Plugging the STEM Skills Gap

Navigating Talent Scarcity

Adecco

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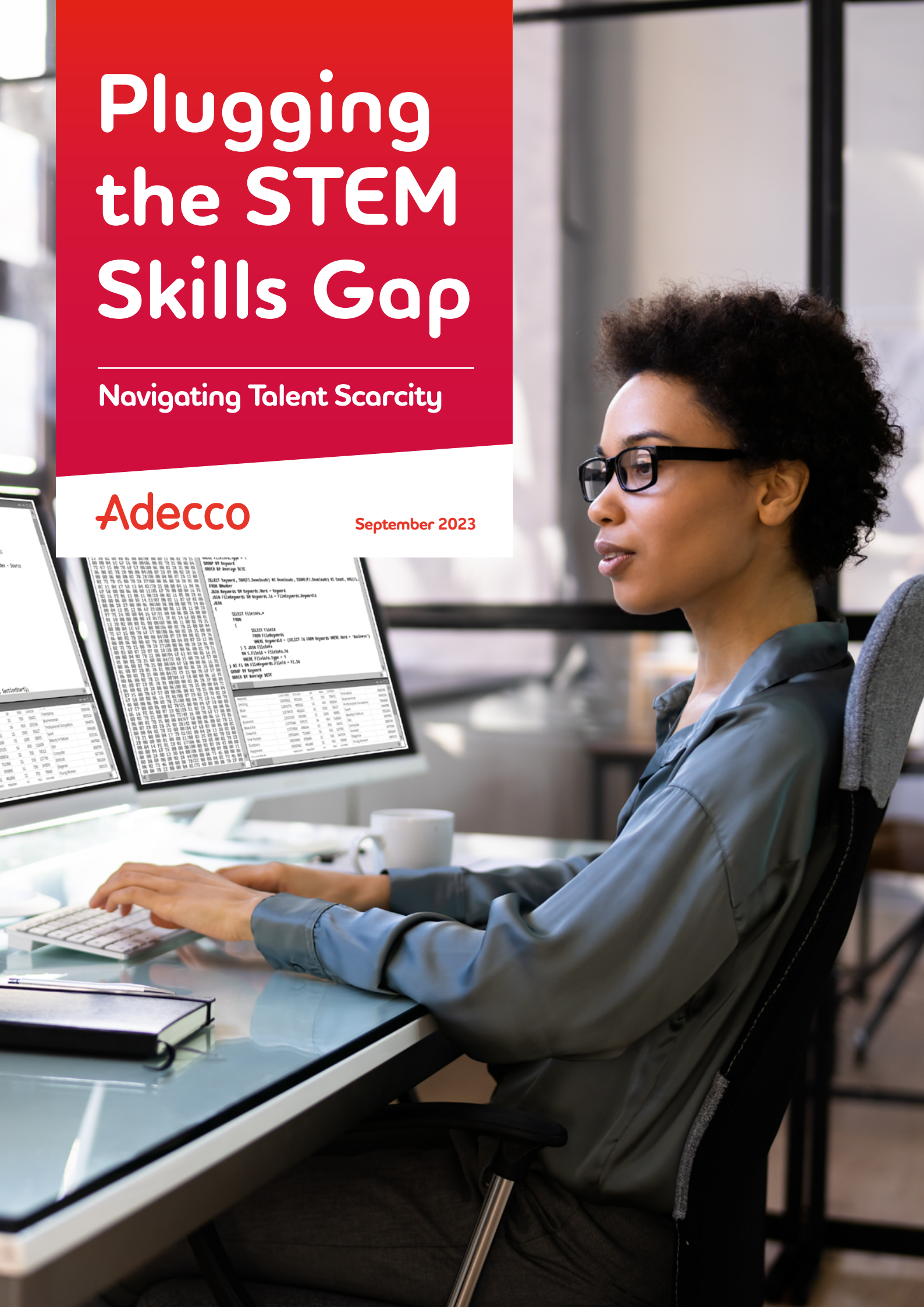

Introduction

In this report, we aim to provide employers and a wider audience with a better understanding of key trends and challenges related to the STEM workforce and skills in the UK. The UK's skills gap is long-running, and the shortage of STEM skills hinders improvement in productivity, economic growth, and the successful delivery of broader policy goals. This whitepaper offers insights into the obstacles surrounding STEM skills and explores effective strategies to successfully overcome them.

What is STEM?

STEM is defined as the study of science, technology, engineering, and mathematics. In terms of industries and employment, STEM should be looked at more broadly to include specialised skills associated with science, technology, engineering, and maths. STEM roles extend beyond the technology sector to include opportunities in chemistry, engineering, data science, and software development.

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The UK STEM Skills Gap

The STEM industry is a vital economic sector, accounting for 18% of the UK's total workforce.[1] However, the UK has long-standing skills gaps in areas of STEM. The supply of STEM graduates in the UK lags behind other member countries of the Organisation for Economic Co-operation and Development (OECD), and the sector is struggling from an increasingly pressing shortage from the wider skills pipeline. It is estimated that the UK economy suffers a loss of £1.5bn per year due to STEM skills deficits.[2] According to the UK Commission for Employment & Skills, 43% of STEM vacancies are hard to fill. This is mainly due to a shortfall of applicants with the required skills and experience.

This talent scarcity has left employment gaps across a wide range of fields, including technology, pharmaceuticals, defence, and aerospace industries. Engineering is among the hardest-hit sectors, and the Institution of Engineering and Technology (IET) Skills Survey 2021 highlighted an ongoing shortage of engineering skills for the last 15 years.

According to more than half of companies, skills shortages will only worsen over the next decade. With 20% of the UK's engineering workforce due to retire by 2026, a major factor driving shortages is an ageing population, coupled with a lack of STEM-skilled students moving into correlating disciplines post-education.[3]

Specific skills shortages are reported among engineers and technicians, as well as cross-sector disciplines such as quantity surveyors, data scientists, cyber security experts, and project managers.[4] The industry is struggling to recruit enough people for these and other critical roles. Attracting and retaining young people with STEM qualifications also continues to be an issue.[5]

The boom in investment in UK tech (the industry has expanded tenfold in the last decade) has led to a surge in hiring for tech and IT-related roles. The demand has further increased following the economic recovery from Covid-19 and the resulting acceleration in organisations' digital transformation goals. UK businesses are falling behind the pace of global digital change, and almost 70% of digital leaders in the UK say they are held back by a talent shortage.[6]

Employers are finding it increasingly difficult to source the technical graduates needed to meet growing demands in areas such as cyber security, artificial intelligence (AI), and robotics.[7] Digital skills are also critical for the UK to achieve key priorities such as net-zero, however, only 15% of IT professionals believe the UK workforce has the digital skills necessary to achieve net-zero by 2050.

Sources:

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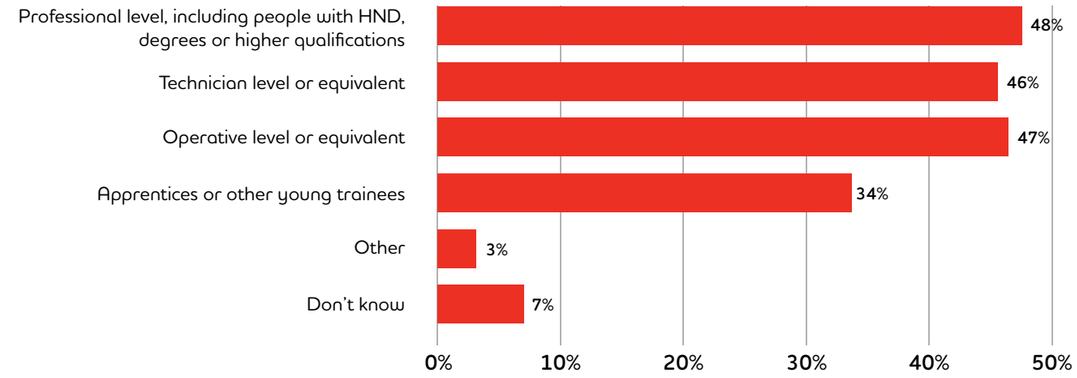
2. STEM Skills Indicator, STEM Learning
3. Engineering Construction Industry Training Board (ECITB), 2022
4. Stem Careers Guide, Youth Employment
5. Workforce renewal and skills strategy 2020-2025, EUSP
6. Businesses held back by talent shortage
7. UK industry in desperate need of cyber, AI and robotics graduates, BCS, 2022

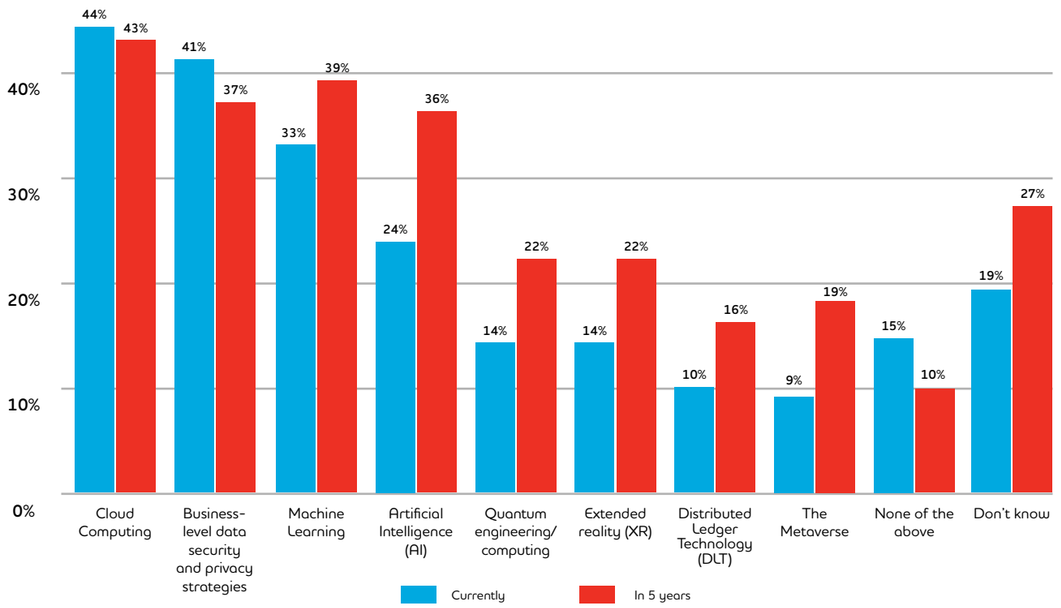
What levels are affected by skills gaps in existing engineering/technical workforce?

Source: https://www.theiet.org/media/9234/2021-skills-survey.pdf



Which skills should engineers currently understand/understand in five years' time?

Source: https://www.theiet.org/media/11064/skills-for-a-digital-future-survey.pdf



The impact of a STEM shortage on net zero

The timely and successful transition to clean energy depends on a significant number of people trained in high-level STEM skills, such as environmental scientists and engineers.[8]

According to recent research by Onward, a UK-based think tank, into the current occupational categories related to net-zero, more than half (56%) of the categories require STEM skills.[9] Onward also estimates the average skill level of net-zero jobs is 26% higher than the current average occupational skill level in the UK.

The process of switching to low-carbon energy sources will also require a large workforce with strong low- and medium-level technical qualifications. These estimates show a large qualification gap at both the specialist and operational ends of the skills spectrum.[10]

According to research commissioned by National Grid, **the UK's energy sector will need to fill 400,000 roles in the net-zero energy workforce by 2050.** These jobs will include civil, mechanical, and electrical engineers, data analysts, machine learning experts, and skilled tradespeople. New roles linked to electric vehicles, hydrogen, and carbon capture technology will also emerge.[11]

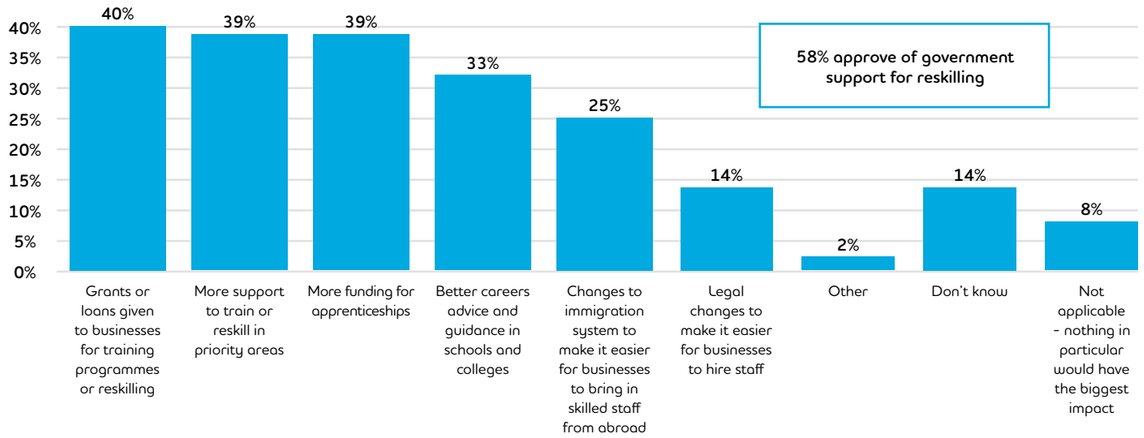
The automotive industry in particular is likely to face challenges, with employment structures heavily impacted by the transition to electric mobility. With the automation shift and the fact that electric vehicles (EVs) are simpler to manufacture than petrol or diesel vehicles, a decline in the required resources in the sector is inevitable. However, we will also see a transition in sought-after skillsets. Higher demand for skills across areas including chemical, material, electronics, and IT is foreseen over mechanical jobs.[12]

By 2025, it is estimated that 25%-35% of all cars sold will be hybrid cars, plug-in cars, or fully electric vehicles. This will require companies to build a new platform architecture to support advanced driving technologies. Companies will need to upskill or reskill their workforce to meet the demand for various roles – such as engineers, specialists, and service teams – and manage the impact on their talent strategies.[13]

There are some assumptions that investing in automation, technology, and networking will lead to significant job losses. However, it is also likely to create new opportunities by transforming and developing existing positions. **37% of manufacturing companies say that job opportunities have increased, almost half (49%) say they will need more higher-level capabilities, and 46% expect to take on more mid-level skills.**[14] This can also be applied to other STEM job roles, such as streamlining engineering to enhance efficiency and precision, as well as increasing the demand for AI experts and robotics engineers. Whilst these emerging fields offer new opportunities, upskilling staff in both technical and analytical skills is crucial to fill future roles.

Potential government action to facilitate meeting digital needs

Source: https://www.theiet.org/media/11064/skills-for-a-digital-future-survey.pdf



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9. Qualifying for the race to net zero, Onward, 2021
10. Qualifying for the race to net zero, Onward, 2021
11. Building the Net Zero Energy Workforce Report, National Grid
12. Auto industry ready to witness job losses and major skill transitioning, Just Auto, 2021
13. Future of Talent in the Automotive Mobility Industry, The Adecco Group, 2021
14. Digital Adoption: The Missing Link in Productivity Growth, MakeUK

Education & Training

More young people are taking STEM subjects at university than ever before, according to statistics by UCAS. Since 2011, there has been significant growth in students choosing STEM subjects, such as computer science, engineering, chemistry, physics, and biology.[16]

However, the percentage of new entrants, students, and graduates in engineering, manufacturing, and construction among all higher education students in the UK is relatively low. The UK is ranked 34th out of 35 in the OECD league table for the share of students studying these subjects. Interest in the fields of natural sciences, mathematics, and statistics is much higher, as the UK has one of the highest percentages of university graduates in these areas.[17]

To boost the domestic STEM talent pool, it is necessary to increase the uptake of these subjects in schools. This is a key action point for the Government, but employers also play an important role by prioritising engagement with local schools, colleges, and universities, as well as providing career advice and guidance.

The lack of knowledge of STEM opportunities is another issue limiting young people's engagement in STEM subjects and careers. **According to research by Engineering UK,**[18] **less than half of young people know about the apprenticeship options available to them.**

There are some significant regional disparities; knowledge of apprenticeship options is highest in London (63%) and lowest in Yorkshire and the Humber (34%). Additionally, despite being introduced by the Government in 2020, the majority of young people are not familiar with T-Levels as a source of further education. T-Levels offer blended education and industry placement and are built on the same standards as apprenticeships with a focus on maths, English and digital skills.

Early engagement and awareness are needed to encourage more people to enter further STEM education and industries. By engaging children in STEM subjects from an early age, there is a higher chance of sparking their passion in these areas, which could lead to setting up a career in STEM fields.[19] **Career guidance is an effective way to support young people in their education, in making transitions into employment, and in achieving long-term success in their lives.**[20]

However, schools face significant challenges in delivering STEM education. One of the UK education system's key hurdles is a severe, long-standing shortage of specialist science teachers, especially in high-demand subjects like physics and computing. The recruitment and retention of teachers and educators across many disciplines fall short of Government targets. Key factors contributing to poor retention of teachers must be understood and addressed.[21]

Socio-economic background also appears to play a role in young people's knowledge and perceptions of education and skills pathways. **Only 35% of young people from lower-income households know the required subjects or qualifications to become an engineer, compared with 52% of young people from higher-income households.** Parents' knowledge also differs depending on income levels.[22]

A lack of understanding and a negative perception also contribute to the low numbers of young people considering STEM career paths. Young people who know more about what engineers do are more likely to view the profession positively and consider a career in engineering.[23] It is clear that more needs to be done to increase young people's knowledge of the routes available to science and engineering careers.

Government Initiatives

The Government has a number of initiatives aimed at addressing the STEM skills gap, including T-Levels, bootcamps, apprenticeships, and degree apprenticeships.

T-Levels

Introduced in 2020, T-Levels play an important part in aspirations for vocational qualifications in England. These two-year courses for people aged 16-18 were developed in collaboration with employers, to ensure that content reflects in-demand skills. Engineering UK has estimated there will need to be a minimum of 30,000, and up to 43,500, placements by 2024/2025 in the engineering and manufacturing sector alone to meet demand going forward. In a joint report with Make UK, they highlight multiple barriers to offering T-Level industry placements to young people. These include a lack of employer understanding of T-Levels and of information and support on offer, staff capacity, time commitments, and concerns about legal constraints.[24]

Bootcamps

Bootcamps form part of the Government's Plan for Jobs in partnership with employers, providers, and local authorities. Developed to help people increase skills in demand in their area, skills bootcamps are adaptable programmes lasting up to 16 weeks that build sector-specific skills and fast-track individuals to an interview with a local employer.[25] These free bootcamps are available to anyone 19 or older, and recent studies show employers felt they helped increase organisational diversity and supported them in recruiting underrepresented groups.[26]

Apprenticeships

Apprenticeships are a great opportunity not just for young people, but also for those looking to upskill. They enable employers to develop young people's skills to fill emerging roles and critical skills gaps. Although much of the income from the Apprenticeship Levy goes unspent and many industry stakeholders would like to loosen the restrictions and include shorter or more modular courses, the Institution of Engineering and Technology has called upon the Government and employers to increase their collective focus on apprenticeships as they are a quicker route to addressing staff shortages.

Degree Apprenticeships

They provide a pathway for individuals to combine work-based learning while working towards a recognised university degree. For STEM roles, this is particularly beneficial as students obtain work experience while their studies are enriched with practical skills. Apprenticeships can also tackle the gender imbalance in STEM subjects. In the first quarter of 2022/2023, 13% more women started STEM apprenticeships than the previous year.

The Lifelong Learning Entitlement (LLE)

The LLE is part of the Government's reforms to post-18 education and training, which aim to support more people to access high-quality courses that meet the skills needs of employers. The LLE, due to be rolled out in August 2025, will cover tuition fees for upskilling and reskilling.

It is necessary to ensure young people can get information on the full range of vocational and academic pathways into STEM roles, from long-established apprenticeships and A-Levels through to newer pathways such as T-Levels and degree apprenticeships. By doing so, those in early careers can often fill key operational roles and gain skills specific to the sector.

As STEM skills requirements are high and forecast to increase, reskilling existing employees to meet demand is also a beneficial route to take. Addressing this skills gap requires changes to recruitment strategies to make sure that no one is excluded from a career in STEM. Improving diversity in the STEM workforce will not only help to plug skills gaps but also create a more innovative sector.

> **Less than half of young people in the UK know about the apprenticeship options available to them.**

Immigration

Addressing the UK's current immigration policy plays a pivotal role in increasing STEM talent. Qualified overseas workers could mitigate the domestic skills gap and ensure the UK achieves its science superpower ambitions.

The House of Lords Science and Technology Committee believes that the Global Talent visa (which replaced the Tier 1 visa in 2020) is beneficial, but that its eligibility requirements are excessively stringent. Becoming a designated visa sponsor for skilled workers can be time-consuming and expensive for smaller businesses. The Committee encourages the UK to take a proactive, competitive approach to becoming a destination for top talent.[15]

The high demand for STEM staff, which is only expected to increase, means we cannot rely solely on overseas talent. Instead, businesses should seek out the UK's sizeable pool of homegrown talent via schools and universities, lifelong learning programmes, and improved diversity and inclusion practices.

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15. People and skills in UK STEM, Science and Technology Committee, 2022
16. More young people are taking STEM subjects than ever before, Gov UK, 2021
17. Overview of the education system (EAG 2022), UK
18. Levelling up engineering skills: widening opportunities for young people
19. Closing the Gap: Early Engagement is Critical in Solving the STEM Skills Shortage, 2020
20. Securing the future STEM careers provision in schools and colleges in England, 2021
21. People and skills in UK STEM, Science and Technology Committee, 2022
22. Levelling up engineering skills: widening opportunities for young people
23. Securing the future STEM careers provision in schools and colleges in England, 2021
24. Unlocking talent: ensuring T Levels deliver the workforce of the future, 2022
25. Skills Bootcamps: £34 million boost for free career training for adults, Gov UK, 2023
26. Evaluation of Skills Bootcamps: wave 2 implementation report, Gov UK, 2023

Diversity in STEM

Opportunities to gain the skills required by STEM employers are not equally distributed. Women, people from certain ethnic backgrounds, people with disabilities, those from disadvantaged socio-economic backgrounds, and those identifying as LGBTQ+ were underrepresented in some areas of STEM education, research, and employment.[27]

Lack of diversity is a significant barrier to increasing the STEM talent pool and has been raised by several industry bodies, including Engineering UK. It has also been a subject of recent inquiries by the All-Party Parliamentary Group (APPG) on *Diversity and Inclusion in Science, Technology, Engineering, and Maths (STEM)*,[28] and the Science and Technology Committee appointed by the House of Commons.[29]

Ethnicity

In terms of ethnicity, the share of ethnic minorities in the STEM workforce is similar to the wider UK workforce (12%). However, aggregated data skews the picture, so that it appears more ethnically diverse than it truly is. More granular data shows a greater representation of workers of Asian Indian ethnicity that masks the underrepresentation of Black workers, specifically Black women and Black-African men.

A recent report by the Science and Technology Committee[30] shows that children and young people from Caribbean backgrounds are clearly underrepresented in the study of STEM subjects in England at all levels of education. This translates into significant underrepresentation of these demographics in the STEM workforce.

Disability

People with disabilities also face a gap in representation between STEM workers and others, which is more prominent for women with disabilities than for men with disabilities. More than half of workers with disabilities in the broader workforce are women (59%), and in the STEM workforce, only one-third (33%) of workers with disabilities are women.

Socio-economic Status

Socio-economic status is not widely reported on by employers or the Office for National Statistics (ONS). However, socio-economic disadvantage has a clear impact, and where there is data, inequity is apparent. People from more privileged backgrounds are overrepresented in the life sciences workforce (Social Mobility Commission, 2021) and more **likely to achieve a managerial or professional position by age 30-39** (Engineering UK, 2021).

To find out more about regional differences, the All-Party Parliamentary Group on Diversity & Inclusion (D&I) in STEM will commission data mapping of skills inequity in the UK. This data analysis will highlight how skills provision varies across the UK and intersects with regional imbalances. It will identify the location-based barriers to STEM and examine links between minoritised communities and STEM access.[31]

Gender

In general, women are proportionally underrepresented in STEM. While women are more likely to progress to higher education, it has been reported that they are less likely to select subjects such as computer science, engineering, or maths.[32] They make up only 13% of computing A-Level students in England and 23% of physics. **According to Engineering UK, 115,000 more girls need to study maths or physics at A-Level to reach equal numbers of male and female students studying engineering and technology degrees.**[33] Consequently, young women are underrepresented in STEM university courses and the workforce.

Computer science and technology fields show the largest gender imbalances, from current students to graduates and the workforce. The share of women in the tech workforce is around half that of the entire labour market (28% vs 50%).[34] Despite progress being made, women are still widely underrepresented in IT professional and leadership roles.

> **The share of ethnic minorities in the STEM workforce is similar to the wider UK workforce (12%). However, aggregated data skews the picture, so that it appears more ethnically diverse than it truly is.**

Sources:

27. Diversity and inclusion in STEM, Science and Technology Committee, 2023
28. Inquiry into Equity in the STEM Workforce, APPG, 2021
29. Diversity and inclusion in STEM, Science and Technology Committee, 2023
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31. Regional STEM Skills Inequity, BSA, 2023
32. Why are we still stuck on inequality street?, 2022
33. Over 100,000 more girls need to study maths/physics A-levels to bridge gender gap, Wise
34. How to build a scale-up, Tech Nation, 2023

Similarly, **non-binary and transgender** individuals face challenges and underrepresentation in STEM fields. Research suggests that an increasing number of female and non-binary STEM students are experiencing imposter syndrome. Such barriers during education can, therefore, limit their opportunity to pursue STEM careers, underscoring the importance of creating inclusive and supportive environments throughout their professional journeys.[35]

Furthermore, the scarcity of tangible data surrounding the representation of **LGBTQ+** individuals in STEM is a cause for concern. Overall estimates suggest that LGBTQ+ people are roughly 20% less represented in STEM fields than expected. Also, LGBTQ+ people who are part of the STEM workforce report more negative workplace experiences than their non-LGBTQ+ counterparts.[36] Professor Giles Oldroyd of Cambridge University highlighted his own encounters with workplace bullying and discrimination and that a lack of representation 'facilitates a community that is conforming to a narrow sector of thinking', ultimately hindering innovation and potential scientific breakthroughs.[37] On 18 November each year, employers can celebrate the International Day of LGBTQ+ People in STEM, which provides an opportunity to amplify the voices of LGBTQ+ individuals within the STEM community and uplift diverse talents in the sector.

Black women are significantly underrepresented in the IT sector. The research by BCS, The Chartered Institute for IT, and Coding Black Females[38] found that Black women make up only 0.7% of IT professionals compared to 1.8% of the UK workforce. As many as 67% of the Coding Black Females network respondents felt they faced more barriers to entry into the tech industry than women from other ethnicities. Nearly a quarter (21%) believe that current diversity and inclusion policies have a negative effect on their ability to progress. If gender representation in IT was to match the female participation in the total workforce, there would have been an additional 486,000 female IT specialists in the UK.[39]

In the case of engineering professions, the proportion of female engineering workers has increased from 10.5% in 2010 to 16.5% in 2021. Although results vary by individual occupation and sector, women are likely to be in related – rather than core – engineering roles and working in industries outside of what is traditionally deemed to be 'engineering'.[40]

As noted by Women into Science and Engineering (WISE) CEO Kay Hussain, attracting and retaining more women in STEM is an economic imperative, not a 'nice to have'. Nina Lawrence from the Government Equalities Office spoke of how inequalities in the labour market must be addressed – by supporting people to return to work at levels that recognise their skills and experience. She argues that the pool of potential 'returners' to the labour market is hovering around the one million mark, and women make up nine out of ten potential returners in the UK. Around 75,000 of these are from a STEM background. It is vital to support people to return to work at levels that recognise their skills and experience.[41]

> **Attracting and retaining more women in STEM is an economic imperative, not a 'nice to have'.**
>
> – Kay Hussain, CEO (WISE)

Increasing female participation in the STEM Workforce

Improving the gender gap in the STEM industry requires addressing all key factors contributing to the underrepresentation of women in the sector, starting from education, through support, and into career progression, countermeasures against bias and discrimination, and female-friendly work benefits.

Education: Education plays a critical role in increasing women's participation in industries traditionally dominated by men. Inclusion needs to start earlier; introducing young girls to STEM programmes as early as primary school is essential. As girls and young women are being put off from a career in STEM by early misconceptions, it is important to bust negative stereotypes and highlight women working in the area to inspire the young female generation. A better understanding of STEM subjects and awareness of career pathways among girls are pressing priorities.

Progressive recruitment: While the lack of women in STEM starts at school age, employers can power positive change by hiring and retaining more women. Forward-looking changes to recruitment strategy, culture, and working practices can make a measurable difference.

Tackling gender bias: Bias against women should also be recognised and countered. The latest Women in Tech survey revealed that 76% of participants had experienced gender bias or discrimination in the workplace at least once.[42] This should be acted on through appropriate policies and training.

Sources:

35. An Increasing Number of Female and Non-binary STEM Students are Experiencing Imposter Syndrome, 2023
36. LGBTQ+ in STEM, 2021
37. Why a lack of diversity is 'unhealthy for science', 2023
38. Thousands of black women 'missing' from the IT industry, BCS, Oct 2022
39. Thousands of black women 'missing' from the IT industry, BCS, Oct 2022
40. Trends in the engineering workforce Between 2010 and 2021, Engineering UK, 2022
41. WISE Conference 2023: "Getting women into STEM is an economic imperative", March 2023
42. Women in Tech Survey, January 2023

Workplace benefits: Women want more flexible working opportunities to balance other life commitments. **63% of women working in tech consider flexible working to be a top benefit that would attract them to a job.**[44] This is followed by remote working and training. Women are more likely to consider roles when they receive female-friendly benefits, such as maternity leave, childcare, fertility treatment support, and programmes helping women return to work after a long absence.[45]

Gender pay gap: Employers should also be transparent about pay and work to narrow the gender pay gap. 74% of WISE's 2020 Women in STEM survey participants feel it is important to work for an organisation that reports its gender pay gap, and 68% rated working for an organisation where the gender pay gap is below the national average as important.[46]

Investment in upskilling: Undoubtedly, prioritising investment in STEM skills should be a focus for employers. Harnessing a culture of upskilling will not only benefit the wider industry's talent pool but also support business growth.

Collaboration: Collaborating with local universities and colleges is a beneficial place to start when looking to implement tangible change in the workplace. 86% of employers have said apprenticeships helped them develop skills relevant to their organisation, and 78% of employers said apprenticeships helped them improve productivity.[47]

Employers should offer clear career progression and enhance the visibility of female role models as part of their EVP strategy. Women are more likely to join a business if they see strong female role models, so visible representation at senior leadership level is essential. From 2019 to 2021, the number of women who said that a company's gender balance would influence whether they would accept a job offer rose from 54% to 67%.[43]

Sources:

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46. Women in STEM 2020 Survey, WISE
47. What are the benefits of hiring an apprentice?, Apprenticeships Gov UK

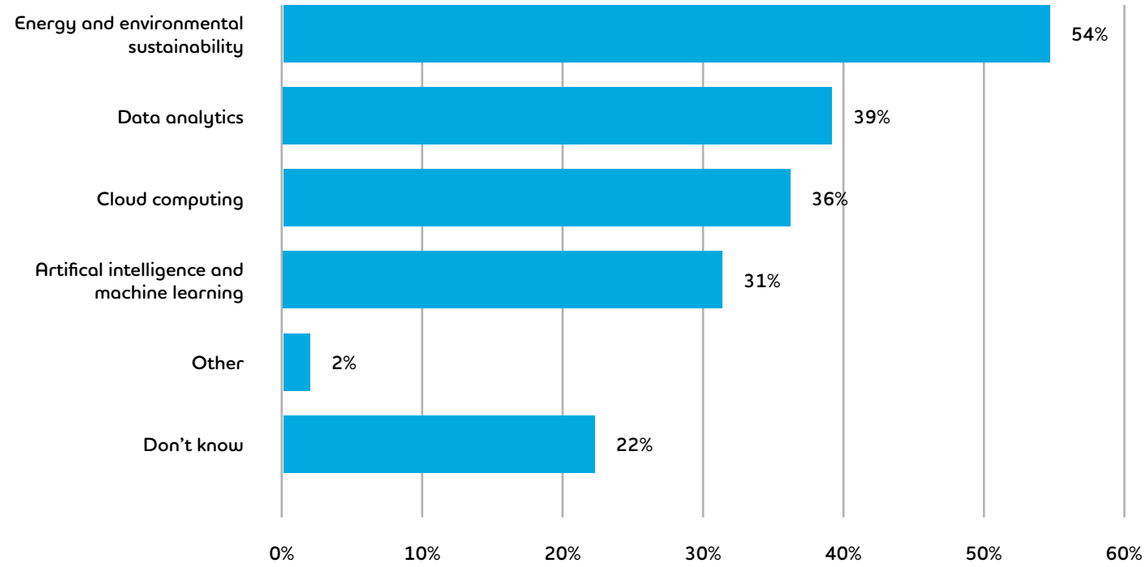
Conclusion

Closing the STEM skills gap requires a coalescent approach in which employers, educational institutions, and policymakers collaborate. Not only does the skills shortage hinder the growth and development of businesses, but economies and policies are also affected. Such shortages are particularly evident in sectors such as technology, pharmaceuticals, defence, aerospace, and engineering, which have been significantly accelerated by the shift to net-zero and digital transformations.

Additionally, promoting diversity and inclusion for underrepresented groups is a vital strategy to overcome shortages and foster a welcoming and inclusive work environment. Together, we must tackle the systemic shortages that hinder the UK's ability to keep up with this rapid pace of change. By investing in STEM education, creating inclusive and supportive policies, and fostering partnerships with industry, we can equip our workforce with the essential skills for success in the digital era.

Digital skills anticipated to be important in the next five years

Source: https://www.theiet.org/media/11064/skills-for-a-digital-future-survey.pdf



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