House of Lords Science and Technology Committee inquiry: People and skills in UK science, technology, engineering, and mathematics

September 2022

https://committees.parliament.uk/work/6838/

The Royal Society of Biology responded to the House of Lords Science and Technology Committee inquiry on People and skills in UK science, technology, engineering, and mathematics. RSB's education policy and science policy team jointly contributed to the submission and drew on established policy positions, previous publications and the work of other science organisations.

Background

During the Committee's inquiry into delivering a science and technology strategy, it heard concerns about the availability of skilled individuals for STEM related careers. Post-Brexit reforms to the UK's immigration system, such as the Global Talent visa and its associated fast track for winners of prestigious prizes are intended to attract talented individuals with STEM skills to the UK. The Committee is interested in whether the UK remains an attractive place for international STEM talent and whether these visa reforms will be effective at attracting this talent.

The Government wants to increase the proportion of UK gross domestic product spent on research and development (R&D) to 2.4% by 2027 from the current 1.74%, as part of its aim to make the UK a "science and tech superpower" by 2030. Increasing R&D spending to such an extent will require a workforce with sufficient STEM skills and teachers with adequate STEM knowledge to educate the next generation. The Committee is interested in the skills the UK workforce is currently lacking and will need in future, and what measures the Government can take to address any skills gaps. This includes what measures can be taken to support workers to retrain and gain new skills mid-career to address key policy challenges such as net zero.

Additionally, the Committee has heard concerning evidence about the growing precarity of academic careers, and the increased pressure on academics. We are interested in evidence on whether academic careers have become less attractive, whether this limits the range of people who pursue scientific research, and what can be done to address these problems.

The Committee invited written submissions on any or all of the following areas

- What more should be done to make the UK an attractive place for people with STEM skills to move to?
- What STEM skills is the UK lacking and what skills are likely to be in high demand in future
- What measures is the Government taking to address any STEM skills gap?
- What major challenges face those in academic scientific careers at present, and have these careers become less attractive?

Royal Society of Biology response to House of Lords Science and Technology Committee inquiry: People and skills in UK science, technology, engineering, and mathematics

The Royal Society of Biology (RSB) is a single unified voice for biology: advising Government and influencing policy; advancing education and professional development; supporting our members, and engaging and encouraging public interest in the life sciences. The Society represents a diverse membership of individuals, learned societies and other organisations. Individual members include practising scientists, students at all levels, professionals in academia, industry and education, and non-professionals with an interest in biology.

2) What STEM skills is the UK lacking and what skills are likely to be in high demand in future?

There will clearly be a demand for the future STEM workforce to address global challenges including climate change, biodiversity loss and chemicals and waste pollution, as well as the related challenges of the current pandemic and other emerging infectious diseases. Expertise in impact measurement will also be a key component of an effective and efficient system to ensure that skills needs are met.

It will be essential to encourage young people to continue to study STEM subjects and progress to STEM careers through both academic and technical pathways; the Government should provide support for initiatives to showcase STEM careers within primary and secondary education. The importance of subject specialist teachers (biology, chemistry, physics and maths) is recognised by the Department for Education as a key determinant of student success. The Government should support primary teachers to enhance their STEM subject knowledge and confidence, through professional development opportunities and during Initial Teacher Training.

The Institute of Physics and Royal Society of Chemistry have conducted detailed analyses of STEM workforce and skills in their respective disciplines.

- *Are STEM graduates being sufficiently prepared for highly skilled careers?*

We believe that early training is important to promote entrepreneurship among STEM graduates, so that they develop the creativity required for them to become innovators and employers as well as skills needed to be employees.

The Royal Society of Biology's degree accreditation programmes are raising the standards of higher education in biosciences, and enabling students to develop both creativity and the skills needed by employers alongside strong academic knowledge and practical skills. Government support for the accreditation of further education bioscience programmes would similarly help to improve standards of technical and professional education and training.

- *What is being done to allow for people to develop STEM skills across multiple disciplines throughout their career? What could improve this?*

There is a need for continued career development and training opportunities, secondments and apprenticeships for researchers, including early-career and technical staff.

3) What measures is the Government taking to address any STEM skills gap? Are they sufficient to address the requirements of wider government policy aims for science and technology, including net zero?

Systemic issues in science teaching are holding back educational outcomes, especially in under-represented groups. There is a shortage of high-quality specialist teachers, recruitment is still falling short of targets and teacher attrition is highest in the sciences. The Early Career Framework outlines that many of these problems can be addressed through subject-specific professional development; however, this is currently hard to find and of variable quality.

Along with other science organisations, the Royal Society of Biology is calling for an investment of up to £100m over 3 years to develop and deliver a systematic approach to subject-specific professional development and retraining in the sciences as part of a STEM education strategy. This represents an additional investment of about £44m over existing spend.

RSB supports the recommendations made in the Subjects Matter report, published by the Institute of Physics in 2020 and the Royal Society's 2021 report Science education for a research and innovation economy. Investment in teachers and teaching quality in the short/mid-term will result in improved efficiencies in training and reductions in attrition - both of which will reduce recruitment costs. In the longer term it will improve student outcomes in the sciences which will help reduce the skills shortage and boost productivity within a science superpower.

The Royal Society of Biology seeks to ensure parity of esteem between academic, technical and vocational pathways. To achieve Government's goal of the UK becoming a science super power by 2030, it is essential that the number of individuals working in research and technical roles is increased. In 2022 The Royal Society of Biology alongside the Association for Science Education, Institute of Physics and Royal Society of Chemistry, provided a written submission to the House of Commons Education Committee on the future of post-16 qualifications and in 2021 with the Royal Society and Royal Academy of Engineering provided a joint briefing to the Department for Education on Level 3 Qualifications in Applied Sciences and Engineering setting out our concerns about the removal of funding for non-T level qualifications and the consequences of closing down an education pathway.

To ensure that a successful education pathway in the sciences is not closed off, RSB recommends that funding of level 3 qualifications in applied sciences and engineering should be retained alongside funding for T levels.

Evidence demonstrates that applied qualifications such as BTECs are highly valued qualifications by post-16 learners at level 3, HE and employers. Around 60,000 students complete such qualifications annually in science and engineering, and many progress to successful outcomes. We doubt this number of students would follow other available routes in sciences if qualifications in applied sciences were to disappear. Neither A-levels nor T Levels will be fully accessible to, nor meet all of the aims or needs of, this many students. Data supplied to our organisations by Pearson show that around 14,000 students progressed from BTEC Applied Science to university in 2017. Around 5,750 of these had studied an Extended Diploma, a course which is the equivalent of 3 A-levels. The majority of these students entered degrees in subjects related to health, science and engineering.

- *Do cultural influences such as social media have a role to play in increasing uptake in STEM careers? Could the Government do more to encourage this?*

The Royal Society of Biology sits on the advisory group for longitudinal ASPIRES research and is supportive of its findings and recommendations. These include: focusing on science capital of students, and the inequity created by the existence of triple science. Research commissioned by RSB, on behalf of the Science Education Policy Alliance, in 2018/19 revealed that almost none of the schools surveyed were able to dedicate three full GCSEs worth of time to triple science routes, and that 78% of schools start GCSE teaching in Year 9 leading to a squeezing of the Key Stage 3 curriculum.

- *How easy is it to recruit teachers with scientific skills and expertise? What more can be done to encourage highly skilled individuals from all backgrounds to go into STEM education?*

The Royal Society of Biology is concerned that the incoming cohort for trainee teachers in 2022/23 has not met the target for biology places for the first time in a number of years – biology is estimated to be recruiting at around 88% of the level required to meet its target. This follows a significant reduction in the bursary available to biology trainees. For 2020/21 the biology bursary was reduced from £26,000 to £7000, significantly less than the £24,000 available to physics, chemistry and mathematics that year, and the following year this increased to £10,000 for biology.

While the Society recognises that biology Initial Teacher Training has previously been in a good position in terms of meeting and exceeding the targets for trainees, in 2020 we cautioned the department that this approach – intended to drive biology trainees into physics and chemistry applications, may have an unintended consequence of simply reducing biology numbers as they looked to use their specialism in another sector without driving up physics and chemistry recruitment. The Initial Teacher Training bursary available to students in 2022/23 remains at £14,000 less for biology than chemistry, computing, mathematics and physics**.**

In order to boost recruitment, RSB recommends Initial Teacher Training bursaries for biology trainees in 2023/24 and beyond should be increased in order to boost recruitment.

The Royal Society of Biology is also concerned about the principles and structure currently in development to support teachers through an arms-length curriculum body as announced in the Schools White Paper in March and lack of transparent tender processes in establishing the body. While we welcome the Department's attempts to reduce teacher workload through provision of good quality resources, we are concerned that there is a lack of oversight in how the contract was awarded to the National Oak Academy, and that provision of "press and play resources" may deprofessionalise the teaching workforce and deprioritise the seeking of subject specialists in shortage subjects.

4) What major challenges face those in academic scientific careers at present, and in the recent past?

The COVID-19 pandemic has presented unprecedented challenges for academic staff and students due to the closure or restriction of access to laboratories and suspension of travel and fieldwork. PhD students have been unable to complete research within the timescale of their funding, and any extension of financial support from small/charity funders in particular has ongoing consequences for the funding of subsequent studentships. In the current economic climate, the prospect of undergraduate student debt is likely to discourage uptake of academic opportunities,

which can be less well-paid and stable than alternative careers, especially in the early stages; this will disproportionately affect those from lower socio-economic backgrounds.

For academic staff, the pandemic is likely to have exacerbated existing inequalities in access, support and career progression experienced by under-represented communities in STEM, including women, Black scientists, those with mental health problems and those with caring responsibilities. Early-stage academic careers can entail many years of short-term positions, relatively low pay, relocation and uncertainty that present additional barriers for some of these groups.

Pressures during the pandemic have led many to reconsider careers in research, with a survey from the British Neuroscience Association finding that over a quarter of respondents were considering leaving research altogether as a result. Researchers have also reported poor mental health from prolonged isolation. An RSB investigation found that those who have shielded due to pre-existing health conditions have expressed concerns about delays in returning to research and teaching, leading to fears about career progression.

- *How should the Government encourage a wider range of people to pursue STEM academic careers?*

Increasing diversity and improving gender balance will be crucial to increase the pool of STEM academic talent and will, in turn, provide role models to inspire subsequent generations. The Government must act to improve the collection and dissemination of diversity data, which should consider intersectionality, as well as the evaluation of programmes to promote access.

The STEM workforce has suffered from underrepresentation of women, disabled people and those from ethnic minorities and lower socio-economic backgrounds, particularly in senior roles. The Government should support the appointment of diversity champions across multiple job grades within organisations, as well as promoting initiatives such as the Athena SWAN Charter and the Race Equality Charter. Flexible working policies should be encouraged, in particular to address inequalities associated with gender and caring responsibilities. Equitable access to training must also be promoted for minority staff, and bystander training should be provided to enable employees to challenge prejudice.

The Government should continue to invest in sector-led organisations that offer guidance on skills and employment issues in the UK, such as the UK Commission for Employment and Skills (now closed). Previous outputs included a review assessing high-level STEM occupations according to labour market need, to inform the development of work-based skills solutions such as higher apprenticeships.

- *What more could be done to address the precarity of STEM academic careers, particularly in the early stages?*

See response to Question 2 above, regarding training of resilient and flexible researchers.