FE covers non-advanced education which can take primarily taught in FE colleges with work-based learning and adult and community learning. HE is study beyond A levels for most full-time students, takes place in universities and other HEIs and colleges. Higher education has three main levels of HE course which is the SCE/National Qualification. (i) Undergraduate courses; (ii) Postgraduate courses leading to higher degrees (including Doctorate, Masters (research and taught); (iii) Other courses which include Diploma (HNC/D, HND, HNC and SVQ or NVQ) and certificates for postgraduate certificates of education (PGCE).

The UK academic system has a traditional hierarchy of university positions, but these are different compared to many other countries such as the USA and the rest of Europe. Currently, UK university appointments include post-doc researcher (Research Associate and Research Fellow) that may lead up to the following appointments (i) Lecturer/Senior Lecturer (Assistant Professor); (ii) Reader (Associate Professor) and (iii) Professor. This hierarchy should apply to most UK institutions. However, some universities may have their own peculiarities and structure with a little bit of change. Usually, university staff has three responsibilities: (i) Conduct research; (ii) Teaching and (iii) Perform administration. Increasingly, in the more successful research-active universities, these activities are more separated that depends upon the skills, expertise and dedication of its Staff. For example, A staff having a stronger teaching will focus on teaching less or no research commitment, rather than having to devote a lot of time to both teaching and research. Every member of staff is expected to contribute towards the realisation of the University's mission and the plans of

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their academic or service unit. Researchers share the responsibility for and need to proactively engage in their own personal and career development.

### ***What is a postdoc?***

In the UK, a postdoctoral researcher is a fixed-term, paid position after the completion of their PhD study. It usually involves working on a project for which another academic (the Principal Investigator) has applied for funding. Postdoctoral researchers may work independently driving scientific research once they obtained a research fellowship. The fixed-term contracts could cover for 3-5 years, dependent on the length of the funding. In some cases, it may be possible for a postdoc to have more than 10 years to work on several different projects (Barton, 2008).

A postdoctoral research position can be, though by no means has to be, a stepping stone on the pathway to an academic career. In science and engineering disciplines, the most common route into an academic career is to conduct two (or possibly three) postdocs, possibly followed by a fellowship, and then a lectureship. It is really rare, postdoc can take a more stable academic position after only one round postdoc now. In Social Sciences and Humanities disciplines, it's increasingly common for people to do postdocs as part of the route to an academic career, though there is also the option of doing a teaching fellowship or temporary lectureship instead of, or possibly as well as, a postdoc, before applying to permanent lectureships.

Postdoc research will normally have a "laboratory" in which their research work is carried out, but the laboratory might be "Wet lab" which postdoc work with benchtop experiments handling chemicals, drugs, biological material or other material. It could be "Dry lab", a bunch of desks and computer workstations with computational or applied mathematical analyses (e.g. Bioinformatics). Postdoc researchers do research in their lab, normally with a team of people and then "write it up" for publication in a journal (more about that later), so a main goal for most postdocs is to publish good work frequently in good journals.

### ***Postdoc's responsibilities***

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Postdocs are appointed with the title Research Associate (assistantship) or Research Fellow (fellowship) depending on the type/source of funding and level. Research Associate is working as a research assistant (RA) on a project that is funded by a grant that has been won by a principal investigator. Research Fellow is a senior postdoc who has been awarded a grant, being paid by the award, rather than to their research supervisor. Advantage is in that you can work freedom with larger component of what you want to do, rather than what your supervisor and his/her granting body want. As a post-doc fellow, you will not be an independent scientist, but will be working in someone else's lab and using their resources and expertise, but you take your fellowship with you to any institutions that can accept you and agree to offer you're a permanent academic position (e.g. Lectureship) after the fellowship.

Although both will engage in research activities, the Research Fellow is normally treated as a senior scholar whose work he or she will assist. The Research Associate, on the other hand, will normally work in a department and be available to offer research assistance to a department and graduate students needing assistance with technical aspects of their research. This may be the entry level for some staff who are expected to train and/or develop to take on more senior researcher roles as their career progresses. (<https://www.researchgate.net/post/>).

#### Research Associate Responsibilities:

- Contribution to the research programme under supervision by an academic staff or Principal Investigator, contribute ideas, and/or enhancement of techniques or methodologies
- Determine appropriate methodologies for research, with advice and support where required and analyse and interpret research data and draw conclusions on the outcomes
- Co-ordinate own work with that of others, deal with problems which may affect the achievement of research objectives and contribute to the planning of the project(s)
- Report information on research progress and outcomes to a Principal Investigator or groups overseeing the research project, and assess research findings
- Write up results from own research activity and provide input into the research project's dissemination, in whatever form (report, papers, chapters, book)

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- Teaching and supervision of under/postgraduates and demonstration duties within undergraduate lab
  - Begin to write, with appropriate support, proposals for individual research funding or, where funders do not permit this, contribute to the writing of collective bids

#### Research Associate Responsibilities:

- Contribution to the research projects and project management including the preparation of
- Play a leading role in research teams to which they belong, including progressively larger and/or more complex projects, or as an individual researcher in their specific research area
- Play a major part in the dissemination of their (or the team's) research findings, presenting at conferences and contributing substantially to publications
- Produce publications of international quality or exhibit potential for international quality (in part through strong national quality publications), at the frequency appropriate to the discipline
- Ensure that knowledge and methodological/technical skills in their own, and related, areas of scholarship are extended and inform research activities
- Monitor and, where appropriate, manage research resources (e.g. time, materials, finance, laboratory space, equipment) effectively
- Supervise postgraduate research students and take responsibility for their training
- Contribute (consonant with the terms of their funding) to the teaching of the School/Institute
- Play an active part in research networks, develop contacts with external bodies, to take a leading role in developing entrepreneurial links either with external organisations.

#### ***Possibilities of Postdoc Research***

##### (1) Funding application

There are three main sources of funding: Government "Research Councils", Charities and Industry. Some funding organisations offer specific grants to support postdoc researchers. Having worked as a post-doc for a few years, in one or more good labs, you should have a fair collection of first-author

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publications in good journals. At this point you should be well placed to apply for a fellowship. There are several organisations that offer fellowships that aim to support the best scientists at various stages of their career. The Leverhulme Trust Offering up to £50,000 over three to twenty-four months for experienced researchers to conduct a programme of research in any discipline

(<https://www.leverhulme.ac.uk/funding/grant-schemes/research-fellowships>) . Royal Society

University Research Fellowship for outstanding scientists in the UK who are in the early stages of their research career and have the potential to become leaders in their field.

(<https://royalsociety.org/grants-schemes-awards/grants/university-research/>). NERC Independent Research Fellowships to develop scientific leadership among the most promising early-career environmental scientists, by giving all fellows five years' support.

(<http://www.nerc.ac.uk/funding/available/fellowships/irf/>). BBSRC offers David Phillips

Fellowships for five years to support researchers wishing to establish their first independent research group. (<http://www.bbsrc.ac.uk/funding/filter/david-phillips/>)

## (2). Joint Postdoc programme with Chinese Institutions

UK researchers are highly collaborative; in 2012, 47.6% of UK-authored published articles were co-authored with at least one non-UK researcher (SciVal, 2013). Over the last ten, I've been working with a number of Chinese Universities and Institutions, and setting many collaborations including very successful joint Postdoc programme with Jiangsu Academy of Agricultural Sciences (JAAS) in Nanjing, China. Initially, we signed an agreement in November 2011, and followed by establish the joint programme between University of Nottingham and JAAS. We have had a very nice collaborative programme with JAAS with their postdocs placed in our labs for 2yrs with the aim of publishing 2 papers at the end of the placement. The programme went very well with 3 postdocs in first round who have published 14 peer reviewed papers, awarded 3 China National Foundation Science Funding (400,000 RMB). They have updated high throughput technologies (e.g. genomics, gene networks, disease resistance analysis, robotic dairy farm) and enhance their scientific skills. One of the benefits of collaboration is to improve ways of thinking and broaden their knowledge through scientific training and seminars. JAAS has obtained well-trained young scientists via joint Postdoc programme. We're really looking forward for further joint Postdoc schemes.

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### ***Problems with UK postdoc system***

There is very little funding in the UK for long-term (i.e. to retirement age) permanent appointments, just about everything is funded on short-term grants from one or more organisations. This presents a challenging problem for a Postdoc. The oversupply of PhD holders in Europe is causing “considerable dissatisfaction and stress” for researchers on temporary contracts, according to a report by the European Science Foundation (Powell, 2015). In recent years, only a tenth of these found academic positions, because of lack of funding and positions which led to the difficulty of building a career in the field. So just how difficult is it to progress from a fixed-term postdoctoral position to a permanent post?

For young postdoc, their salaries have remained low — often similar level to PhD studentship after paying an income tax. It is a very unsettled time in their lives that creates a lot of anxiety and stress. The idea of a career in science is less attractive so we are losing out on the truly best and brightest scientists who move out of science or to do something that is more rewarded and where it takes less time to get into a permanent job.

### ***Conclusions***

Postdoctoral researchers are critical to universities. Most UK universities rely on postdocs to drive research projects and to help guide PhD students’ research on a day-to-day basis. But what is it actually like to work as a postdoc in a UK university today? I think that you can learn to face this situation, handle the challenge of striving to succeed in a highly competitive environment, and publish and secure your own funding. The real solution to the postdoc problem lies in dramatically changes in providing funding from government and industry to support with a higher ratio of permanent staff scientists.

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