

Review of post-18 education and funding

Campaign for Science and Engineering submission | 26th April 2018

About CaSE

The Campaign for Science and Engineering (CaSE) is the UK's leading independent advocate for science and engineering. Our mission is to ensure that the UK has the skills, funding and policies to enable science and engineering thrive. We represent over 110 scientific organisations including businesses, universities, professional bodies, and research charities as well as individual scientists and engineers. Collectively our members employ 380,000 people in the UK, and our industry and charity members invest around £43bn a year globally in R&D¹.

Part 1: Choice and competition across a joined-up post-18 education and training sector

Pathways to post-18 education

The approach to skills must help the UK move past the false divide between apprenticeships and degrees, vocational or academic routes. The introduction of T-levels must be done with care to ensure that it doesn't reinforce a twin-track system with no crossover between the two. Degree apprenticeships offer the practical training of an apprenticeship and a degree qualification. It is unhelpful to perpetuate the idea therefore that apprenticeships are an alternative to university.

The implementation of T-levels is linked to the success of any post-18 system. Unfortunately, the scale of T-level courses does not leave room for individuals to mix and match taking some A-levels and some T-levels. Both T-levels and A-levels therefore need to be viable, attractive routes through to an apprenticeship and to university. To successfully deliver T-levels, keeping in mind that they are much larger qualifications than those currently taught, will require sufficient resource for equipment, teaching space and teachers. This is particularly the case for many STEM courses which require bespoke teaching space and equipment. Currently the funding provided to colleges is a disincentive to investing in infrastructure to deliver STEM courses. This must be addressed by appropriate weighting of funding for teaching and for capital investment. The additional funding that was announced for T-level delivery should be carefully reviewed to ensure it covers costs associated with the change.

Evidence based approach to competition and collaboration

If the review is to take an evidence-based approach to improving post-18 provision, it must ask the right questions. Beginning with a question of how the government can create a more dynamic market in price and provision between universities and across the post-18 education landscape could result in unintended consequences including disincentivizing collaboration and partnerships working where it would otherwise have been beneficial.

¹ Figure calculated in March 2018 from latest available data

It may be right for aspects of the post-18 system to drive competition within the UK and also internationally. However, developing the skills base is an area where collaboration and strategic planning could be very beneficial; domestic collaboration to be globally competitive.

One such case is the Institutes of Technology. There are plans for around 15 of these institutes nationally and they should not be set up in competition with each other. They should be strategically placed within regions across the UK with a mandate to collaborate with each other and to facilitate collaboration with other parts of the education and skills ecosystem including schools, colleges, and universities within their region.

Similarly, strategic collaboration between colleges and universities may be necessary to ensure the UK doesn't lose capacity in key skill or subject areas, regions or types of provision. For instance, the UK has just ceased to provide courses in chemical toxicology, an area that we increasingly rely on overseas talent, for instance to fulfil essential regulatory functions that require chemical toxicologists. Market factors alone would not necessarily deliver the desired outcome. The review should consider where it is and isn't appropriate to depend on market factors and competition and where there is a case for intervention through funding or other means. For instance, funding for higher cost STEM subjects, targeted support to deliver programmes in niche or shortage skill areas, or monitoring and addressing regional spread of provision, for instance in some STEM courses so that they are accessible to all.

Part 2: A system that is accessible to all

Q9: What particular barriers (including financial barriers) do people from disadvantaged backgrounds face in progressing to and succeeding in post-18 education and training? Q10: How should students and learners from disadvantaged backgrounds best receive maintenance support, both from Government and from universities and colleges?

To ensure STEM courses that cost more to teach, in both higher and further education settings, are accessible to all there must be no financial disincentives built into the system. From a provider perspective this means that there should be a funding stream with an appropriate weighting to account for the reasonable additional costs required to deliver quality STEM courses. For certain skills gaps to be met, and for new provision to be set up in emerging or priority areas, there should also be reasonable capital investment available. These capital costs are disproportionately high for courses that require bespoke teaching space and equipment, such as a laboratory, rather than multi-purpose teaching space and materials. There must be sustainable funding for higher and further education, with additional funding for high-cost STEM subjects. From a student perspective, the evidence remains that ensuring there is no up-front cost to studying is a key factor for students from more disadvantaged backgrounds². A system that is free at the point of use is an essential feature of our system that must remain so as not to deter these students.

The dramatic drop in part-time and flexible provision must also be addressed if the system, and STEM opportunities, are to be open to all. Given the future landscape for skills and work is likely to increasingly require retraining and upskilling, the UK's productivity, social mobility and wider society would benefit from ensuring there is the opportunity to access or return to higher or further education later in life. To be successful this will require more flexible provision and changes to the funding system that make

² IFS (January 2010) Submission to Independent Review of HE Funding and Student Finance

accessing such provision feasible for people in a range of life settings, and feasible for providers to deliver. This could include introducing an incentive for flexible learning that will reduce fees for students studying part-time in higher education, and reviewing maintenance support including for part-time students, and so promote real choice, competition and value for money.

Part 3: Delivering the skills the UK needs

Q11: What challenges do post-18 education and training providers face in understanding and responding to the skills needs of the economy: at national, regional and local levels? Which skills, in your view, are in shortest supply across the economy? And which, if any, are in oversupply? Q12: How far does the post-18 education system deliver the advanced technical skills the economy needs? How can Government ensure there is world-class provision of technical education across the country?

Evidence to inform skills policy

Education, skills and migration policy in the Department for Education, Business Department and the Home Office must work together if Industrial Strategy aims are to be met. The proposal in the Industrial Strategy for the Government to work towards a joined up authoritative view of sector specific skills gaps is very welcome. This should be a core capacity within government to support planning in a range of policy areas. With the closure of the UK Commission for Employment and Skills (UKCES), there is a clear need to rebuild and strengthen this activity. The review should make a recommendation for how this activity will be undertaken and coordinated as an ongoing activity to inform post-18 education policy in future.

STEM skills in shortage

A skills shortage is a major impediment to economic growth and productivity. In its international benchmarking study, the Department for Business Innovation and Skills found that the UK's science and innovation system is hampered by weaknesses in its STEM talent base³.

Within the engineering sector in particular, businesses have continually struggled to recruit an appropriately skilled workforce from the UK. Reports have conservatively calculated that there will be a need for 186,000 engineers within the manufacturing industry before 2024⁴. In addition, Engineering UK conducted a study that found the engineering graduate supply falls well short of demand: the publication reports a shortfall of at least 20,000 annually. The UK is highly dependent on attracting and retaining international talent from the EU and beyond to help meet this shortfall⁵. These shortfalls do not take into account the expected increases in demand for STEM skills that will arise from the Government's mission to promote science and engineering as a strategy to rebalance the economy. The Government also plans to invest £100 billion in infrastructure over the next five years. Projects like HS2 and Cross Rail will require specialist engineers and the world's best minds to be delivered efficiently. Failure to meet demand for engineering skills alone is estimated to cost the UK £27 billion a year from 2022⁶.

³ <https://www.gov.uk/government/publications/science-and-innovation-system-international-benchmarking>

⁴ <https://www.eef.org.uk/resources-and-knowledge/research-and-intelligence/industry-reports/making-migration-work-for-manufacturers>

⁵ <http://www.engineeringuk.com/media/1355/enguk-report-2017.pdf>

⁶ http://www.engineeringuk.com/Research/Engineering_UK_Report_2015/

Although progress is being made to fill the pipeline of new workers, including essential and widespread work on increasing the number of high-level, high quality apprenticeships, the shortage will take many years to be solved. Addressing the shortage begins at school and has a long time-lag: for those that do choose to continue in STEM, the training period for a PhD-qualified scientist or chartered engineer is around 10 years, and the acquisition of specialist and highly technical skills can take even longer. Migration in the short to medium term will be an essential part of meeting the STEM skill gap⁷. And the two are linked; skilled immigrants will contribute to a longer-term up-skilling of the UK population as they pass on their skills and knowledge to school and university students, trainees, and other workers.

Teacher skills shortage

Indeed, attracting teachers to the UK was one of the Department for Education's strategies for meeting teacher shortages in STEM subjects - and science teachers remain on the Shortage Occupation List. More broadly the government must properly consider how to grow the number of STEM teachers. There is a need to develop an evidence-based strategy to improve recruitment and retention of teachers, particularly specialists in subjects with shortages. Recruitment is below target in engineering, physics, maths, computing and technology in particular and turnover is high with issues of retaining trained teachers. This is the case for both schools and colleges. Given the role of post-18 education in training the teacher workforce through a range routes, this post-18 review should address how to best deliver teacher training (initial and ongoing CPD) to meet current demand for teachers as well as to meet ambitions for growth in line with industrial strategy aims.

Improving diversity is essential to addressing skills gaps

Encouraging more people to pursue STEM training is vital to the future health of our economy, particularly in areas where we face skills gaps. We face the largest skills gaps in the areas where we have the lowest diversity. Improving diversity must be a core part of any plans to address skills gaps. Less than 25% of employees are women in four of the top five areas with the highest net STEM job requirements⁸.

Industry	Net requirements 2016-2023 in core STEM (000s)	Current proportion of women (%)
Computing services	88	16
Head offices etc	57	21
Architectural and related	38	10
Legal and accounting	35	29
Scientific research and development	29	20

⁷ [In the balance, the STEM human capital crunch](#), Social Market Foundation, 2013

⁸ <http://www.sciencecampaign.org.uk/resource/jobs-of-the-future---social-market-foundation--edf-energy.html>

Similarly, there is an annual shortage of 20,000 engineers⁹ but in the core engineering workforce only 9.8% are women¹⁰, 6% BAME and 5% have a disability¹¹ (compared to 51%, 14% and 17% of the working population).

We would recommend that there is action that could be taken by Government to address these often-intersecting challenges in two key areas; diversity data, and improved careers education. Our diversity policy review makes a number of recommendations, some of which are drawn out below.¹²

Providing proper support for schools and colleges to deliver careers support is particularly important if all are to benefit from the Government's ambition to diversify provision post-18 and provide people with more choice. Government must embed diversity and inclusion throughout a joined-up careers strategy. This will include additional funding and support for schools and colleges for careers support so that they can be equipped to help young people navigate their options. The review should also consider how this will be addressed for those accessing or returning to education and training later in life so that there is informed choice for all. Providing greater options and choice without greater agency to take informed choices will only perpetuate social injustice and entrenched patterns of advantage and disadvantage.

Recent careers announcements from the Department for Education contain some encouraging proposals but schools and colleges need additional funding if they are to adequately deliver on the Career Leader ambition. We recommend that the Career Leader role must be adequately funded. For instance, increasing the national budget for schools and colleges by £40m would fund 0.25 FTE (based on average teacher salary) to fulfil the Career leader role at each education provider. In the next spending settlement there should be an aim of providing sufficient funding to support 1FTE per school or college. The review should also consider and recommend that CPD funded through the careers strategy includes current STEM and apprenticeship content.

Also, the National STEM Ambassador programme could include a specific diversity function, perhaps incentivising volunteers from apprenticeship schemes and SMEs, and increase monitoring of volunteer characteristics such as disability and socio-economic background, to allow channeling to where they can have the most impact.

There could be a focus on strengthening progression pathways between FE, apprenticeship and HE, with the aim of enabling more people to progress from lower-level technical qualifications to more advanced sub-degree and degree-level technical qualifications. This could include monitoring the number of level 2 apprentices who progress to higher level technical or other training for instance at level 4 and above in each sector, including science, engineering and technology. Also, as apprenticeships are developed in partnership with employers, the new standards should include skills which are relevant and valuable beyond just the current job, supporting progression within the sector. In science and engineering there are professional registration standards, such as Registered Science Technician, that have been

⁹ <http://www.sciencecampaign.org.uk/resource/state-of-engineering-2017.html>

¹⁰ <http://www.sciencecampaign.org.uk/resource/state-of-engineering-2017.html>

¹¹ <http://www.sciencecampaign.org.uk/resource/creating-cultures-where-all-engineers-thrive.html>

¹² [Diversity Policy Review](#), CaSE, 2018

developed with the input of employers and the education sector and provide transferability and progression pathways.

Apprenticeships

There are some particular challenges that must be addressed with apprenticeships. As the number of apprenticeships grows action is needed to ensure that their take-up is diverse and not contributing to or perpetuating social injustice or inequality.

The recent growth in apprenticeships has been mainly at the lower skill level with higher apprenticeships only making up 2% of total starts. Across all levels there were fewer than 500 apprenticeships in science and mathematics, not enough to be recorded. Those within engineering are largely at the lower level¹³. With all parties wanting to see more young people taking apprenticeships as a route into meaningful work, the opportunities available to young people must begin to reflect political discourse. The targets, funding and scheme rules of the apprenticeship levy must work together to develop more highly-skilled STEM workers and give employers and apprentices sufficient flexibility.

There are also social justice issues to be addressed relating to gender imbalances in apprenticeships. Whilst female apprentices have outnumbered males since 2010, women are more likely to be found in the service sectors where pay, qualification levels and career prospects tend to be lower. In traditionally male-dominated sectors, women's progress has stalled, with the percentage of female engineering apprentices declining from 4.6% in 2002 to 3.8% in 2014¹⁴. There has been an increase in the number of female STEM apprentices, but more recent figures show that the proportional total has decreased from 8.4%¹⁵ in 2011/12 to 7.5% in 2015/16¹⁶.

We were pleased to see the Industrial Strategy White Paper allocating £60m to support apprenticeship take up by young people and poorer families from disadvantaged areas and to see a target of increasing the proportion of apprenticeships started by people of black and minority ethnic backgrounds or with a learning difficulty and/or disability by 20% by 2020.

The Government should also require the Institute for Apprenticeships to embed diversity monitoring, ensuring coverage of multiple characteristics by sector. The Government could then consider options for using funding as a lever to increase diversity where data shows progress in diversity is insufficient. In addition, much of reporting on apprenticeships, and indeed government targets, relate to apprenticeship starts at any level on any course. These are not the most helpful measures. Instead data and measurement should focus more on completion and outcomes, with these also broken down by multiple characteristics by sector to provide accountability and drive progress in quality and equality.

¹³ Apprenticeships statistics, House of Commons Library, Feb 2014

¹⁴ http://www.sciencecampaign.org.uk/resource/making_apprenticeships_work_for_young_women.html

¹⁵ http://www.sciencecampaign.org.uk/resource/wise_uk_statistics_2014.html

¹⁶ www.wisecampaign.org.uk/resources/2017/11/women-on-stem-apprenticeships-201516