

CAREER COLUMN | 14 November 2023

Why postdoctoral training needs a stronger focus on innovation

Innovation straddles policy, change management, budgeting, negotiating and influencing skills. Researchers need all these and more, says David Bogle.

By [David Bogle](#)



At the 2023 Crick Innovation Challenge at the Francis Crick Institute in London, scientists from across the United Kingdom came together to come up with innovative solutions to four challenges in areas such as planetary health and healthy living.

Five years ago, I called for [postdoctoral training to go broader and deeper](#). I argued that researchers need to do more than deliver science that is directed largely by their principal investigator (PI).

They should also apply strategic thinking, learn how to be leaders and managers and improve their communication skills.

Since then, the number of postdoctoral researchers, particularly in the sciences, [has grown substantially in high-income countries](#).

Many of these researchers plan to pursue careers in research and development or in the private, public or charitable sectors. These positions will require original thinking and innovation. However, the majority of postdocs still see their future in academia.

Nature's 2023 global postdoc survey, [published last month](#), found that 65% of the 3,800 self-selecting respondents plan to base their careers in academia, a 2% rise from 2020, when the survey last ran.

But at the same time, many struggle with job insecurity (59% of those aged 31–40 cite it as a concern, for example, with 51% worried about advancement opportunities).



Career resources for postdoctoral researchers

[academia](#).

They feel this way because the academic system lacks the capacity to absorb all of them into faculty positions, [given the considerable increases in the number of postdocs in the past few decades](#).

As a consequence, fewer doctoral graduates are choosing to [apply for postdoctoral positions in](#)

In the United Kingdom, the United States and France, for example, it has long been the case that less than [half of all PhD graduates choose to pursue a postdoctoral position](#).

Impact beyond academia

In their graduate studies, researchers are trained to strip a problem to its fundamentals, a skill they hone as postdocs. They devise original ideas to overcome limitations and take them through to proof of concept, and they communicate with expert and non-expert audiences. Researchers focus mainly on answering questions through analysis and experimentation – or, in the social sciences, other types of data gathering.

However, in the past decade, universities and funders have recognized that researchers need to be trained to make an impact in society beyond academia.

To help achieve this, all research universities offer doctoral researchers generic [training in topics such communication, project management and entrepreneurship](#).

But there's another area that needs more attention, to benefit science careers in academia and beyond: innovation. And I don't mean just entrepreneurship, although that is important.

Innovation is defined by global management-consulting firm McKinsey as [“the systematic practice of developing and marketing breakthrough products and services for adoption by customers”](#), and by sociologist Everett Rogers as [“an idea, practice, or object that is perceived as new by an individual or other unit of adoption”](#). Alan Altshuler and Robert Behn, sociologists at the Harvard Kennedy School in Cambridge, Massachusetts, define innovation as including the [generation, admission and realization of new ideas, products, services and processes](#).

Research at universities, funded mainly by governments, produces papers, patents and data – some of which will be put to use. But universities also produce highly trained people, all of whom can drive innovation in society. They can champion new products and processes, implement new policies and persuade stakeholders to embrace change. In many countries (such as the [United Kingdom](#), [the United States](#) and [Germany](#)), the private sector funds a significant amount of research, and much of

it is driven and executed by the postdocs produced by universities. The private sector is more interested in innovation and impact than fundamental research.

To make the best use of the public investment in producing researchers, we must ensure that scientists are trained in both research and innovation, in this broader sense.

Highly trained researchers can be invaluable in creating disruptive innovation – when an idea or service is introduced to address a fundamental problem, technical or social, that needs fresh solutions, in fields such as climate change and personalized medicine.

'Intrapreneurship'

It is time to change the postdoctoral experience. Researchers need to be taught to translate research findings, both their own and those of others, into products, policy and solutions to difficult problems.

This will prepare them to transform research results from any source to make an impact on society.

Some existing training programmes could be modified. Entrepreneurship courses, for example, often focus on the research of each individual – but these could also include teaching about how to identify existing research findings that can solve a problem and how to take results forward ([this course for PhD students at the Norwegian University of Science and Technology in Trondheim does this](#)).

Many training courses are focused on developing spinoffs or licences as a way of making an impact, but innovation is needed in many existing companies and organizations.

This is sometimes called 'intrapreneurship', and it requires distinct strategies to create change in complex organizations. Examples include facilitating the adoption

of technical ideas in an organization and creating structural or social change – effectively ‘managing change’ on the basis of robust research ideas.

Entrepreneurship training tends to emphasize technical innovation, but there is also a need for social-entrepreneurship training in the context of charitable and government agencies.

In July, the European Commission [launched a new framework for research careers](#). It recommends that universities begin “fostering an entrepreneurial mindset in researchers ... to improve knowledge valorization and the transformation of innovative ideas into new services and products”.

This will involve improving training, as I have described. But postdocs must also have the time and opportunity to cultivate their innovation skills independently. This might involve, for example, assembling a team to advance a specific innovation that has been identified by their organization’s innovation incubator, where researchers who want to start or grow businesses on the basis of their research can get support, or by a partner firm. The team could help to raise funding, explore barriers to commercialization and ways around them, develop plans to implement social change on the basis of research findings and, when possible, begin to put in place the structures to achieve change.

These changes would help to tackle the concerns that postdocs have and make their training experience more valuable for their career prospects – and hopefully more enjoyable.

The postdoctoral experience should be one in which early-career researchers do great work, develop great skills, see it as a great career move and have a great time. At the moment, only the first one of these is achieved consistently.

doi: <https://doi.org/10.1038/d41586-023-03544-y>

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