

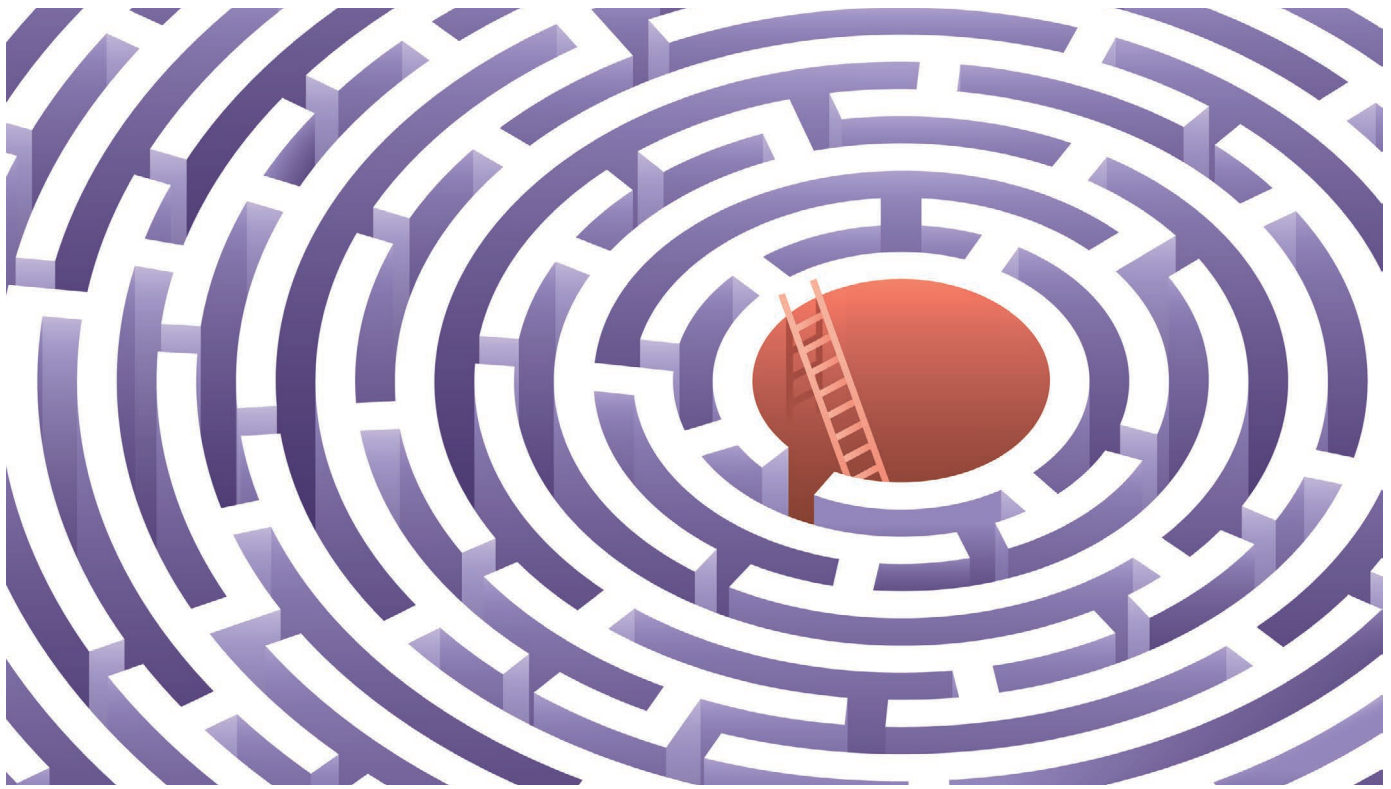
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COLUMN

You are not a failed scientist

PhD students who leave academia should be supported, says **Philipp Kruger**.

As a PhD student in my final year, I find it demoralizing and frustrating to be constantly reminded of the bleak job prospects in academia. This dim outlook may well increase the pressure on students and contribute to high rates of anxiety and depression among them (T. M. Evans *et al.* *Nature Biotechnol.* **36**, 282–284; 2018). The scientific community could help to solve this problem by encouraging us all to change the way we think about the PhD. And scientists can start by appreciating a simple truth: researchers who leave academia are not failed academics.

Students and their supervisors must begin to regard a PhD programme as a traineeship in scientific thinking and an invaluable qualification for a diverse range of careers. If everyone involved in academic science could accept a variety of roles as the default outcome, we

could change our flawed definition of success. We could transition from a culture of failure to a healthier and happier scientific enterprise.

I've found it daunting to determine the best career to match my personality, skills, priorities, ambitions and interests, particularly because most people around me treat the academic path as the default. But we PhD students have an obligation to see to our own professional futures. Many of us, of course, are driven by the excitement of discovery, and we relish the freedom to pursue our curiosity in an academic laboratory.

However, some of us discover during our PhDs that in our dream job, the emphasis would be on using interpersonal and communication skills, having a more immediate impact on society or gaining financial rewards, job security or family-friendly working

hours. Our direction should be the result of a conscious decision rather than a perception of a lack of opportunities. And it should have nothing to do with a sense of fear of 'failure'.

WHAT PHD STUDENTS CAN DO

To make an informed decision about their professional future, students need to use their initiative and be proactive. Here's what has worked for me and what I think my student peers could do.

Determine your preferences. A PhD provides you with diverse experiences, from conducting lab experiments to giving talks and supervising students. I've found it useful to write down whenever one of these tasks is particularly fascinating, enjoyable, stressful, boring or frustrating. Doing this over four years has ►

► helped me to determine patterns and decide which tasks should make up my future job. For example, this is how I discovered that I enjoy discussing and presenting my data much more than actually collecting them in the lab.

Develop a range of skills. It was important for me to be aware of and actively develop transferable skills, such as teamwork, line management of more-junior students, project and time management, written communication and conference presentations, from an early point in my PhD. You could seek activities outside the lab that provide further experience, such as organizing events, teaching, public engagement or writing a blog. I have, for example, co-organized conferences in Oxford for the British Society for Immunology, and I'm teaching immunology in various undergraduate programmes at the University of Oxford, UK.

Find out what's out there. This is not as straightforward as it should be, but I found that my university's careers service was a good place to start. Career advisers regularly encounter PhD students with doubts about their future roles, and they can help you to structure your self-assessment and broadly match your preferences and skills to specific roles. I also read job adverts to find out about available positions and the skills that employers seek. Another useful resource is science-careers fairs, where you can meet potential employers. Even after a lot of research online, I encountered jobs at those fairs that I had never heard of.

Organize talks. Don't depend solely on online articles and blog posts to understand what a certain role is really like. For me, the most substantial insights have come from talking to people who actually have those jobs. I've found that those who have decided to leave the lab for other professions know how difficult it is and are willing to give talks about their journey. Initiation of such careers seminars often comes from students, and you could even organize one yourself. In my department, we plan four of those talks each year. Send this article to your department or programme director when you ask them to fund your event.

Build your network. Early on, I found that my LinkedIn profile was a helpful tool for keeping track of connections and providing information about myself. If you send follow-up messages to people you have spoken to at seminars, meetings or fairs, they are more likely to remember you when you ask them for advice or work experience. For example, multiple career-seminar speakers have sent me details afterwards about their job-search strategy, companies they'd considered and more.

Arrange an internship. Use your (or your supervisor's) network, or cold-e-mail

people and ask them for internship or work-shadowing opportunities. In February, I spent one week at *Nature Immunology* (after meeting an editor at a conference), and this was enough to get a good understanding of day-to-day life in the job. I was involved in discussing article submissions, wrote a commentary and identified appropriate reviewers for a paper. In addition, I spoke to people in the company and learnt about their roles: for example, I found out the differences between primary-journal and review-journal editors.

WHAT SUPERVISORS CAN DO

A free and open exploration of different career options requires a work environment that encourages students to take out time for career exploration and that actively helps them to find the relevant information. However, most supervisors arguably know little about non-academic careers and might not have much incentive to provide students with access to such information. As a consequence, only one-third of the respondents in *Nature's* 2017 Graduate Student Survey reported receiving useful advice from their supervisor regarding non-academic careers (see <https://go.nature.com/2qwsyfx>).

When I was involved in organizing the 2016 Medical Sciences Careers Day for PhD students at the University of Oxford, some suggested also inviting academic speakers to provide a more 'balanced picture'. But PhD students already have plenty of role models in their academic environment and solid access to information about the academic career track. And the main purpose of events such as this is to provide information that students don't have access to, and thereby correct the already existing imbalance.

PhD students alone are unlikely to transform the culture of academic science. I think that PhD programmes and individual supervisors have a responsibility to make it easy for students to find the path that is right for them, and I know many group leaders who see this as part of their role as a mentor. As a principal investigator (PI), you can take several steps to support your students.

Support students' professional development. Offer students opportunities to teach, supervise, chair meetings, manage collaborations and write papers or grant applications. In my experience, this is already widely practised, but some PIs do not always appreciate the importance of these training opportunities to students. I learnt the most when I had to develop a certain skill — say, doing a practice run for a major presentation — and received feedback. You could formalize this into a regular meeting and discuss what the students enjoy and where they need more practice.

Establish a flexible work environment. The students I have met who had developed a clear career plan by the end of their PhD were usually from research groups that cultivated a flexible, low-pressure environment. Encourage students to take time out for extracurricular activities that will provide them with useful experiences. I have been fortunate to have had the opportunity to try out different things, but I know others who feel pressured to be in the lab all day, every day.

Encourage work experience. Some formal PhD programmes include an option, even a requirement, to do an internship outside academia, and I think this is a great idea. Friends of mine have spent three months drafting policy at the World Health Organization or filming science documentaries for the BBC. Everyone I know who has done an internship greatly valued the experience, and individual supervisors can support this — and let their students know that they do — by, for example, providing contacts in relevant sectors.

Show your support. Arguably the most important thing that supervisors can do is openly show support for lab members and mentees who might be heading out of academia. For example, you could say on your lab page that it is important to you to support your lab members' professional development. You could supplement the statement with an up-to-date list of lab alumni to show that you are proud of their achievements. Potential PhD and postdoc applicants will greatly appreciate your stand on this issue.

A PHD IS HIGHLY VALUABLE

This leaves us with one last aspect of the culture of failure and its effect on doctoral students and postdocs: the widespread misconception that a PhD is useful training only for academic research. Or, in other words, if you leave academia, your mum will think that you've wasted your time doing a PhD. You might even have wondered about that yourself.

We know that most PhD graduates eventually go on to other careers, but have they all wasted their time? Absolutely not. The skills you are acquiring (or have acquired) during a PhD are highly sought by employers beyond academic science. You are incredibly resilient, hard-working and motivated. You make decisions based on evidence, you can interpret data, you can communicate complex concepts clearly, you are an effective team player and you can prioritize tasks. And you have a degree to prove all of this.

You have every reason to be positive about your job prospects.

Personally, I won't regret having done my PhD, regardless of my future career. ■

Philipp Kruger is a PhD student in immunology at the University of Oxford, UK.