People and Skills in UK Science, Technology, Engineering and Mathematics (July 2022)

For more information about the enquiry please visit: https://committees.parliament.uk/work/6838/

Background:

The Physiological Society is Europe's largest network of physiologists, at the forefront of science for 145 years. Physiology is the science of life, and research in physiology helps us to understand how the body works in health, what goes wrong in disease, and how it responds and adapts to the challenges of everyday life and thus, is critical to understanding the existing STEM skills gap in the UK. We work with a broad range of organisations within academia as well as professional bodies and industry both in the UK and internationally. Our membership is made up of researchers from neuroscience through to endocrinology, nutrition and sport and exercise science with the science ranging from the mechanistic to the applied, from molecular to whole body.

The House of Lords Science and Technology Committee conducted an inquiry into people and skills in science, technology, engineering and mathematics in the UK. The aim of the inquiry is to consider whether the UK has a sufficiently skilled workforce to become a "science and technology superpower", and what policies can be done to develop and retain skills in the UK workforce.

The Society's response to the consultation is based on our Chatham House-rule workshop with a combination of PhD students and Early Career Researchers (ECRs) in response to the New Deal for Postgraduate Research call for input from UK Research and Innovation. Additionally, our response is supplemented by information gathered in our recent projects into the importance of knowledge exchange and interdisciplinary research in solving problems such as the STEM skills gap as well as increasing employability.

Consultation Response:

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

The UK Government's *Life Sciences Vision* highlights 'skills' as critical to increasing the UK's attractiveness for life sciences businesses.[1] However, businesses struggle to recruit graduates with the appropriate skills – 43% of vacancies in STEM roles are hard to fill due to a shortage of applicants with the required skills, according to the UK Commission for Employment and Skills (UKCES).[2] Graduates often lack employability and practical skills for a career in industry due to the lack of opportunities to develop such skills during their degree and education.

The composition of degree courses in the UK, apart from those offering joint honours, prevents students from developing STEM skills across multiple disciplines during their degree. Interdisciplinary skills are vital to user-driven research and open innovation which can help address complex societal challenges such as climate change

[1] Department for Business, Energy & Industrial Strategy and Office for Life Sciences. *Life Sciences Vision*. Available from: https://www.gov.uk/government/publications/life-sciences-vision

[2] UK Commission for Employment and Skills. *High level STEM skills requirements in the UK labour market.* Available from: https://www.gov.uk/government/publications/high-level-stem-skills-requirements-in-the-uk-labour-market

and ageing. Furthermore, the UK Government recognises the need for interdisciplinary skills as its *Innovation Strategy* recommends "encouraging interdisciplinary innovators who have breadth across disciplines and who can thrive in both academia and business."[3] Therefore, there is a need for STEM graduates to acquire skills and knowledge beyond their own disciplines to increase employability and encourage innovation.

Apart from interdisciplinary skills, STEM graduates wishing to explore non-academic careers, such as those in industry, face other challenges. Students are often unaware of the job opportunities available outside the academia within industry unless they have industry exposure or networks built into their academic course (for example, a year in industry); this was highlighted by PhD students during our Chatham House-rule workshop. Furthermore, the UK job market is saturated, with undergraduates and postgraduates applying for the same entry level roles outside the academia. In the *R&D People and Culture Strategy*, the UK Government outlines its desire to address 'gaps in the UK's talent offer so that we can develop appropriate programmes…to attract and retain talented people within the sector'.[1] As demonstrated above, there has been insufficient progress in this area. Thus, the Government must ensure that there are sufficient opportunities available for graduates with different skill sets wishing to apply for industry roles.

The Government can take several measures to ensure STEM graduates are well-prepared for careers in industry. First, UK funding bodies should ensure that interdisciplinary and applied research is recognised, rewarded and well-funded. Second, students should be provided with more opportunities for mentoring and upskilling as well as working with industry partners during their degrees. Third, STEM students must have better access to and information on careers available outside of the academia within industry. This can be achieved through workshops and training days. For instance, our report on *Translating UK Knowledge and Research into Impact* included a case study on a life sciences graduate skills workshop conducted by the Glasgow Economic Leadership (GEL) Life Sciences Skill Theme group in Scotland.[4] The workshop helped graduates in physiology, pharmacology and biomedical sciences identify the diversity of roles within the Scottish science sectors, and helped them gain industry knowledge targeted and focused on future job opportunities. After the workshops, students reported being 'better informed about their career opportunities.'

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?

The then-Government's 2017 *Industrial Strategy* pledged to invest an additional £406 million in maths, digital and technical education to address the shortage of STEM skills.[5] Yet, there remains a significant STEM skills gap. As mentioned, the need for interdisciplinary skills and research is reinforced in the UK Government's *Innovation Strategy* and *R&D People and Culture Strategy*. These skills can re-shape the landscape creating new fields and job opportunities as well as combine skills that were previously disparate. Interdisciplinary skills are required to address complex challenges such as climate change and achieve net zero. Our report, *The Climate Emergency: Research Gaps and Policy Priorities,* highlights the need for interdisciplinary skills within STEM to mitigate climate

[3] The Physiological Society. *The Future of Interdisciplinary Research Beyond REF 2021*. Available from: https://www.physoc.org/policy/research-landscape-and-funding/interdisciplinary-research/

[4] The Physiological Society. *Translating Knowledge and Research into Impact*. Available from: https://www.physoc.org/policy/knowledge-exchange/translating-knowledge-research-into-impact/

[5] Department for Business, Energy & Industrial Strategy. *Industrial Strategy: building a Britain fit for the future*. Available from: https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future

change.[6] For instance, developing green cities that are habitable and act as carbon sinks requires collaboration between experts such as physiologists, botanists, and architects, as well as local government planners. Furthermore, physiology research can provide the evidence-base to highlight how certain practices such as healthy eating and active travel are beneficial to individuals and the planet. Cross-disciplinary collaboration with other researchers such as behavioural scientists and psychologists is required to help convince people to adopt such practices. Thus, the Government should encourage the development of activities to facilitate interdisciplinary problem-focused collaborations.

The UK is also lacking in collaboration between different sectors such as industry and academia, with very few opportunities available for knowledge exchange. Knowledge exchange refers to the multiple interactions between higher education institutions, businesses and public service; it is critical to the UK R&D sector as it brings together people from different academic and professional backgrounds.[4] For example, UK Spine is working with over 50 businesses, charities, patient groups; this has allowed cross-institution and cross-sector collaboration, resulting in the creation of knowledge, tools and new therapeutic development pathways. Higher education institutions should ensure that there is accessible professional knowledge exchange support available and increase take-up by students and staff alike. These can include joint research and development projects, consultancy, and training opportunities. Thus, knowledge exchange has the potential to address the STEM skills gap by allowing graduates to develop skills across sectors, and apply these skills to solve major health challenges. For example, physiologists who have commercialised their research have emphasised about the opportunity that knowledge exchange brings for them directly, allowing them to be involved in translating their science into real world applications and enabling collaboration with other stakeholders to develop new research ideas and opportunities.

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

There are several challenges facing those in academic scientific careers. A major challenge is that graduates often lack the time needed to pursue the required training and obtain a workable knowledge of the processes needed. Another challenge is that graduates completing PhDs often lack knowledge about future job prospects and career trajectories after completion of their academic study. For example, during our Chatham House-rule workshop PhD students noted that career support was limited during their study. Another major challenge is the pay gap between academia and similar roles within industry. Scientists working within industry are often paid better and have higher job satisfaction than colleagues working within academia; this dissuades many early careers STEM researchers from pursuing academic scientific careers.[7] Furthermore, there is perception that workers within industry have more opportunities for career progression.

In order to address the precarity of STEM academic careers, students should be provided with more opportunities to understand their career trajectories within academia upon completion of their degree. This can be achieved through workshops such as the aforementioned life sciences graduate skills workshop.[4] Institutions can also conduct focus groups and survey students to understand what support they could benefit from.

[6] The Physiological Society. *The Climate Emergency: Research Gaps and Policy Priorities*. Available from: https://static.physoc.org/app/uploads/2022/07/12080835/Climate-Emergency-Research-Gaps-and-Policy-Priorities-Report.pdf

[7] Nature. *Industry scores higher than academia for job satisfaction*. Available from: https://www.nature.com/articles/d41586-021-03567-3

For more information on the views of physiologists on the current status of academia, please see our response to UKRI's *New Deal for Postgraduate Research – call for input* by following this link https://www.physoc.org/policy/policy-consultations/.

Related reading:

Translating Knowledge and Research into Impact

The Future of Interdisciplinary Research Beyond REF 2021