



George Freeman MP
Minister of State (Minister for Science, Research and Innovation)
Department for Business, Energy and Industrial Strategy
(By e-mail)

15 December 2022

Dear George Freeman,

Science and Technology Committee – inquiry into people and skills in UK STEM

We recently concluded an inquiry into people and skills in UK STEM (Science, Technology, Engineering and Mathematics). This letter sets out our findings as well as our conclusions and recommendations.

The issue of the UK's skills gap is long-running. The shortage of people with the necessary STEM skills impedes improvements to productivity, economic growth and the fulfilment of wider policy goals, such as net zero and energy security. If the UK is to achieve its ambition of becoming a 'science and technology superpower' by 2030, urgent action is needed.

Our inquiry focused on four areas which have informed the four sections of this letter:

- Immigration policy for STEM talent
- Quantifying and addressing the domestic skills gap
- Recruiting and retaining science teachers and educators
- The precarity and attractiveness of STEM academic careers

While the recommendations in each of these sections are predominantly aimed at BEIS, the Department for Education and the Home Office, there are cross-cutting elements which should be taken into account by multiple departments and by public sector organisations such as universities and UK Research and Innovation.

General conclusions

There is a mismatch between the scale of the UK's skills gap and the solutions proposed by the Government, especially given the UK's ambition to be a science and technology superpower. The Government's policies are inadequate and piecemeal. Closing the gap requires aligning the high-level priorities of a number of departments; co-ordination is crucial so that the availability of a skilled workforce does not prevent the growth of STEM industries.

The Government has a number of initiatives aimed at addressing the skills gap, including T-Levels, the National Skills Fund and Institutes of Technology. However, we did not hear sufficient evidence from the Government that the impact of these initiatives is enough to address the skills shortage.

Immigration policy for STEM talent

Overseas STEM talent will play a key role in ensuring the UK achieves its science superpower ambitions. Skilled individuals should feel valued and welcome.

Visa costs for skilled workers and scientists seeking to work in the UK are unjustifiably high compared with the UK's competitors. *The Home Office should produce a breakdown of visa costs and benchmark like-for-like costs to those in comparable nations. The Government should introduce a scheme that allows upfront costs like the immigration health surcharge to be paid over time.*

The Global Talent visa is welcome, but the criteria for it are too narrow. It is too onerous for SMEs and other smaller organisations to become recognised visa sponsors for the Skilled Worker visa. *The Global Talent visa fast-track criteria should be expanded. The list of shortage occupations, and the list of eligible employers for visa sponsorships, should be updated more often.*

The UK should take a proactive, competitive approach to becoming a destination for top talent. The Home Office policy that the “user should pay” for the immigration system is not appropriate for highly skilled immigrants who can contribute much to the UK economy and should be abandoned. *Reforms could include extending the post-graduation work visa from two to five years. New types of visa, such as a remote working visa, should be explored. The Government should introduce a support system to help the most talented individuals navigate the UK visa and settlement processes.*

Quantifying and addressing the domestic skills gap

We explored a number of aspects of the skills gap: the so-called “missing middle”, enrolment and regional variation in take up of apprenticeships, the Apprenticeship Levy and lifelong learning.

The ‘missing middle’

There is a ‘missing middle’ of people with technical skills at Levels 3–5. This was highlighted a quarter of a century ago in the Dearing Report and the problem is worsening. People need to be able to gain mathematics, coding, IT and other STEM skills later in life. *Further education and technical colleges should be more extensively and sufficiently resourced to provide modular courses below degree level that enable workers to retrain or gain new STEM skills. Existing organisations, such as the Catapults and other Public Sector Research Establishments, often have unique facilities and expertise and should play a greater role in training apprentices.*

The UK needs a better understanding of precisely which skills are in deficit, such as the US Bureau of Labor Statistics provides with its occupational shortage lists. *The Unit for Future Skills should publish details of its assessment of the skills gap in the first half of 2023, indicating precisely which skills are likely to be required and associated timelines. It should set out a quantitative assessment of how its policies and initiatives will contribute to resolving this gap, including how many people will be trained, in which areas and by when, taking into account evidence from industry and the requirements for UK policies such as net zero. These insights should be translated into training course provision and apprenticeship standards.*

Enrolment and regional variation in apprenticeships

Apprenticeships remain a vital component of training a skilled workforce, but enrolment has declined in recent years. University courses are easier to apply to, with UCAS providing a “one-stop shop” for applications. We are unclear whether schools are incentivised to encourage students to undertake apprenticeships in the same way. *Degree apprenticeships could be expanded and more could be done to publicise this option. Apprenticeship standards must be updated more regularly. It should be easier for applicants to navigate the apprenticeship system to understand which opportunities are available to them.*

There is an assumption that apprenticeships are inherently local, but the local talent pool may not always match up to demand, especially where large infrastructure projects are concerned. *The Government should explore providing grants or loans for apprentices to move around the country.*

Flexibility of the Apprenticeship Levy

Much of the income from the Apprenticeship Levy goes unspent and many industry witnesses expressed a desire to loosen the restrictions on how the money can be spent to include shorter or more modular courses. *The Government should make the Apprenticeship Levy more flexible to allow funds to be spent on other forms of training. The Government should take further steps to understand why industry is not hiring apprentices and encourage them to do so.*

Lifelong learning

We endorse the Skills Minister’s vision of the Lifelong Learning Entitlement being used for modular courses and look forward to seeing the results of the work being done on this. However, there was concern that in hard economic times people in work may not feel able to take on a loan and take time out from employment to retrain without further support. *The Lifelong Learning Entitlement should be geared towards shorter, modular and part-time courses and levels of support should be carefully monitored to ensure there is sufficient uptake. The Government should consider allowing the Lifelong Learning Entitlement to be used for Level 7 courses.*

Recruiting and retaining science teachers and educators

There is a severe, long-standing shortage of specialist science teachers, especially in high-demand subjects like physics and computing. Encouraging student enthusiasm for scientific subjects must begin early. Generous bursary schemes have failed to address this problem. The result is poorer educational outcomes, worsening educational inequality and students being deterred from taking these subjects at A Level and beyond. *Differential pay, through bursaries and payments like the Levelling Up Premium, should be pursued – it is substantially cheaper to pay teachers more and retain them than to train new teachers. Specialist training should be provided so that teachers from other STEM subjects, such as engineering, can fill the shortfall in physicists. There is scope to explore projects like Teach Next, which would retrain skilled individuals to become teachers later in their career.*

Recruitment and retention of teachers and educators across many subjects falls short of Government targets. This is especially true in shortage subjects. *The factors behind the failure to retain teachers must be understood and addressed. Continuing professional development opportunities should be made available to teachers in specialist subjects to improve retention rates.*

The precarity and attractiveness of STEM academic careers

The Committee welcomes UKRI's commitment to increase PhD stipends to reflect cost of living increases. The Government must ensure low stipend levels do not mean that PhD research is an option only for those with external means.

More data are needed to understand the career outcomes of PhD students and postdoctoral researchers and to provide them with careers advice and appropriate experience.

The majority of PhD students, and many postdoctoral researchers, will not end up in permanent academic positions, but alternative careers can be hard to navigate. *Careers advice needs to be improved for PhDs and postdoctoral researchers. Initiatives that allow PhD students and postdocs to spend time in industry, as part of their training, should be expanded.*

A lack of standardisation in contracts, as well as the short fixed-term nature of most contracts, contributes to the precariousness of careers for postdoctoral researchers. *Consideration should be given to addressing this with Government and charitable funders taking career precarity into account. Funding can have "strings attached"— such as creating, where possible, more longer-term research fellowships with funding, rather than short-term postdocs, or awarding funding on the expectation that a permanent position will be created. Institutions need to be clearer with Principal Investigators that continuing to employ people on a succession of short-term contracts without a clear route to permanent employment is not acceptable. In addition, postdoctoral researchers should be offered careers advice, highlighting opportunities outside of academia.*

We look forward to your response to the conclusions set out in this letter by February 15. We are copying this letter to the Rt Hon Greg Clark MP, Chair of the House of Commons Science and Technology Committee.

Yours sincerely,

A handwritten signature in black ink that reads "Brown of Cambridge". The signature is written in a cursive, flowing style with a long horizontal line extending to the right from the end of the name.

Baroness Brown of Cambridge
Chair, House of Lords Science and Technology Committee

Appendix: Summary of evidence

Immigration policy for STEM talent

1. The UK's immigration system has changed significantly since the Brexit deal was finalised. As free movement has ended, initiatives such as the Global Talent visa have been introduced to encourage “leaders or potential leaders” in research and academia across science and engineering fields to work in the UK.¹ We heard from the Home Office that 3,833 Global Talent visas were granted in the 12 months to June 2022, up from 2,659 in the previous year and rising since the cap of 2,000 was removed in 2019.²
2. Despite these encouraging figures, we heard that there are still significant barriers for the most talented individuals who want to come to the UK. Professor Maggie Dallman, Vice President and Associate Provost at Imperial College London, noted that “the messaging on welcoming highly skilled scientists to the UK is increasingly drowned out by post-Brexit rhetoric and policy to reduce overall immigration to the UK.”³
3. Professor Sir Robin Grimes noted an “increasing gap between us and other countries, which makes us less attractive”, that a postdoctoral researcher on a five-year global talent visa would need to pay “£3,700 in upfront immigration costs”.⁴ The Royal Society has noted that, for an adult with three family members, this would amount to £12,880 in upfront application costs: £1,220 per person in visa fees and £2,000 per person on the immigration health surcharge.⁵ Many who provided written evidence said that these costs are substantially higher than in comparative countries.⁶
4. For the skilled worker permit, which is significantly broader, the Royal Society noted that the combined cost to individuals and sponsors in the UK (£8,419) substantially exceeds the average in other leading science nations (£1,316).⁷ In particular, evidence highlighted the upfront nature of the immigration health surcharge; migrants pay taxes and national insurance, but are also required to pay an advance payment for the NHS.⁸ Some countries require public or private healthcare insurance to be paid by migrants or employers, but none do so through an upfront charge like the immigration health surcharge. These costs introduce inequalities to the immigration system – some institutions and some employers are more able to help their employees pay for these charges and are therefore more able to recruit overseas talent.⁹

¹ Home Office, 'Work in the UK as a researcher or academic leader (Global Talent visa)': <https://www.gov.uk/global-talent-researcher-academic> [accessed 9 December 2022]

² [Q 73](#) (Phillipa Rouse)

³ [Q 1](#) (Prof Maggie Dallman OBE)

⁴ [Q 11](#) (Prof Sir Robin Grimes)

⁵ The Royal Society, *UK science and immigration: why the UK needs an internationally competitive visa offer* (July 2019) Figure 2, p 7: <https://royalsociety.org/-/media/policy/Publications/2019/international-visa-systems-explainer-july-2019.pdf> [accessed 9 December 2022]

⁶ The high visa costs were mentioned by many of the organisations that submitted evidence, including but not limited to [PSU0008](#) [PSU0009](#) [PSU0013](#) [PSU0020](#) [PSU0023](#), [PSU0024](#), [PSU0030](#), [PSU0036](#), [PSU0037](#), [PSU0051](#), [PSU0052](#), [PSU0054](#) and others.

⁷ The Royal Society, *UK science and immigration: why the UK needs an internationally competitive visa offer* (July 2019) Figure 2, p 5: <https://royalsociety.org/-/media/policy/Publications/2019/international-visa-systems-explainer-july-2019.pdf> [accessed 9 December 2022]

⁸ [Q 2](#) (Prof Dame Ottoline Leyser)

⁹ Written evidence from Dr Yusra Siddiqui, Dr Rania Edris and Dr Bilal Malik, University of Derby ([PSU0008](#))

5. We asked the Home Office witness about the high cost of the Global Talent visa. They cited research which “shows the hierarchy and the different things that people who have come through the visa prize. Fees and process were relatively low down their priorities. It was about the roles, the opportunities in the UK and the like.”¹⁰ The Committee asked to see this research and we were directed to the Global Talent Visa evaluation survey.¹¹
6. We note that applicants who are deterred from coming to the UK by high visa costs would not be captured by an exit survey such as this. We also note that 59% of respondents to this survey – who have successfully obtained a Global Talent Visa – described the immigration health surcharge as “unfair”, while 52% felt that paying fees for dependant relatives was unfair. The research itself recommended that a mechanism to pay the immigration health surcharge over time would help address this.
7. **Visa costs for skilled workers and scientists seeking to work in the UK are unjustifiably high compared with the UK’s competitors. The Home Office should produce a breakdown of visa costs and benchmark costs to those in comparable nations. The Government should consider introducing a scheme that allows upfront costs like the immigration health surcharge to be paid over time.**
8. Joanna Hunt, Director and Head of Immigration at the law firm Fieldfisher, noted that the skilled worker visa is the most popular route for companies wanting to bring in workers, but they need to “obtain a sponsor licence first ... that is a costly process. It takes perhaps two to three months ... they want to be able to secure that worker as quickly as possible.” The “exorbitant” costs for employers, mentioned above, can often lead to employers using “clawbacks” to recoup these costs from employees, which makes working in the UK less attractive. This was compared unfavourably with the UK’s old “highly skilled migrant programme”, which allowed individuals to get visas based on their own characteristics and have free access to work for anybody.
9. The time taken to process applications and the level of detail required were also highlighted. Ms Hunt told us that to be competitive recruiters wanted to be “agile and nimble” and “to secure [a] worker as quickly as possible”. Although she acknowledged that the Home Office had a priority process, “that has not worked that well”. She expressed concern that, although visa applications are now processed online, it is an “intrusive process”, with burdens such as the requirement to “declare ... travel history going back many years” deterring applicants. In addition, skilled workers still have a long route to citizenship, with a five-year wait before they can apply for indefinite leave to remain. In contrast, countries such as Germany offer a “shortened visa” for tech talent to qualify for settlement and citizenship.¹²

¹⁰ [Q 67](#) (Phillipa Rouse)

¹¹ Home Office, *Global Talent Visa Evaluation: Exploring experiences of the Global Talent visa process* (30 May 2022): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1072031/Final_Global_Talent_evaluation_wave_1_report_-_for_publication.pdf [accesses 16 November 2022]

¹² [Q 12](#) (Joanna Hunt)

10. Professor Dame Ottoline Leyser, CEO of UK Research and Innovation, noted that “the three or four years you spend for [PhD] study does not count towards your clock on indefinite leave to remain ... that is about career opportunity.”¹³ These factors make the UK’s visa system less competitive. Ms Hunt also emphasised the lack of competitiveness in what visa holders are offered compared with other countries. For example Germany offers “a shortened visa for tech talent, which is a quicker route to settlement and citizenship, which is a massive draw.”
11. In contrast, “In the UK, when a skilled worker comes to the country, it is a five-year wait before they could apply for ... indefinite leave to remain, which is permanent residence, and another further year before you can apply for citizenship. That is quite a long wait.”¹⁴ Raj Mann, Director of Global Immigration at Vialto Partners, echoed this: “If the UK really wants to make itself attractive to STEM talent to come and stay, settlement has to be looked at, in terms of how it can be made more streamlined and easier to obtain”.¹⁵
12. Ms Hunt noted that in contrast to other European countries, where a migrant can apply for Schengen visas to other countries, a migrant in the UK does not receive any preferential treatment if their company wants to send them elsewhere in Europe. This reduces the competitiveness of the UK’s visa offering.
13. Ms Mann noted that the UK’s shortage occupation list needs to be “quicker and more adaptable to change ... anticipating where the need is.” At present, applying for a job on the shortage occupation list “does not do much other than lower the salary threshold if you are applying for a visa”, so reforms could provide further incentives to fill the UK’s skills gaps.¹⁶
14. Witnesses praised the Global Talent visa, with Prof Sir Robin Grimes noting that it gave workers “the freedom to switch jobs and grow careers”, and the ability to travel freely for research without it counting towards the maximum period of absences that other visa processes have.¹⁷ Others noted that the qualification criteria for this visa remained very narrow – McClaren said that only 37 universities qualified for the visa, with 20 prestigious schools in the US, none in India and only two in China.¹⁸ Ms Hunt noted that limiting the High Potential Individual route to “the top 50 universities in the world” meant that it is “unlikely to have a major impact.”¹⁹ The fast-track route which relies on prestigious awards has been criticised as too narrow, with only one successful applicant in the first year.²⁰
- 15. The Global Talent visa is welcome, but the criteria for it are too narrow. It is too onerous for SMEs and other smaller organisations to become recognised visa sponsors for the Skilled Worker visa. The Global Talent visa**

¹³ [Q 3](#) (Prof Dame Ottoline Leyser)

¹⁴ [Q 12](#) (Joanna Hunt)

¹⁵ [Q 12](#) (Raj Mann)

¹⁶ [Q 13](#) (Raj Mann)

¹⁷ [Q 12](#) (Prof Sir Robin Grimes)

¹⁸ Written evidence from McLaren Automotive ([PSU0020](#))

¹⁹ [Q 13](#) (Joanna Hunt)

²⁰ Daniel Waldron, ‘UK visa scheme for top scientists flops’, *Workpermit.com* (6 June 2022): <https://workpermit.com/news/uk-visa-scheme-top-scientists-flops-20220606> [accessed 16 November 2022]

fast-track criteria should be expanded. The list of shortage occupations, and the list of eligible employers for visa sponsorships, should be updated more often.

16. The Committee heard about the attitude shift which will be required to attract skilled workers to the UK. Ms Hunt spoke of a “war for talent”, where “the UK still has that association with being expensive and rather bureaucratic”, and “other countries ... are more open to the idea of offering incentives to come.”²¹ Ms Mann noted that, since Brexit, the immigration system has become slightly easier for non-EU nationals but substantially more difficult for residents from the EU.²²
17. Ms Hunt told us “There are other countries that have perhaps been more nimble, flexible and innovative in what they are offering ... There seem to be other countries that are more open to the idea of offering incentives to come, rather than simply having an immigration system that limits talent and reduces opportunities.”²³ More generally, as Ms Hunt said, “There is still this remaining residual sense that the UK is not as hospitable as it once was and is not a place for a long-term future”.²⁴
18. We heard that the ongoing failure to associate with Horizon Europe has been very damaging for the UK research community and has directly led to a number of researchers in receipt of European Research Council grants being forced to move abroad.²⁵
19. Harry Anderson of Universities UK noted that the GREAT Talent Campaign was a good start but “perhaps a bit too promotional rather than practical”, and it needed to provide more practical information in a “one-stop shop”, such as the Research in Germany platform provides for that country.²⁶
20. Ms Mann noted that talented workers in the tech industry are increasingly seeking to work remotely, even internationally, post-COVID, and praised countries that have introduced a “stand-alone, publicised ... remote working visa option, a digital nomad visa.”²⁷ We heard that companies that want to compete for talent want to be as flexible as possible with their remote working policies but that “there are jurisdictions that do not allow that so easily, the UK being one.”²⁸ The EU is proposing to increase the period of absence an individual can take without losing long-term residence status from one year to two. “That is an incredibly flexible and forward-looking way in which to try to retain talent in this new post-pandemic way of working.”²⁹
21. A theme from this inquiry is that visa policy should be proactive in supporting wider policy goals. One idea our witnesses mentioned was for a “regional visa in the UK”, which could support levelling-up by attracting skilled people to different regions in the

²¹ [Q 11](#) (Joanna Hunt)

²² This was supported in written evidence – for example, McLaren Automotive told us that “Where we previously hired from the EU (mainly automotive engineers from Italy) we have seen our number drop from up to 150 per year to pretty much zero.” ([PSU0020](#))

²³ [Q 11](#) (Joanna Hunt)

²⁴ [Q 11](#) (Joanna Hunt)

²⁵ [Q 16](#) (Prof Sir Robin Grimes)

²⁶ [Q 1](#) (Harry Anderson)

²⁷ [Q 11](#) (Raj Mann)

²⁸ [Q 11](#) (Raj Mann)

²⁹ [Q 12](#) (Raj Mann)

UK, rather than just London. Canada has a similar model for settlement aimed at people in the tech industry which is based on regions.³⁰

22. The UK should take a proactive, competitive approach to becoming a destination for top talent. The Home Office policy that the user should pay for the immigration system is not appropriate for highly skilled immigrants who can contribute much to the UK economy. *Reforms could include extending the post-graduation work visa from two to five years. New types of visa, such as a remote working visa, should be explored. A support system to help the most talented individuals navigate the UK visa process should be considered.*

Quantifying and addressing the domestic skills gap

23. Many of our witnesses described the existence of a significant STEM skills gap in the UK. This was with respect to both current skills and those that will be needed in the future. The CBI's Robert West told us that "by 2030, over 30 million people, equivalent to 90% of the workforce, will need to be reskilled."³¹ Kate Shoesmith, Deputy CEO of the Recruitment and Employment Confederation, said that economic modelling showed "if demand continued to uplift as expected around the need for labour [with STEM skills], that would cost us around £30 billion to £39 billion per year by 2024, which was the same as the annual defence budget".³² Dr Clive Hickman, Chief Executive of the Manufacturing Technology centre, told us that "digital, engineering and manufacturing skills are where we have a significant shortfall ... at graduate, postgraduate and, in addition, apprenticeship levels" and "the gap is certainly widening."³³
24. A 2018 Government report showed that only 4 per cent of 25-year-olds in England hold a Level 4 or Level 5 qualification as their highest level, compared with nearly 30 per cent for both Level 3 and Level 6. In Germany, Levels 4 and 5 make up 20 per cent of all higher education enrolments.³⁴ The Department for Education's Paul Kett told us that "we used to have about 500,000 learners studying at levels 4 and 5, but that has collapsed to less than half of that in 10 years."³⁵
25. The Minister, Rt Hon Robert Halfon MP, accepted that the UK had a significant STEM skills gap, telling us "we lag behind international peers in adult technical skills. Just 19% of 26 to 64 year-olds hold vocational qualifications, a third lower than the OECD average. We know that there has been significantly less employer training, down to £1,530 per employer from £1,700 some years previously. Adult education has declined in level 3 from 2.8 million in 2010 to 1.5 million."³⁶

³⁰ [Q 13](#) (Raj Mann)

³¹ [Q 31](#) (Robert West)

³² [Q 30](#) (Kate Shoesmith)

³³ [Q 24](#) (Dr Clive Hickman)

³⁴ Supplementary written evidence from Prof Dame Athene Donald ([PSU0083](#)); The Royal Society, *Regional absorptive capacity: The skills dimension* (13 April 2022): <https://royalsociety.org/-/media/policy/Publications/2022/absorptive-capacity-report.pdf> [accessed 16 November 2022]; and Gatsby, *Technicians and Innovation: A Literature Review* (12 July 2019): <https://www.gatsby.org.uk/uploads/education/technicians-and-innovation.pdf> [accessed 16 November 2022]

³⁵ [Q 71](#) (Paul Kett)

³⁶ [Q 78](#) (Robert Halfon MP)

26. Paul Lewis, Professor of Political Economy at King's College London, told us that the UK could do better at anticipating future skills needs; he thought it crucial that firms “get the technician workers [they] need, not three years after the technology has been developed and firms are trying to deploy it but in a fashion that helps the firms to deploy that technology in a timely manner.”
27. A significant component of the skills gap relates to the so-called “missing middle”, Levels 3–5. As Prof Lewis told us, “The UK has a smaller share of technicians in its workforce than other countries with which we like to compare ourselves.”³⁷ This is exacerbated by the UK training a smaller share of apprentices relative to its existing technician workforce. In addition, providers were incentivised to provide apprenticeships below Level 3.
28. Witnesses agreed that STEM skills will increasingly be required for many careers. For example, Prof Leyser told us “coding is currently considered a difficult STEM [subject. However] it needs to be a primary school subject, along with reading, writing and arithmetic.” STEM subjects should therefore be “open to students right across their educational experience and right through life, including the ability to retrain.”³⁸
29. Discussing apprenticeships, Dame Judith Hackitt, former Chair of Make UK, emphasised that “there is a real concern in industry about the ... pipeline ... While I would agree that we have a good system in place and the good foundations of an apprenticeship framework for the UK, we need to speed up the ability to adapt and change in order to meet the needs of industry.”³⁹ Mr West likewise emphasised the need for ongoing training: “we have ... an education system that broadly suggests that you are educated up to an age of 18 or 21, and then you get a job ... In a world of changing technology ... we need to do a bit more, starting at the youngest age, of encouraging that culture that you will learn throughout your life”.⁴⁰
30. Crucial to this is developing a more flexible and modular education system, acknowledging that formal apprenticeships or STEM degrees may not be appropriate or necessary for workers to reskill or upskill throughout their careers.⁴¹
31. Despite the importance of lifelong learning, Professor Dame Athene Donald, of the University of Cambridge, told us that “about 40% of adults over 25 do not have any qualifications above GCSE, for instance. What is troubling is the amount of investment into this cohort—both those who leave school without high-level qualifications and adults who want to reskill ... An IFS report said that spending on adult education and apprenticeships fell by 38% over the last decade, and adult classroom learning by 50%. Those are horrifying numbers. It is impacting people with the lowest-level qualifications most.”⁴²

³⁷ [Q 47](#) (Prof Paul Lewis)

³⁸ [Q 8](#) (Prof Dame Ottoline Leyser)

³⁹ [Q 47](#) (Dame Judith Hackitt)

⁴⁰ [Q 31](#) (Robert West)

⁴¹ This was a common theme in the written evidence, referred to by submissions from the Institution of Engineering and Technology ([PSU0004](#)), the Open University ([PSU0007](#)) and ADS ([PSU0035](#)).

⁴² [Q 31](#) (Prof Dame Athene Donald)

32. One problem is that, where a skill is currently relatively niche, there is less demand for it and so companies only want to train a small number of individuals. However, apprenticeships are relatively expensive. Prof Lewis recommended that Catapults could play a role in addressing this challenge: “they already have a lot of the relevant equipment and kit that is needed to train people. They also have people who can become trainers who are conversant with the new technology ... It needs to be made clearer to the Catapults that they have a really important role, not just in technology diffusion but in the development of the relevant skills.”⁴³ He added that this role could also be played by Public Sector Research Establishments (such as the Rutherford Appleton Laboratory and the Culham Centre for Fusion Energy). The AMRC in Sheffield was highlighted as a successful model that other PSREs could emulate.⁴⁴
33. Other witnesses agreed that it was difficult to quantify the gaps or to specify which areas face the greatest challenges. Dame Judith said that “it can sometimes be ... hard to get data on just how big the skills gap is [because] if you go to big companies, they will tell you that they are oversubscribed—they get too many applicants for a small number of apprenticeship roles—while if you talk to SMEs, they will tell you they cannot find people ... what we do not have is the granularity beneath [the existing] data to tell us what we are really short of and what we need.”⁴⁵ The Institute for Apprenticeship’s Robert Nitsch agreed, saying that “better acuity on what is needed would be really important”.⁴⁶ Written evidence compared this situation unfavourably with that in other countries, noting that “the UK has much to learn from the US Department for Labor Employment and Training Administration’s O*Net system, which provides a regularly updated database of occupational characteristics and worker requirements across the US economy.”⁴⁷
34. The Minister, Mr Halfon, accepted the need for more data. He told us that there is a new analysis unit in the Unit for Future Skills (UFS) which aims “to pursue data improvements ... It is also working with the Office of National Statistics and commissioning research into good practice, developing a skills taxonomy. The UFS has produced six data dashboards to help users engage with existing data on jobs and skills, such as the local skills dashboard.” In addition, there are local skills improvement plans in 38 geographical regions, whose aim is “to ensure that that information about skills needs is fed into the local economy.”⁴⁸
35. **There is a ‘missing middle’ of people with technical skills at Levels 3–5. People need to be able to gain mathematics, coding, IT and other STEM skills later in life. Further education and technical colleges should be more extensively and sufficiently resourced to provide modular courses below degree level that enable workers to retrain or gain new STEM skills. Existing organisations, such as the Catapults and other Public Sector Research Establishments, often have unique facilities and expertise and should play a greater role in training apprentices.**

⁴³ [Q 49](#) (Prof Paul Lewis)

⁴⁴ [Q 49](#) (Prof Paul Lewis)

⁴⁵ [QQ 50, 53](#) (Dame Judith Hackitt)

⁴⁶ [Q 53](#) (Robert Nitsch CBE)

⁴⁷ Written evidence from ADS ([PSU0035](#))

⁴⁸ [Q 86](#) (Robert Halfon MP)

36. **The UK needs a better understanding of precisely which skills are in deficit, such as the US Bureau of Labor Statistics provides with its occupational shortage lists. The Unit for Future Skills should publish details of its assessment of the skills gap in the first half of 2023, indicating precisely which skills are likely to be required and associated timelines. It should set out a quantitative assessment of how its policies and initiatives will contribute to resolving this gap, including how many people will be trained, in which areas and by when, taking into account evidence from industry and the requirements for UK policies such as net zero. These insights should be translated into training course provision and apprenticeship standards.**
37. Whilst recognising that it was only one element of the solution, many witnesses emphasised the importance of apprenticeships in addressing the gap, There was a decline in numbers during COVID-19 and witnesses said that take-up of apprenticeships needed to increase to meet the demand for skills.⁴⁹
38. One type of apprenticeship discussed by a number of witnesses were degree apprenticeships. Dame Judith said that it was an “ideal mix of practical and academic qualification that employers seem to like a great deal” and “we should be doing more”.⁵⁰ Dr Tim Bradshaw, Chief Executive of the Russell Group, also advocated “growing degree apprenticeships and working with business to find more places available across industries.”⁵¹ However, Prof Lewis sounded a note of caution. Degree apprenticeships will be taken by those who did well at A Level; “they do not therefore do terribly much to help those 16 to 18 year-olds who are seeking to do a level 3 qualification.”⁵²
39. The Department for Education’s Paul Kett said that “data from UCAS this summer shows the number of people registering an interest in degree-level apprenticeships on its system at an all-time high. Some degree apprenticeships are now more competitive than the most competitive degree courses”.⁵³ The Minister, Mr Halfon, agreed that degree apprenticeships were important, telling us “they solve so many problems. It means that disadvantaged people can climb that ladder of opportunity. There is no loan, no debt, and they earn while they learn. It means they get skills in STEM.”⁵⁴
40. One reason for the lack of take-up of non-degree apprenticeships is that the system is hard to navigate. There is no equivalent of UCAS for apprenticeships and no central point of contact where information on the range of options can be explored. As Prof Lewis noted, “one of the reasons why especially SMEs have found it difficult to engage with the apprenticeship system is that it is unstable and very complex.”⁵⁵ Prof Donald told us: “if you are either an employer or a potential student trying to make your way through the incredibly complicated ecosystem to work out what

⁴⁹ [Q 47](#) (Robert Nitsch CBE)

⁵⁰ [Q 52](#) (Dame Judith Hackitt)

⁵¹ [Q 17](#) (Dr Tim Bradshaw)

⁵² [Q 52](#) (Prof Paul Lewis)

⁵³ [Q 71](#) (Paul Kett)

⁵⁴ [Q 83](#) (Robert Halfon MP)

⁵⁵ [Q 51](#) (Prof Paul Lewis)

courses might be for you, how you get funding or how the employer might sponsor you, it is really complicated.”⁵⁶

41. This ad hoc and decentralised approach to apprenticeship recruitment is one cause of regional variation in the take up of apprenticeships. Dr Hickman told us: “We do not tend to get apprentices who travel across the country to take an apprenticeship in the way that an undergraduate would move ... to take a degree. We tend to get people staying in their local catchment area.”⁵⁷
42. Dame Judith told us that Catapults could play a co-ordinating role in liaising with local businesses and educational institutions. She noted that the Advanced Manufacturing Research Centre “at its heart [offers] a matchmaking capability with the local industry community”.⁵⁸
43. The majority of witnesses wanted greater flexibility in using the Apprenticeship Levy. This was especially the case with short-term, modular courses of study.⁵⁹ Mr West told us that the levy “forces people to look at one particular answer”.⁶⁰
44. Mr Kett recognised this call for greater flexibility, noting “more flexible apprenticeships, which, for example, enable apprentices to move employers.”⁶¹ Mr Halfon highlighted “£5 million support [available] for eligible agencies, such as construction, where short-term project-based work is the norm. There were 14 flexi-job apprenticeship agencies on the register, with nine specifically operating in STEM.” However, Mr Halfon said that “there are currently no plans to review the apprenticeship levy.”⁶²
45. **Apprenticeships remain a vital component of training a skilled workforce, but enrolment has declined in recent years. University courses are easier to apply to, with UCAS providing a “one-stop shop” for applications. We are unclear whether schools are incentivised to encourage students to undertake apprenticeships in the same way. Degree apprenticeships could be expanded and more could be done to publicise this option. Apprenticeship standards must be updated more regularly. It should be easier for applicants to navigate the apprenticeship system to understand which opportunities are available to them.**
46. **There is an assumption that apprenticeships are inherently local, but the local talent pool may not always match up to demand, especially where large infrastructure projects are concerned. The Government should explore providing grants or loans for apprentices to move around the country.**
47. **Much of the income from the Apprenticeship Levy goes unspent and many industry witnesses expressed a desire to loosen the restrictions on how the**

⁵⁶ [Q 32](#) (Prof Dame Athene Donald)

⁵⁷ [Q 30](#) (Dr Clive Hickman)

⁵⁸ [Q 50](#) (Dame Judith Hackitt)

⁵⁹ [Q 26](#) (Kate Shoosmith, Andrew Croydon and Dr Clive Hickman)

⁶⁰ [Q 33](#) (Robert West)

⁶¹ [Q 71](#) (Paul Kett)

⁶² [Q 88](#) (Robert Halfon MP)

money can be spent to include shorter or more modular courses. The Government should make the Apprenticeship Levy more flexible to allow funds to be spent on other forms of training. The Government should take further steps to understand why industry is not hiring apprentices and encourage them to do so.

48. Some witnesses were optimistic about the introduction of the Lifelong Learning Entitlement (LLE). However, there were concerns about the courses it would be available to pay for – witnesses wanted it to be available for shorter, more modular, courses. Additionally, the minimum eligibility requirements may restrict access to courses. If a course is at the same or a lower level of qualification than a qualification an applicant already holds they may not be entitled to funding. Prof Donald said in written evidence that the “rule needs to change or we are trapping people in jobs that aren’t where they are needed.”⁶³ Witnesses were also concerned that people would not want to take on the burden of a loan: “if you are already in full-time employment, but not in a very well-paid job, and you have a family and dependants, are you really going to be able to take out a loan to do something? It may be one of these schemes that do not work in practice, just because it is impractical.”⁶⁴
49. Whilst the focus in lifelong learning has been on Levels 4, 5 and 6, Dr Bradshaw said there was a significant opportunity at Level 7 (i.e. master’s level): “something like 30% of the working-age population already has a degree, which is only going to increase over time. If people need to come back and reskill, it will probably be at master’s level or maybe another degree ... it is much easier to modularise a master’s course than it is a three-year degree.”⁶⁵
50. **We endorse the Skills Minister’s vision of the Lifelong Learning Entitlement being used for modular courses and look forward to seeing the results of the work being done on this. However, there was concern that in hard economic times people in work may not feel able to take on a loan and take time out from employment to retrain without further support. The Lifelong Learning Entitlement should be geared towards shorter, modular and part-time courses and levels of support should be carefully monitored to ensure there is sufficient uptake. The Government should consider allowing the Lifelong Learning Entitlement to be used for Level 7 courses.**

Recruiting and retaining science teachers and educators

51. One thread in our inquiry was a long-standing problem recruiting and retaining specialist science teachers. STEM Learning, a national training provider, wrote: “it is clear these shortages [of science teachers] cannot be solved solely through the recruitment and training of new teachers. This would be true even if the Government was able to meet its own recruitment targets, but it is not. In 2021/22, only 73% of the target was achieved for teacher recruitment across STEM subjects – and the figure

⁶³ Supplementary written evidence from Prof Dame Athene Donald ([PSU0083](#))

⁶⁴ [Q 35](#) (Prof Dame Athene Donald)

⁶⁵ [Q 20](#) (Dr Tim Bradshaw)

was only 22% for physics, a situation exacerbated by the small pool of physics graduates available.”⁶⁶

52. The Institute of Physics estimates that 500 schools do not have a specialist physics teacher, out of about 4,100 in the UK.⁶⁷ Prof Donald described the shortfall as “appalling” and noted that “it would take every physics graduate for the next 10 years going into physics teaching to fill the need.”⁶⁸
53. Pay is a major factor behind this shortfall in recruiting and retaining specialist teachers. Research from the National Foundation for Educational Research and Education Policy Institute shows that a physics teacher starting salary is 27% below the average starting salary for other physics graduates.⁶⁹ This “pay penalty” is less in subjects which have a smaller deficit in teachers, such as biology, and in subjects like English and P.E. graduates earn more as teachers. Research from the Gatsby Foundation suggested this could amount to £6,400 per year for physics graduates.⁷⁰ This situation is unlikely to improve with the below-inflation pay offer of 5% for teachers in 2022.⁷¹
54. This shortage of specialist teachers is likely to perpetuate educational inequalities. James Zuccollo, Director for School Workforce at the Education Policy Institute, told us that “for physics, about half of teachers in affluent schools have a relevant degree, but if you look at disadvantaged schools it is only about 16%.”⁷² Fewer specialist physics teachers means fewer pupils taking standalone physics GCSE and then A Level physics. STEM Learning noted that this translates into socioeconomic disadvantages in science education: “Every student in England is supposed to take at least two GCSEs in science. A quarter study intensive ‘triple science’ – physics, chemistry and biology as three single subjects. The rest take ‘combined science’ – which counts as two GCSEs – studying all three sciences but less of each. 80% of students from disadvantaged backgrounds take combined science vs 66% of their peers. They are also less likely to pass or attain a high grade – whether in combined or triple science.”⁷³
55. The gap grows wider at A Level, with students from disadvantaged backgrounds even less likely to take science A Levels and secure high grades. For physics in particular,

⁶⁶ Written evidence from STEM Learning ([PSU0072](#)). A summary of how these targets have been revised can be found in Education Policy Institute, ‘Analysis: Five charts that explain the state of teacher recruitment’: <https://epi.org.uk/publications-and-research/analysis-five-charts-that-explain-the-state-of-teacher-recruitment/> [accessed 16 November 2022]

⁶⁷ British Education Suppliers Association, ‘Key UK education statistics’ (last updated 2 July 2021): <https://www.besa.org.uk/key-uk-education-statistics/> [accessed 16 November 2022]

⁶⁸ [Q 36](#) (Prof Dame Athene Donald)

⁶⁹ Education Policy Institute, ‘Teachers’ pay in context’: <https://epi.org.uk/publications-and-research/teachers-pay-in-context/> [accessed 16 November 2022]

⁷⁰ Gatsby, ‘Teacher recruitment, retention and development’: <https://www.gatsby.org.uk/education/programmes/teacher-recruitment-retention-and-development> [accessed 16 November 2022]

⁷¹ Freddie Whittaker, ‘DfE announces 5% pay rise for most teachers in 2022–23’ *Schools Week* (19 July 2022): <https://schoolsweek.co.uk/df-e-announces-5-pay-rise-for-most-teachers-in-2022-23/> [accessed 16 November 2022]

⁷² [Q 56](#) (James Zuccollo)

⁷³ Written evidence from STEM Learning ([PSU0072](#))

there remains a big gender imbalance: in 2021 23% of physics students were female.⁷⁴ Prof Donald noted that “if education puts girls and young women off STEM, we are losing half the potential talent pool”. She regretted the perception that “girls don’t like hard maths” which she thought had been allowed to permeate in schools and may lead to students being dissuaded from studying these subjects, contributing to a shortage of graduates.⁷⁵

56. Professor Carole Mundell, President of the Science Council, noted that private schools can afford support and ancillary staff who can run experimental labs and enrichment activities, whereas these activities fall on teachers in poorer schools, if they can be conducted at all.⁷⁶ Jenni French, Head of Teacher Supply Programmes at the Gatsby Foundation, noted that schools from disadvantaged areas are less likely to advertise for specialist teachers in physics and other subjects.⁷⁷ Disadvantaged schools are more likely to require teachers to teach outside their subject area expertise, which adds to workloads, and they are less likely to be able to release teachers to undertake Continuing Professional Development (CPD) courses or afford to be able to support them in the provision of these courses.⁷⁸ All this contributes to a risk of entrenched educational and socioeconomic inequality.
57. These problems are exacerbated by a low retention rate of trained teachers. The Government’s statistics showed that 34% of teachers and up to 40% of STEM teachers leave the profession within the first five years;⁷⁹ this is higher in subjects with a more acute shortage. Witnesses highlighted that doing more to retain teachers is more cost-effective than training new teachers.
58. Alongside pay, unmanageable workload was cited as the most common reason ex-teachers gave for leaving the profession. There is evidence that science teachers spend more time on lesson planning and preparation than other teachers, and the science technicians who used to assist in this in schools are no longer there.⁸⁰
59. The Government has attempted to address the pay disparities and recruitment problems with bursaries for initial teacher training in shortage subjects, such as physics, where the bursary is £24,000.⁸¹ In addition, the Government has implemented annual bonuses under the Levelling Up Premium of £1,500–3,000 for teachers in eligible state schools of shortage subjects, including mathematics, physics, chemistry or computing.

⁷⁴ Natasha Plaister, ‘Which A-Level subjects have the best (and worst) gender balance?’ *FFT Education Datalab* (17 September 2021): <https://ffteducationdatalab.org.uk/2021/09/which-a-level-subjects-have-the-best-and-worst-gender-balance/> [accessed 16 November 2022]

⁷⁵ Supplementary written evidence from Prof Dame Athene Donald ([PSU0083](#))

⁷⁶ [Q 56](#) (Prof Carole Mundell)

⁷⁷ [Q 56](#) (Jenni French)

⁷⁸ [Q 36](#) (Prof Dame Athene Donald)

⁷⁹ Written evidence from STEM Learning ([PSU0072](#)); and Education Policy Institute, ‘Teachers’ pay in context’: <https://epi.org.uk/publications-and-research/teachers-pay-in-context/> [accessed 16 November 2022]

⁸⁰ Written evidence from the National Foundation for Educational Research ([PSU0043](#))

⁸¹ Written evidence from the National Foundation for Educational Research ([PSU0043](#)). We note that this bursary has decreased since the pandemic started, from £26,000, and is not increasing in line with inflation, which is likely contributing to a worsening initial recruitment rate.

60. Our evidence suggests that this is the right approach. Paying specialist teachers more improves recruitment and retention.⁸² Doing so centrally, through the Department for Education, removes many of the issues with trying to do so through school budgets, which could lead to perceptions of unfairness, or incentives for schools not to hire specialist teachers. But research from the Gatsby Foundation and the National Foundation for Educational Research suggested that, even taking these measures into account, “the Government’s current medium-term policy is insufficient to ensure adequate supply for physics, computing, chemistry and all science combined.”⁸³
61. Many witnesses emphasised the importance of Continuing Professional Development (CPD), especially subject-specific training courses, in helping to retain teachers and improve the quality of science teaching. Prof Donald said that “mandatory and funded CPD would make a big difference”⁸⁴ while Prof Mundell noted that “subject-specific CPD provision in England compares unfavourably with other high-performing countries” and suggested it would be a “win-win” to provide it, as long as it is not “another hoop that we force teachers to jump through.”⁸⁵ Undertaking CPD is associated with a higher retention rate for specialist teachers. Determining causality in this area is difficult, although statistical analyses have attempted to do so and found that the association is strong.⁸⁶ We heard from the Minister, Mr Halfon, that “Science Learning Partnerships” are being used to spread best practice, and individual investments in maths and computing were highlighted.⁸⁷
62. We also heard concerns about career progression in the teaching profession. Prof Mundell told us: “It appears that the only way to really be promoted within the teaching profession is to go into management, which takes you out of the classroom, again compounding the problem.”⁸⁸ This can deter STEM graduates, who may be able to move into careers with better opportunities for progression. There is scope for an alternative form of career progression that involves senior specialist teachers being involved in training the next generation of teachers in Subject Knowledge Enhancement courses, particularly in areas with a severe shortage where there is a need to retrain existing teachers.
63. We heard some evidence about the idea of encouraging people to switch careers into teaching later in life. Mr Zuccollo told us: “an organisation called NowTeach ... tries

⁸² [Q 61](#) (Jenni French). Jenni French ([Q 55](#)) noted that “paying teachers a 5% salary supplement not only would have alleviated the shortage of teachers had we applied it between 2011 and 2015 but would have been cheaper than simply recruiting new teachers.”

⁸³ Written evidence from the National Foundation for Educational Research ([PSU0043](#))

⁸⁴ [Q 36](#) (Prof Dame Athene Donald)

⁸⁵ [Q 57](#) (Prof Carole Mundell) Jenni French ([Q 55](#)) highlighted the programmes run by “The Institute of Physics, STEM Learning, the Ogden Trust and ASE”. In addition, Prof Mundell ([Q 57](#)) noted that the Science Council holds “the registration for the chartered scientist teacher qualification. That is a useful, pragmatic tool for valuing teachers’ quality. Incentivising schools to support their teachers to go for that qualification through their CPD may be a way to make that CPD very visible.”

⁸⁶ FFT Education Datalab, *Improving Science Teacher Retention: do National STEM Learning Network professional development courses keep science teachers in the classroom?* (September 2017), pp 36-37: https://www.stem.org.uk/system/files/elibrary-resources/2019/10/science-teacher-retention_0.pdf [accessed 16 November 2022]

⁸⁷ [Q 89](#) (Robert Halfon MP) “Some £30 million is being invested in maths hubs and £100 million invested in teaching for mastery programmes for maths. There is a National Centre for Computing Education, with £84 million of funding to improve the teaching of computing.”

⁸⁸ [Q 55](#) (Prof Carole Mundell)

to recruit people when they have had another career... they have several hundred recruits each year. The department needs to recruit some 30,000 or 40,000 new teachers every year, so that has not had a huge impact yet.”⁸⁹ Part of the issue is that for many older professionals, becoming a teacher entails a significant pay cut. We were told by Ms French that “career changers tend to drop out of programmes at greater rates than graduates” and may need additional support.⁹⁰

- 64. There is a severe, long-standing shortage of specialist science teachers, especially in high-demand subjects like physics and computing. Encouraging student enthusiasm for scientific subjects must begin early. Generous bursary schemes have failed to address this problem. The result is poorer educational outcomes, worsening educational inequality and students being deterred from taking these subjects at A Level and beyond. *Differential pay, through bursaries and payments like the Levelling Up Premium, should be pursued – it is substantially cheaper to pay teachers more and retain them than to train new teachers. Specialist training should be provided so that teachers from other STEM subjects, such as engineering, can fill the shortfall in physicists. There is scope to explore projects like Teach Next, which would retrain skilled individuals to become teachers later in their career.***
- 65. Recruitment and retention of teachers and educators across many subjects falls short of Government targets. This is especially true in shortage subjects. *The factors behind the failure to retain teachers must be understood and addressed. Continuing professional development opportunities should be made available to teachers in specialist subjects to improve retention rates.***

The precarity and attractiveness of STEM academic careers

66. One of the concerns that arose from the Committee’s last inquiry into delivering a UK science and technology strategy was that academic research careers are becoming less attractive over time. In particular, we heard that these careers are becoming more precarious, with worse employment conditions and opportunities for career progression, which limits the number of people who find a research career attractive.
67. Professor Julia Buckingham, Chair of the Institute of Cancer Research, said “the biggest problem—probably everything else stems from this—is the insecurity posed by short fixed-term contracts”, which is often bad for research as it is a long-term endeavour, and often bad for individuals because of the insecurity it poses.⁹¹ The long-term, worsening issue of precarious careers, combined with disputes over low pay for researchers and pension cuts for permanent university staff, have contributed to dissatisfaction.⁹²
- 68. The Committee welcomes UKRI’s commitment to increase PhD stipends to reflect cost of living increases. The Government must ensure low stipend**

⁸⁹ [Q 59](#) (James Zuccollo)

⁹⁰ [Q 59](#) (Jenni French)

⁹¹ [Q 39](#) (Prof Julia Buckingham CBE)

⁹² Written evidence from the Royal Society of Chemistry ([PSU0036](#))

levels do not mean that PhD research is an option only for those with external means.

69. The Careers Research and Advisory Centre noted that 89% of researchers are employed on a fixed-term contract, with 20% employed on contracts of a year or less. More than 70% of researchers leaving academia cite better long-term employment prospects and job security as a factor.⁹³ Prof Buckingham noted that this career insecurity also impacted the quality of research, as “If you have a very short-term contract ... you are very keen to get your publications out and not to take the risks” that can lead to more novel results or ideas.⁹⁴
70. Professor Cláudia Sarrico, Professor of Management at Portugal’s University of Minho School of Economics and Management, outlined some of the factors that contribute to this insecurity: “in the OECD we have seen that the number of doctoral researchers has been increasing a lot. In many countries, they cannot possibly stay in academia. This is one of the issues that leads to precarity, because there are so many of them and they cannot all possibly get a permanent position.”⁹⁵ We heard from Dr Sally Hancock, Senior Lecturer in Education at the University of York, that “the vast majority of PhD graduates (~70%) leave academia around three years after completing their doctorate.”⁹⁶
71. Despite the fact that this is the outcome for the majority of PhD graduates and many postdoctoral researchers, we heard that the careers advice given to them could be improved. Prof Buckingham said “Universities are extraordinarily bad at supporting early career researchers in getting that difficult [career] advice”, and referred to a scheme at Brunel where postdoctoral researchers are given 10 days for professional development each year.⁹⁷ She noted that “careers departments across universities ... are very focused on undergraduates and have a relatively small investment in postgraduates”.
72. Part of the change that is needed is cultural, both inside and outside academia. Dr Hancock’s evidence noted that “the majority of young researchers embark on a PhD with the ambition of securing an academic research career. This aspiration has endured despite changing doctoral career outcomes.” Dr Hancock noted that “there is growing evidence of the relatively poor mental health and wellbeing of doctoral and postdoctoral researchers, with an explicit link to perceived uncertainty over long-term career prospects and frustrated ambitions.”⁹⁸
73. Prof Buckingham said that employers outside of academia do not “necessarily understand the very broad range of transferable skills that people who have done a PhD have.”⁹⁹ Witnesses emphasised that part of the culture shift in academia could include valuing experience and contributions to research outside of publication record

⁹³ Written evidence from the Careers Research and Advisory Centre ([PSU0081](#))

⁹⁴ [Q 40](#) (Prof Julia Buckingham CBE)

⁹⁵ [Q 39](#) (Prof Cláudia Sarrico)

⁹⁶ Written evidence from Dr Sally Hancock ([PSU0084](#))

⁹⁷ [Q 42](#) (Prof Julia Buckingham CBE)

⁹⁸ Written evidence from Dr Sally Hancock ([PSU0084](#))

⁹⁹ [Q 39](#) (Prof Julia Buckingham CBE)

– such as contributions to patents or projects in industry – which would enable greater porosity between academia and industry.¹⁰⁰

74. Our witnesses did not necessarily say that PhD students were being overproduced, but that “Precarity arises because of the shape of the academic pyramid ... Is a PhD a training for an academic career or something much broader?”¹⁰¹
75. Reforms to PhD programmes could help address these issues. Prof Sarrico pointed to the Norwegian model for PhDs and postdocs, where “20% of their time is spent doing something else. Some people teach; some do consultancy outside the university; they do work-based learning outside the university. This sort of thing is very important to prepare people for other trajectories. That is transparent and it is a given from the beginning.”¹⁰² Prof Sarrico emphasised the prominence of internships and placements in industry, academia, and public sector institutions or not-for-profits forming integral parts of PhD and postdoctoral programmes in other countries, making the transition “not traumatic”.¹⁰³ Dr Hancock recommended that PhD programmes should include an element of “research in practice” as a key reform.¹⁰⁴
76. We heard from Isabel Allgeyer of the Department for Business, Energy and Industrial Strategy that UKRI is working on its “new deal for postgraduate research students”, which is “looking at four broad areas: funding and stipend levels; working conditions and rights; routes in, through and out of postgraduate study; and the diversification of access and models.”¹⁰⁵ We understand that the consultation on it has closed and urge UKRI to consider our evidence about the need for better careers advice and wider career opportunities within a PhD to help address the precarity of academic careers.
77. One concern raised was the lack of data on PhD career outcomes in the UK. Dr Hancock wrote: “we have very limited data ... in contrast to the vast body of knowledge we have about first degree outcomes and graduate jobs; and ... compared to the efforts of other nations” on tracking PhD career outcomes. Gathering these data is necessary to understand the problem, to enable “the provision of clear, evidence-based information, advice and guidance on doctoral career outcomes” and to support graduate schools and supervisors to understand the career pathways of PhDs.¹⁰⁶ This was supported by the Careers Research and Advisory Centre.¹⁰⁷
78. For postdoctoral researchers, part of the issue comes from a succession of short-term contracts – the so-called “permadoc” phenomenon. The nature of funding, and of employment, can be highly dependent on the Principal Investigator of the project, who receives project funds and has some discretion over how they are spent, which can create insecurity.¹⁰⁸ Prof Sarrico’s research recommends that Government agencies

¹⁰⁰ [Q 45](#) (Prof Julia Buckingham CBE)

¹⁰¹ Written evidence from Prof Dame Athene Donald ([PSU0033](#))

¹⁰² [Q 42](#) (Prof Cláudia Sarrico)

¹⁰³ [Q 44](#) (Prof Cláudia Sarrico)

¹⁰⁴ Written evidence from Dr Sally Hancock ([PSU0084](#))

¹⁰⁵ [Q 74](#) (Isabel Allgeyer)

¹⁰⁶ Written evidence from Dr Sally Hancock ([PSU0084](#))

¹⁰⁷ Written evidence from the Careers Research and Advisory Centre ([PSU0081](#))

¹⁰⁸ Organisation for Economic Co-operation and Development, *Reducing the precarity of academic research careers*, Technology and Industry Policy Papers, No 113 (May 2021): <https://www.oecd-ilibrary.org/docserver/0f8bd468-en.pdf> [accessed 16 November 2022]

“attach conditions” to how funding is used – projects should be funded with the expectation that, if successful, they will provide permanent academic jobs.¹⁰⁹ This approach is similar to the one Prof Buckingham told us about at the University of Surrey, which offers “five-year research fellowships for real stars, I hope, with a guarantee of a tenured academic post at the end of it, provided they meet the necessary performance criteria for that role.”¹¹⁰

79. **More data are needed to understand the career outcomes of PhD students and postdoctoral researchers and to provide them with careers advice and appropriate experience.**
80. **The majority of PhD students, and many postdoctoral researchers, will not end up in permanent academic positions, but alternative careers can be hard to navigate. *Careers advice needs to be improved for PhDs and postdoctoral researchers. Initiatives that allow PhD students and postdocs to spend time in industry, as part of their training, should be expanded.***
81. **A lack of standardisation in contracts, as well as the short fixed-term nature of most contracts, contributes to the precariousness of careers for postdoctoral researchers. *Consideration should be given to addressing this with Government and charitable funders taking career precarity into account. Funding can have “strings attached”– such as creating, where possible, more longer-term research fellowships with funding, rather than short-term postdocs, or awarding funding on the expectation that a permanent position will be created. Institutions need to be clearer with Principal Investigators that continuing to employ people on a succession of short-term contracts without a clear route to permanent employment is not acceptable. In addition, postdoctoral researchers should be offered careers advice, highlighting opportunities outside of academia.***

¹⁰⁹ [Q 42](#) (Claudia Sarrico)

¹¹⁰ [Q 39](#) (Prof Julia Buckingham CBE)