Spending Review 2025 – Phase 2

EngineeringUK stakeholder representation

EngineeringUK is a not-for-profit organisation that works in partnership with the engineering community, including over 400 businesses, to increase the pipeline of engineers and technologists. We directly reach over 120,000 young people each year with activities such as the Big Bang Programme, which are designed to excite them about the variety of opportunities presented by a career in modern engineering and technology.

This submission sets out a range of policy proposals for the Spending Review Phase 2, drawing on our extensive research and first-hand experience of working with STEM educators and employers. The recommendations are aimed predominantly at the Treasury and the Department for Education.

Summary of spending priorities

EngineeringUK's spending priorities for STEM and engineering education and skills are sub-divided into six broad categories:

1. Growing engineering apprenticeships for young people
2. Ensuring high-quality careers provision and work experience in schools
3. Supporting effective STEM outreach programmes
4. Improving STEM teacher recruitment, training, and retention
5. Reforming the national curriculum
6. Expanding routes into engineering higher education.

Policy proposal	Revenue implications for the Exchequer
1. Move towards a new model of directly funding apprenticeships for young people between the ages of 16 and 18, through an increase to the DfE budget	£720m per annum
2. Publish a new long-term careers strategy, backed by at least £85m per annum in funding over the next five years, alongside a comprehensive work experience strategy as a roadmap to delivering 2 weeks' work experience for every pupil	£85m per annum
3.1 Fund what works research to conduct robust evaluations of STEM interventions	£2m per annum (or £10 million over the 5-year Spending Review period)

3.2 Commit to sustaining funding for the STEM Ambassadors programme, delivered via STEM Learning	*Cost neutral as in line with current funding levels, at approx.* £5m per annum
3.3 Additional funding for the British Science Association to double the uptake of CREST Awards over the next 5 years, whilst maintaining current funding	£0.7m per annum (or £3.6m over the 5-year Spending Review period)
4.1 Sustain existing Initial Teacher Training funding for STEM subjects, including key practical subjects such as Design and Technology	Cost neutral as in line with current funding levels
4.2 Invest in high-quality Continuing Professional Development for STEM teachers	£29m per annum (Estimated £580m long-term benefit for the wider economy)
5. Sufficient funding to implement the changes recommended by the Curriculum and Assessment Review	Cost implications subject to the Review's publication
6. Increase grant funding for strategically important, high delivery-cost STEM courses via the Strategic Priorities Grant	Subject to recommendations by the Office for Students (Doubling current levels would cost c. £750m per annum)

Policy recommendations

1 Move towards a new model of directly funding apprenticeships for young people between the ages of 16 and 18.

Target departments: Department for Education, Treasury

The government must take urgent steps to grow and sustain the number and diversity of young people taking engineering apprenticeships, reversing a declining trend in uptake over the past decade.

EngineeringUK research indicates that, although engineering and technology-related apprenticeship starts have increased by 1.6% since 2022/23, starts are still lower than they were before the pandemic – down 6.3% since 2018/19. Level 2 apprenticeship starts in engineering and technology-related apprenticeships have had a particularly difficult time and have decreased by 52% since 2017/18 and by 8.7% between 2022/23 and 2023/24 alone. This coincides with a decline in under 19s taking up apprenticeships. In 2017/18 the proportion of engineering apprenticeship starts by people under 19 was 41%, this has dropped to 36% in 2023/24. At the same time the share of engineering related apprenticeship starts by people aged 25 or above has increased from 24% in 2017/18 to 33% in 2023/24.[1]

[1] EngineeringUK, Apprenticeships Pathways into Engineering (Nov 2024)

While the increase in the uptake of higher-level apprenticeships and the changes to the apprenticeships systems are said to have had a positive impact on total value-added of the apprenticeships and 19-plus FE system, the changes seem to have had a negative effect on the number of apprenticeships available to young people.[2] Therefore, the training opportunities available to this age group have become restricted further at a time when we need many more young people moving into the engineering and technology sector to support the government's growth and clean power missions.

Given the declining uptake of engineering apprenticeships by young people and building on the findings of EngineeringUK's inquiry chaired by Lord Willetts and Lord Knight, we recommend that the government adopt a model of directly funding apprenticeships for 16- to 18-year-olds, ideally through an increase to the DfE's annual budget.[3]

Revenue implications for the Exchequer

We estimate that directly funding apprenticeships for 16- to 18-year-olds will cost in the region of £720m per annum, reflecting the total spent on 16- to 18-year-olds via the levy and apprenticeship budget in the 2021/22 academic year.[4] We suggest that in the immediate term this could be funded through re-directing unallocated levy receipts which, based on OBR forecasts, returned an estimated £800m to the Exchequer in FY 24/25.

How the measure would support growth and wider macroeconomic implications

As is widely recognised, the engineering and technology labour market is already exhibiting signs of skills shortages, with this having an impact on productivity and economic growth. It has, for example, been reported that nearly half of manufacturers (49%) cite shortage of labour as a factor likely to limit output.[5] In addition, research published by EngineeringUK shows that engineering vacancies account for one in 4 job adverts (25%) despite comprising one in five overall jobs (19%), with green engineering jobs driving this demand (adverts for green engineering jobs have risen by 55% in the last five years).[6] In fact, the Climate Change Committee estimates that the Net Zero transition could create up to an additional 725,000 jobs by 2030 in low-carbon sectors, many of which will be in engineering and tech.[7]

Given the centrality of engineering and technology skills to the net zero transition and linked to this economic growth, ensuring a steady flow of new engineering talent must undoubtedly be a priority for this government. Apprenticeships do and will play a vital role in this, and government must ensure that the system enables young people to enter a sector that is vital to the UK economy alongside those in need of reskilling and upskilling.

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[2] DfE, Apprenticeships and 19-plus Further Education Skills Index (March 2024)
[3] EngineeringUK, Fit for the Future: Growing and sustaining engineering and technology apprenticeships for young people (Oct 2023)
[4] Based on the median maximum funding for all Level 2 and Level 3 apprenticeships approved for delivery, and the number of starts by under 19s at Level 2 and Level 3 in AY 2023/24. See DfE, Apprenticeships Data for 2023/24 (Oct 2024)
[5] CBI, Employment Trends Survey (2022)
[6] EngineeringUK, Engineering skills needs – now and into the future (May 2023)
[7] Climate Change Committee, A Net Zero Workforce (2023)

EngineeringUK believes that, together with other incentives and support for employers, directly funding 16- to 18-year-olds apprenticeships would support the government's efforts to re-balance the apprenticeship system towards young people. This, in turn, will also help government to deliver on its manifesto pledge for a 'Youth Guarantee' of access to training, an apprenticeship or support to find work for every young person. It would also help to level the playing field between those young people choosing the apprenticeship route and those following academic routes via A levels or T Levels, education pathways which are fully funded by government.

A CBI report highlights that 2 of the main current threats to the UK's labour market competitiveness are seen as access to labour (75%) and access to skills (72%), and that closing future skills gaps could provide a £150 billion uplift in GVA by 2030.[8]

Likely effectiveness and value for money

Together with other incentives and support for employers, directly funding 16- to 18-year-olds' apprenticeships should have the effect of de-risking employing 16- to 18-year-olds for levy-paying companies and is therefore likely to lead to more employers being willing to offer apprenticeships to this age group.

If young people are unable to access training opportunities such as apprenticeships, the likelihood of them being Not in Education, Employment, or Training (NEET) increases. The University of York has estimated the lifetime cost to the Exchequer of a young person aged 16 to 18 being NEET as £56,000 in benefits, lost tax and national insurance contributions, as well as notional costs like health and criminal justice.[9] In contrast, the cost of delivering a Level 2 apprenticeship currently stands at between £3,000 and £19,000.[10] Indeed, according to the government's own estimates, each £1 of government funding invested in level 2 to 5 apprenticeships yields a £14 to £25 return.[11]

2. Commit sufficient funding to improve careers advice infrastructure in schools and colleges across England and to implement 2 weeks' work experience for every student

Target department: Department for Education

Despite progress in careers provision over recent years – indeed, national school performance against the Gatsby Benchmarks for good career guidance has more than doubled in the last 5 years – there remains significant work to be done.[12] An EngineeringUK survey of careers leaders and other staff conducted in April 2024 reveals that only 26% of respondents say that their school offers personal guidance interviews with a careers professional before Key Stage 4, whilst only 59% said their school engages with employers annually[13]. More broadly, the Children's Commissioner has found that 1-in-3

[8] CBI, Employment Trends Survey (2022)
[9] University of York, Estimating the life-time cost of NEET: 16-18 year olds not in Education, Employment or Training (2010)
[10] Based on IfATE apprenticeship funding bands (2024)
[11] DfE, Measuring the Net Present of Value of Further Education in England in 2018/19 (May 2021)
[12] Gatsby Foundation, New national data reinforces the impact of the Gatsby Benchmarks on young people (March 2024)
[13] EngineeringUK, Advancing STEM careers provision in England (Sept 2024)

secondary schools pupils report that they do not know enough about good jobs available to them after leaving school, a key contributor to rising skills shortages and NEETs.[14]

2.1 Publish a long-term careers strategy, backed by at least £85m per annum in funding over the next five years

The Labour Party's General Election campaign commitments to train 1,000 new careers leaders and ensure all careers advisors have up-to-date knowledge of post-16 pathways were both welcome; however, they must be backed by a comprehensive, sufficiently resourced careers strategy and the funding to enable this strategy to succeed. This strategy should continue to build on the Gatsby Benchmarks and look to address persistent inequalities in careers provision.

There is extensive academic evidence that good careers guidance yields significant economic benefits for both the individual, in terms of higher salaries and improved financial stability, and the Exchequer, in terms of supporting the effective functioning of the labour market and higher tax receipts.[15] This is supported by a recent survey of 100,000 students by the Careers and Enterprise Company, which found that good careers education increases students' likelihood that they aspire to careers in areas of labour market need and decreases their likelihood of being influenced by perceived gender bias in sectors.[16]

Careers activities have been shown to increase students' career readiness, which in turn increases the likelihood that they aspire to careers in areas of labour market need, including the high-growth sectors identified in the Industrial Strategy. Therefore, investment in careers provision represents a cost effective and socially acceptable way to shape young people's educational choices and pathways to the jobs where they are needed.

Our research has identified staffing and time constraints as a major barrier to STEM careers provision, with only 22% of respondents saying that their school have a full-time equivalent careers leader, whilst 46% of respondents also identified funding as a significant barrier to STEM careers provision.[17] Accordingly, the government should aim to ensure that all schools can allocate more time for their designated careers leader to focus on developing and supporting careers activities. It also essential to ensure that careers advisors have the necessary CPD, so that they can convey up-to-date knowledge of modern engineering and technology careers.

Increased funding would:

- Enable schools to allocate more time for their designated Careers Leader to focus on developing and supporting careers activities in their school
- Ensure all schools can offer an annual careers guidance meeting for students in Years 9, 10, and 11 with a qualified careers advisor, in line with the Gatsby benchmarks.

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[14] Children's Commissioner, The Big Ambition (2024)
[15] E.g. Percy, C. and Dodd, V. The economic outcomes of career development programmes (2020); Kashefpakdel, E. T. and Percy, C. Career education that works: An economic analysis using the British Cohort Study' (2017)
[16] Careers and Enterprise Company, Careers Education 2022/23: Now and Next (March 2024)
[17] EngineeringUK, Advancing STEM careers provision in England (Sept 2024)

- Support teachers' and careers advisers' understanding of STEM careers and their integration into the curriculum through accredited CPD, coordinated through the existing national careers infrastructure including local Careers Hubs.

2.2 Publish a comprehensive work experience strategy as a roadmap to delivering 2 weeks' work experience for every pupil

Alongside a refreshed careers strategy, we also ask that the government develop a clear work experience strategy that links into and sits alongside the wider careers strategy. To ensure that the government can deliver on its ambition of providing 2 weeks of work experience for every child and to ensure maximum benefit for young people and employers alike, the government must ensure the right infrastructure and connections exist between employers, schools and the wider careers network, and that schools have access to the funding to unlock those opportunities for young people. The ambition of this strategy should be to ensure that all students can access meaningful work experience with a range of employers, including more STEM employers.

In light of this, we welcome the pilots currently taking place, organised and run by the Careers and Enterprise Company in partnership with Mayoral Combined Authorities[18]. The aim of the pilots is to scale provision of modern work experience with a focus on multiple, targeted and variable workplace experiences, totalling 10 days.

The government must ensure sufficient funding is in place to support the roll out of the work experience programme in the long run. It must be willing to reassess whether the additional £85m budget promised for both careers provision and the work experience rollout is sufficient to achieve the intended outcomes of the programme.

Revenue implications for the Exchequer

Funding careers provision and a work experience guarantee will require at the minimum an additional spend of £85m per annum but EngineeringUK would recommend to more ambitious in this funding settlement. As has been suggested in the fiscal plan that accompanied the Labour Manifesto, this could be funded with the revenue generated from applying VAT and business rates to private schools.

How the measure would support growth and wider macroeconomic implications

Improving the overall knowledge of engineering and tech, the breadth of careers they offer, including in areas which young people are interested in (such as addressing climate change), as well as the salaries they can expect, is key to attracting more, and a more diverse group of, young people into engineering careers. Research conducted by EngineeringUK clearly shows that young people who know more about what engineers do are more likely to perceive the profession in a positive way and to consider a career in engineering.[19] The research also shows that STEM outreach and education activities are critical in this context.

Pupils who had attended any (one or more) STEM careers activity, were 3.5 times more likely than those who hadn't attended any to know about what people working in engineering did. They were also 3.4 times more likely than those who hadn't attended a STEM careers activity, to consider a

[18] Careers and Enterprise Company, Modern work experience: Equalex
[19] EngineeringUK, Engineering Brand Monitor (2020)

career in engineering.[20] Furthermore, the number of STEM activities attended made a difference. Those who had attended two or more STEM activities were 8 times more likely than those who hadn't attended any to know about what people working in engineering did, and those who had attended just one, were three times more likely than those who hadn't attended any to know about what people working in engineering did.

In light of the skills and workforce shortages touched on earlier in this response, a good careers provision model with access to outreach activities that are proven to be effective and access to work experience opportunities in the sector play a vital role.

Likely effectiveness and value for money

Exposure to a relevant sector at an early age, such as during Key Stage 3, can help to promote STEM careers for young people, increase their motivation and attainment in STEM subjects at school, and encourage them to pursue routes into STEM careers through post-16 academic or technical qualifications. Indeed, the Education Endowment Foundation found that children eligible for free school meals who received work experience via the Generation STEM programme made the equivalent of one month's additional progress in mathematics and science.[21]

In addition, there is extensive evidence which finds that career guidance more broadly can be effective in supporting young people in their education, in making transitions and in achieving long term success in their lives.[22] There is also evidence which shows that not only does good career guidance support individuals to achieve better salaries and greater financial stability, but it also supports economic policy goals contributing to both the effective functioning of the labour market and to increased returns for the exchequer.[23] Recent return on investment analyses show that career guidance is a net benefit to the exchequer and is ultimately responsible for more money coming in than is initially spent.[24]

3.Fund programmes and activities proven to work in the STEM outreach space and invest in what works research in relation to improving diversity in the workforce

Target departments: Department for Education, Department for Science, Innovation and Technology

The engineering and technology sector workforce lacks diversity, undermining its ability to grow and to harness the diversity of thought so important for innovation in this sector. Women, for example, only make up 15.7% of engineering and technology workforce, compared with 56% in the rest of the

[20] Ibid.
[21] Education Endowment Foundation, Testing the impact of preparing for, applying for and participating in STEM-related work experience (2021)
[22] Hooley, T. 'The evidence base on lifelong guidance', European Lifelong Guidance Policy Network (ELGPN), 2014; Hughes, D. et. al. 'Careers education: International literature review', Warwick; Kashefpakdel, E. T. and Percy, C. 'Career education that works: An economic analysis using the British Cohort Study', Journal of Education and Work, (2017)
[23] Percy, C. and Dodd, V. 'The economic outcomes of career development programmes', The Oxford handbook of career development, (2020)
[24] Percy, C. Personal guidance in English secondary education: An initial return on investment estimate [online], accessed 14/05/2021

workforce.[25] People from other demographic groups are also under-represented in engineering and technology, albeit to a lesser extent:

- 12% of the engineering and technology workforce are from UK minority ethnic groups compared with 16% in other occupations
- 14% of the engineering and technology workforce as disabled versus 18% in other occupations
- 24% of the engineering and technology workforce are people from lower socio-economic backgrounds compared to 26% in other occupations.

As well as impacting the productivity and relevance of engineering and technology activities, this lack of diversity creates a significant societal inequity, limiting the accessibility of people from certain demographic groups to careers that are in demand and about a third higher paid than average.[26]

Education and training routes into engineering and technology are currently not faring much better in terms of gender diversity. In 2024, only 23.3% of the A Level physics cohort and 17.5% of those taking A level computing were young women, with women also under-represented in engineering and technology apprenticeships and T Levels.[27] Only 17% of engineering apprenticeships are taking up by women, and 9% of engineering T Levels. There are a multitude of factors affecting perceptions of and interest in engineering and technology careers, and experiences differ greatly across demographic groups, with significant gender differences already apparent at the beginning of secondary school.

Government, businesses and charities have invested billions of pounds over decades on interventions to increase the uptake and diversity of young people taking STEM subjects. Much of this spending is driven by the need to meet workforce shortages especially in critical areas of engineering, technology and digital sectors. In the financial year 2022–23 alone, DfE has said that it "spent approximately £57.4m on STEM programmes including the Inclusion in Schools project delivered by the Association for Science Education and the STEM Ambassadors programme which have both had a positive effect on inclusion in STEM subjects".[28] Schools will also be directly contributing. Based on analysis by PwC of the costs of the Gatsby Career benchmarks, we estimate that delivering the relevant encounters with employers and employees, experiences of workplaces and encounters with FE and HE would be about £58m in 2024 if schools were meeting the benchmark targets.[29] While these costs would be across all subject areas, they only cover staff costs to enable these experiences and a small allocation for travel, rather than delivery costs of, say, employers or charities.

In addition, businesses are also providing resources, with many organisations covering the costs of a huge amount of in-kind resource, for example, through staff volunteering days which are spent as STEM Ambassadors. Estimating the total non-government spend on STEM related experiences is

[25] EngineeringUK, Women in Engineering and Technology (May 2024)
[26] EngineeringUK, Engineering skills needs – now and into the future (May 2023) "The average advertised salary in engineering (£38,600) almost 30% higher than the average salary for all occupations (£30,000)"

[27] EngineeringUK, A level and Scottish Higher Results (August 2024)
[28] Diversity and inclusion in STEM: Government Response to the Committee's Fifth Report
[29] Good Career Guidance, Gatsby Charitable Trust, 2014 PwC estimated the cost of established delivery of benchmark 5 Encounters with employers and employees, Benchmark 6 experiences of workplaces and Benchmark 7 Encounters with FE and HE as £11,070/school or £43 million per year in 2014; accounting for inflation, this equates to £58 million in 2024

difficult, but STEM Ambassadors delivered an average of 36,000 activities a year between 2016 to 2021.[30] If each activity takes a day and assuming volunteers are paid the median advertised engineering salary of £38,600, in kind staff support of STEM interventions would cost employers around £6.3m each year.[31] Despite all this spending, improvements in uptake particularly by young women in the relevant STEM subjects and entering engineering and technology education and training pathways are insufficient to meet the nation's needs.

3.1 £2m per annum to fund What Works research to conduct robust evaluations of STEM interventions

While we know that in general, careers engagement increases career readiness and that students with high career readiness are more likely to aspire to careers in areas of labour market need and that buck gender stereotypes, a fraction of the many hundreds of outreach activities or interventions occurring each year have been robustly evaluated; more should be done to ensure that money being spent on these activities achieves the intended outcomes.[32] In a sample of 103 organisations involved in engineering and technology interventions in 2024, for example, only a quarter (24%) said that they used trained evaluators and many identified feedback and/or evaluation as something that they would like support to improve.[33] Similarly, a recent evidence review of interventions to increase the uptake of computer science by girls and women noted a lack of meaningful evaluations in the UK.[34]

Hence, we recommend that the government funds a research programme to build the evidence base for which interventions result in more and more diverse young people on pathways into the engineering, technology and digital workforce. This research could be conducted through the creation of a new STEM-focused What Works Centre, or by funding a What Works programme across one or more established What Works Centre, at an estimated cost of £10m over 4-5 years. Several of these centres have relevant experience and one or a combination of them could run the programme. For instance, the Education Endowment Foundation evaluates typically school-based interventions and has focused on improving students' academic outcomes, the Youth Futures Foundation focuses on evaluating interventions to support marginalised young people into work and TASO examines how to transform access and student outcomes in higher education.

The government understands the importance of research to improve the effective of interventions in a range of areas and has established a series of What Works Centres to achieve this. We note the government's guidance on setting up a What Works Centre and we believe that this proposal meets the criteria for what works research.[35] We recommend this focus (E&T) rather than a wider examination of STEM because the critical workforce shortages are in engineering and technology, including digital skills (including where they overlap with other sciences, such as bioinformatics or bioengineering).

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[30] UKRI, STEM Ambassador programme review (2022)
[31] UKRI, STEM Ambassador programme review (2022)
[32] Careers and Enterprise Company, Careers Education 2022/23: Now and Next (March 2024)
[33] Tomorrow's Engineers Code, The Code Check-in report (2024)
[34] The Hg Foundation, Girls and women in Computer Science: A rapid review of intervention review evidence (2024)
[35] Evaluation Task Force, Considerations around Setting up a What Works Centre (2022)

3.2 Commit to sustaining funding for the STEM Ambassadors Programme, at £5m per annum

In addition, we recommend that government continues to fund the programmes that we already do know work including, but not exclusively the STEM Ambassadors programme, supported via UKRI at a cost of approximately £5m per annum.[36]

The STEM ambassadors programme, delivered by STEM Learning, represents a highly effective means of connecting young people with STEM employers via outreach in schools, colleges, and universities, thereby helping to fill key vacancies in the engineering and tech sectors. According to UKRI estimates, between 2016 and 2021, approximately 143k STEM ambassadors were registered to the programme and delivered over 181k activities, engaging between 15.2m and 25.7m young people.[26]

3.3 An additional £0.7m per annum to double the uptake of CREST Awards, whilst maintaining existing funding for the programme

CREST, run by the British Science Association and funded via UKRI, is a scheme that encourages young people to think like scientists and engineers through project-based work. Over 50,000 young people currently complete a CREST Award each year, of whom over 50% are girls, and the scheme has run for nearly 40 years. At a cost of only £11 per award (excluding additional grants to schools in challenging circumstances), the scheme has been demonstrated to be highly cost-effective, with independent analysis finding that Silver CREST award students achieved half a grade higher in their best science GSCE and 21% more likely to take a STEM AS-level than a statistically matched control group.[37]

CREST currently receives funding of approximately £740,000 per annum from UKRI resulting in approximately 10,000 young people at Key Stage 3 completing a Bronze CREST award each year. The BSA have estimated that CREST could increase that to around 292,000 young people completing a Bronze CREST award over a five-year period at a cost of approximately £2.8m. An additional £830k over 5 years would allow for the provision of additional support for schools in challenging circumstances enabling them and their students to take part.

Revenue implications for the Exchequer

We recommend that the government invests £10m over 4-5 years programme to fund research within its already established What Works Centres to build the evidence base for which interventions result in more and more diverse young people on pathways into the engineering, technology and digital workforce. This level of investment has been identified as ideal by the government's evaluation taskforce[38]. Insights from this research would ensure that government and other stakeholders are able to leverage a much greater return on the money spent by government, employers, charities and education providers on STEM interventions.

In addition, we recommend that the government sustain funding for programmes that are already proven to work, including £5m per annum for the STEM Ambassador programme. We would also recommend looking at increasing funding for the Crest Awards to £0.7m per annum and for government to look to fund any other STEM outreach programmes proven to work.

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[36] For more information, see: STEM Learning, STEM Ambassadors

[37] Wellcome Trust, Young Researchers Reflections from Wellcome on the impact of doing research projects (2016)

[38] What Works Network, Setting up a What Works Centre – Key Considerations (2022)

How the measure would support growth and wider macroeconomic implications

The shortage of STEM skills in the UK costs the economy billions per year in lost revenues, representing a major brake on growth. Numerous surveys and conversations with employers in the engineering and technology sector have highlighted skills are their number one priority.[39] STEM careers engagement that is proven to work will support companies looking to expand, helping to fill the growing job market in this sector.

Likely effectiveness and value for money

We are confident that the findings of What Works research would rapidly impact practice and improve outcomes. Thus, the government's modest £10m investment into the research over a five-year period would be greatly amplified in terms of benefits to the wider economy. Given that DfE's annual expenditure on STEM programmes totalled £57.4m in FY 2022/23, this represents a relatively small cost to ensure high-quality programmes are being delivered.

4. Invest in STEM teacher recruitment and retention

Target department: Department for Education

STEM teacher shortages in England are at an all-time high and have been increasing exponentially over the last 10 years. In 2023/2024 there were just over 1,600 vacancies compared to around 1,300 even just a year ago and 360 in 2010/11.[40] The teacher recruitment crisis is particularly acute for STEM subjects, with most recent DfE data published in December 2024 showing that only 30% of physics teacher recruitment targets were met in 2024/2025, 37% of the computing teacher target, and 40% of design technology targets. For several years in a row now, of the 10 subjects with the highest vacancy rate, 7 are STEM subjects in 2023/24. In addition, 9% of the classroom teachers of all subjects in state funded secondary schools left in 2022/23.[41]

As a result of this crisis in recruitment and retention of teachers, the proportion of teachers with a relevant post-A level qualification is particularly low for some core engineering STEM subjects, including Engineering 15.9%, Computing 39.9%, ICT 53.1% and Physics 58.1%. The subjects listed have consistently been in the bottom 10 subjects for this measure. This is problematic. The 2023 Science Education Tracker highlights that shortages of specialist teachers have a wide-ranging impact on young people's learning of STEM subjects, affecting schools' ability to deliver STEM subject education and in return pupils' motivation to learn sciences.[42]

Tackling the STEM teacher shortage must be at the forefront of the government's efforts to improve the education system in England. While we welcome the commitment to recruit 6,500 more teachers, we would urge government to also focus on the retention of existing teachers as a means of reducing leakages to the talent pool.

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[39] Engineering and Technology Magazine, Engineering skills crisis: a multi-pronged problem (Jan 2023)
[40] DfE, School workforce in England (June 2024)
[41] DfE, Initial Teacher Training Census (Dec 2024)
[42] Royal Society and EngineeringUK, Science Education Tracker (April 2024)

We are particularly concerned by the Government's decision to proceed with cuts to ringfenced budgets for continuing professional development (CPD) programmes for STEM teachers, including the decision to cease funding the Stimulating Physics Network beyond March 2025. Consequently, ring-fenced funding for CPD for science teachers is set to drop by almost half between the 2023/24 and 2024/25 financial years, from £8.4m to £4.5m. We understand that this funding pot will be abolished entirely from the 2025/26 academic year, with future CPD funding to be drawn entirely from core school budgets, which remain highly stretched.[43] In light of the need to expand the science, engineering and technology workforce, and the importance of good teaching in these subjects, we strongly encourage the government to reverse these cuts to STEM CPD as a matter of urgency, and to publish plans for the 'Teacher Training Entitlement' CPD programme that it has pledged to introduce at the earliest opportunity.

4.1 Sustain existing Initial Teacher Training funding for STEM subjects, including key practical subjects such as Design and Technology.

We have welcomed the new government's commitment to recruiting 6,500 new specialist teachers within the current Parliament as a positive step towards addressing the serious teacher shortages facing schools and further education providers.

The expansion of the 'Every Lesson Shapes a Life' teacher recruitment campaign and the restarting of the 'Share Your Skills' campaign represent a step in the right direction, though the government must ensure it prioritises recruitment for subjects facing particularly acute shortages. A high proportion of STEM subjects in England are taught by non-specialist teachers, with 80% of engineering secondary school teaching hours for engineering delivered by a non-specialist in the 2022/23 academic year, whilst physics and D&T came in at 28% and 21% respectively.[44]

To ensure that recruitment targets are filled, the government should also commit to retaining – and where necessary, increasing – Initial Teacher Training Bursaries for STEM subjects. We have welcomed increases in ITT bursaries to £29,000 for chemistry, mathematics, and physics, as well as up to £26,000 for design and technology from the 2025/26 academic year.[45] However, the persistent shortfall in STEM recruitment targets in recent years will have yielded a substantial saving against the expected outlay on teacher training, which the government should consider re-investing in recruitment and retention schemes.

The government should also continue to pursue recruitment initiatives specifically aimed at career switchers. This includes the Engineers Teach Physics programme, run by the DfE and the Institute of Physics (IOP), which was rolled out nationwide from the 2023/24 academic year to offer tailored Initial Teacher Training (ITT) and wider support for engineering and material science graduates.[46]

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[43] Parliamentary Question, UIN 21283 (tabled 19 December 2024)
[44] DfE, 'Specialist teachers in state funded secondary schools' from 'School workforce in England' (2023)
[45] DfE, Funding: ITT, academic year 2025 to 2026 (Oct 2024)
[46] For more information, see: DfE, Offer an Engineers teach physics course

4.2 £29m per annum to invest in high-quality Continuing Professional Development for STEM teachers, yielding a significant return on investment through increased retention rates and improved quality of STEM teaching.

The government must also ensure that teachers have the training and STEM subject specific CPD needed to deliver quality learning for young people. Investing in CPD enables STEM teachers, especially those without the relevant STEM qualifications, to teach STEM effectively, increasing the quality of STEM teaching, teacher retention and student progression. Indeed, analysis commissioned by Wellcome found that providing science-specific CPD increases the odds of STEM teachers staying in the profession the following year by 160%, from 1 in 12 leaving to 1 in 30.[47]

In a 2021 report, the Royal Society estimated that a 1.5% improvement in the retention rate of teachers would mean that 8,800 teachers from each annual cohort remain in the profession until retirement, saving at least £126m in recruitment and training costs.[48] The same report calls on the government to commit roughly £29m for science CPD per annum, a demand which we would reiterate for the next spending review period at a minimum.

Revenue implications for the Exchequer

Overall, the revenue implications of the above are £29m for CPD for STEM teachers across state primary and secondary schools at a minimum.

How the measure would support growth and wider macroeconomic implications

Teachers are the foundation of a functioning education system and prolonged pressures on the workforce are known to have a negative impact on young people's education. We know from the Science Education Tracker[49], a representative survey of more than 7,000 young people, that a shortage of specialist teachers has a wide-ranging impact on young people's learning of STEM subjects and that having a good teacher is a motivating factor for students to learn sciences. To be able to teach STEM subjects well, teachers need to be equipped with the subject knowledge to do so. It is therefore vital that we not only have more specialists entering the teaching workforce, but also that they are continuously brought up to date, to ensure that they can, and feel confident, to pass on relevant knowledge to their students.

The evidence is clear that we need a growing STEM, and in particular engineering and technology workforce, in order to grow and improve the UK's productivity gap. In light of this, it is vital that we as a country invest in the people that are the cornerstone of the education system.

Likely effectiveness and value for money

Continuous Professional Development

As touched upon above, there is a direct positive impact on retention of providing CPD to teachers, particularly in the STEM subjects, with science-specific CPD increasing the odds of STEM teachers staying in the profession the following year by 160%, from 1 in 12 leaving to 1 in 30.[50] An investment

[47] Wellcome Trust, Solving the STEM shortage: CPD improves science teacher retention (2017)
[48] Royal Society, Science education for a research and innovation economy (2022)
[49] Royal Society and EngineeringUK, Science Education Tracker (April 2024)
[50] Wellcome Trust, Solving the STEM shortage: CPD improves science teacher retention (2017)

of £29m for CPD must therefore be set off against potential savings being made on teacher recruitment. A 1.5% improvement in the retention rate of teachers would mean that 8,800 teachers from each annual cohort remain in the profession until retirement, saving at least £126m in recruitment and training costs.[51]

Additionally, recent analysis by STEM Learning indicated that every £1 invested in STEM CPD generates £20 in economic benefit, making it a high-impact, cost-effective solution to the STEM skills crisis. Based on this model, a £29m investment in STEM CPD could result in a £580m boost for the wider economy in the long-term.[52]

5. Sufficient funding to implement the changes recommended by the Curriculum and Assessment Review

Target department: Department for Education

The government is currently undertaking a curriculum review which will be concluded over the coming months. This review is likely to lead to changes in the way young people are being taught at schools. It is not yet clear how far-reaching these changes will be. However, any modifications in teaching hours, materials, assessments or focus will bring with it some additional costs. It is vital that these changes are fully funded and that in addition to that, sufficient and good quality continuous professional development is being funded to support teachers with these changes.

6. Additional funding for higher education engineering courses

Target departments: Department for Education and Treasury

Alongside technical education and school interventions, increasing the supply of engineering graduates will be an essential means of meeting the demand for 124,000 engineers and technicians required each year to meet current and future demand for 'core engineering' roles, thereby unlocking growth and opportunity.[53]

However, existing funding structures provide perverse incentives for universities to scale up places on STEM degrees for domestic students, as illustrated by recent high-profile department closures and staff redundancies by a range of universities (including Russell Group institutions).[54] Indeed, in 2019 the Department for Education estimated the real costs of delivering a range of courses and engineering courses averaged out at £12,853, compared with a fee income of £9,250.[55]

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[51] Royal Society, Science education for a research and innovation economy (2022)
[52] STEM Learning, Why cutting STEM CPD funding risks a crisis in education and industry (2024)
[53] EngineeringUK, Net zero workforce – an analysis of existing research (May 2024)
[54] See, for example: High-ranking Sheffield University departments including Civil Engineering among those targeted by redundancies (The Star, Nov 2024)
[55] Department for Education, Measuring the cost of provision using Transparent Approach to Costing data (May 2019)

After inflation, the Engineering Professors' Council (EPC) estimates that delivery costs per engineering undergraduate will now amount to £18,819 on average for the 2025/26 academic year.[56] This would mean that universities face an annual average shortfall of £7,591 per year per engineering student, even after accounting for the recently announced tuition fee increase and the high-cost funding uplift for institutions via the Strategic Priorities Grant. Based on HESA headcounts for the 2023/24 academic year, that this underfunding annually equates to more than £897.5m for engineering alone.[57]

In the absence of additional funding via domestic tuition fees or Government grants, Higher Education Institutions are left footing around 40% of engineering course running costs from other sources, such as cross-subsidisation from other subjects, research funding, or international students. On the latter, we are concerned that this has resulted in an over-reliance on international students to make engineering courses viable, with latest HESA data showing that one in four engineering first degree students are from overseas, compared with c15% across all subjects.[58]

Due to the higher fees charged to international engineering students (an average of £19,536 in 2022), the EPC and UCL estimates that fee income from engineering courses is roughly split equally between domestic and international students, whilst at least nine large providers generate over two-thirds of fee income from international student intake.[59]

Meanwhile, despite a proportionally higher increase in the number of engineering and technology students between 2009/10 and 2020/21 compared to other degrees (14% vs 5.2% increase), research by the Engineering Professors Council (EPC) for the Royal Academy of Engineering on UCAS admissions highlights a ceiling in the capacity of the engineering HE sector to accept more students.[60] Stagnation in admissions to undergraduate engineering is largely being driven by providers, who are mitigating against increased applications, likely in response to the unaffordable subsidy cost per student.

Increasing the availability and uptake of engineering degrees will also contribute to the government's mission of breaking down the barriers to opportunity. Indeed, the study of engineering at university is a significant driver of social mobility: EPC analysis in 2021 showed that the average salary of engineering graduates ten years after qualifying was £11,700 higher than other graduates, with higher earnings spread evenly across the country.[61] Moreover, the same research paper suggested that the gap between the incomes of engineering graduates from different socio-economic backgrounds was significantly smaller than for other graduates.

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[56] Based on Universities UK's inflation methodology
[57] Adjusting for the Strategic Priorities Grant (2023/24 levels) and taking HESA FTE headcount (2023) by cost centre as a conservative measure of English-domiciled first-degree engineering student numbers (2023)
[58] HESA HEDI+ All providers student FPE record, accessed 04/02/25
[59] Written evidence from the Engineering Professors Council and Engineering Council (April 2023)
[60] EngineeringUK, Engineering in Higher Education report (May 2023)
[61] Engineering Professors' Council, Engineering Opportunity (2021)

6.1 Increase funding for strategically important, high-cost STEM courses via the Strategic Priorities Grant

The Strategic Priorities Grant (SPG) is supplied annually by government to support teaching and students in higher education. In 2023/24, over half of the £1,454m total SPG budget was directed towards provision of high-cost subjects, including science, engineering and technology subjects, and specific labour market needs.[62] As an illustration, this amounts to £1,693.50 per Office for Students-fundable full-time home student per year in academic year 2023/24 (in addition to tuition fee income) on engineering degrees.

However, as stated previously, even after accounting for this grant funding, universities still face an annual shortfall of around £900m in delivering engineering degrees in the 2025/26 academic year. Whilst it may not be feasible for the Treasury to fully fund this difference, we recommend that at the very least the Treasury support the DfE to increase allocations in the Strategic Priorities Grant for high-cost STEM subjects, and engineering degrees in particular, from the 2026/27 academic year.

Whilst not a long-term solution, a significant uplift via the grant would allow institutions to plug short-term funding gaps and decrease the pressures on institutions to limit places or close departments, thus expanding the pool of young people pursuing engineering careers. Based on current expenditure levels, doubling funding available to institutions for strategically important high-cost subjects (including engineering and other STEM disciplines) would cost in the region of £800m per annum.

If you would appreciate any further information on these proposals, or to discuss EngineeringUK's work more generally, please reach out to jgordon@engineeringuk.com.

[62] Office for Students, Strategic Priorities Grant sets out funding for 2024-25 (Apr 2024)