

Securing the future

STEM careers provision in schools and colleges in England



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June 2021

Thank you

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Foreword

The last year has been difficult for everyone. For young people, the pandemic and the lockdowns that came with it put a stop to their attending school or college and forced them to adjust to a whole new way of learning and life. For those leaving education, job and training prospects dwindled by the day. Apprenticeship numbers, for example, have fallen substantially, while youth unemployment has risen, with a recent LSE report highlighting that 16-25 year olds are twice as likely as older employees to have suffered job losses [1]. It is therefore not surprising that young people are concerned about their future and say that they are worried that finding a job or training opportunity has become more difficult [2].

At the same time, we know that the science, technology, engineering and maths (STEM) sector will offer hundreds of thousands of valuable opportunities for good quality, secure employment. With the government focus on developing the UK as a leader in science and net-zero and the policy of 'building back better', careers in STEM and engineering will be a reliable choice.

The challenge is how we make sure that young people know what they need to do to get into these careers and that more are inspired to do so. All young people, irrespective of their gender, ethnicity, socio-economic background or other characteristics, should be aware of and open to considering a career in STEM.

We must rise to this challenge with some urgency. This includes ensuring that all young people have access to good quality STEM careers provision throughout their schooling, and beyond. Good quality STEM careers provision connects young people with the world of work. It shows them that what they learn in their lessons will be useful and important in a job. It guides them through the maze of choices, nurtures their ambitions and offers hope at a time when they undoubtedly need it more than ever.

We at EngineeringUK, our partners on this report, and many others across our sector, are committed to working with young people to inspire more of them from more diverse backgrounds to become the engineers of the future. Collectively we offer many hundreds of activities to achieve this – at EngineeringUK, we contribute through the Big Bang Programme, Energy Quest and Robotics Challenge. However, the reality is that we will only ever be able to reach young people in schools and colleges that have the capacity and commitment to get involved.

There is no doubt that progress has been made in developing careers programmes in line with the Gatsby benchmarks and with the support of the Careers and Enterprise Company (CEC) and many hundreds of organisations and employers. However, some schools are struggling to deliver comprehensive careers support, including access to independent and professional advice, that works for all students.

Supporting young people in their careers choices is a win-win situation, as teachers and employers know. It motivates young people to learn and achieve more, enables them to progress into employment, and secures the future workforce needed for net-zero, economic growth and levelling up.

We must act now to ensure that schools are equipped and financially supported to deliver on careers.



Dr Hilary Leever
Chief Executive,
EngineeringUK





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1. Executive Summary

Careers policy is at a crossroads. The government’s 2017 Careers Strategy recently came to an end and the Skills for Jobs white paper, unveiled earlier this year, offers only limited insights into what the government wants to do next. What better time to take stock and examine the delivery of STEM careers provision through the lens of people who live and breathe it – careers leaders, teachers and other school staff involved in careers provision?

This report draws on findings from a survey of around 200 teachers and careers leaders in secondary schools and colleges in England¹ undertaken at the end of 2020 as well as on relevant literature and research on STEM and careers provision. Outlined below is an overview of the findings, observations and recommendations. Further detail with regards to the recommendations can be found in the final chapter.

Findings and observations	Recommendation
<p>Schools and colleges which took part in our research reported experiencing various challenges with delivering comprehensive careers provision to young people including limitations due to funding and time.</p> <p>For the government to succeed in making the UK a global science superpower it needs hundreds of thousands of home-grown scientists and engineers. For this to happen, young people need good STEM careers provision as much as they need good STEM teaching. This requires the government to have a clear vision laid out in a new strategy.</p>	<p>1. We ask the government to urgently publish a new careers strategy for England.</p>
<p>The commitment in the Skills for Jobs white paper to continue with the roll-out of careers hubs in England is welcome. However, the white paper is much less clear on timelines and the extent to which the network will be expanded.</p> <p>Our research suggests that schools and colleges in careers hub areas are faring better on certain aspects of STEM careers provision than those not in hubs. For example, among schools and colleges in careers hubs who completed the survey, 83% said they delivered work experience with STEM employers at least once in a typical academic year, 57% said the same of STEM ambassadors programmes and 80% said their pupils received at least one STEM employer encounter every year. This compares to 60%, 33%, and 53% respectively among schools and colleges not in careers hubs.</p>	<p>2. We ask that careers hubs are rapidly expanded to cover all secondary schools in England by mid-2022.</p>

¹Our survey findings reflect how schools and colleges in our sample responded and cannot be taken to be representative of all schools across England. Schools and colleges that participated in our research had higher scores on the Gatsby benchmarks and compass data reported by the Careers and Enterprise Company than the overall school average in England, suggesting that those who took part were better performing than average schools across England in terms of careers provision.

Findings and observations	Recommendation
<p>While the above data show that careers hubs are associated with more STEM employer engagement, they also show that a considerable minority of schools and colleges that are currently part of a careers hub have not been able to offer STEM employer encounters to their students.</p> <p>The main barriers to engaging with more STEM employers identified by respondents to the survey included limited capacity within their school (44%), limited funding for their careers programme (34%) and not knowing how to engage with STEM employers (24%). Several respondents suggested that enabling more shared learning between schools on STEM careers would be a useful way to increase insights and knowledge but time and cost constraints appear to be hampering efforts to do this.</p> <p>We therefore ask that each careers hub is given a new coordinator – a STEM leader – whose role it is to build schools’ capacity around STEM careers, support sharing and facilitate joint STEM careers activities with employers, including work experience. The cost for this is calculated at £3.5 million per annum² and is part of the wider investment package outlined in recommendation 4.</p>	<p>3. We recommend that there is a dedicated STEM leader within each careers hub.</p>
<p>46% of respondents to the survey said that ‘lack of funding for STEM careers provision’ affected their ability to deliver STEM careers provision.</p> <p>Some respondents specified financial barriers such as not being able to pay for travel to attend STEM events or kit for STEM clubs. Respondents also told us that funding pressures on schools have increased with the pandemic.</p> <p>We recommend an investment of</p> <ul style="list-style-type: none"> • around £30 million annually to ensure that schools are better resourced to support all young people with their careers choices • £3.5 million annually to pay for STEM leaders in careers hubs (see recommendation 3) • £10 million annually for a ‘STEM Diversity Fund’ <p>Additional funding would enable schools and colleges to address the financial barriers hindering greater participation by students in STEM careers activities and support efforts to address some of the additional challenges by schools with more young people from groups who are under-represented in the STEM workforce³.</p>	<p>4. We recommend that government provide additional funding in the region of £40 million annually to support careers activities in schools.</p>



² This is based on an assumption that there will be around 70 careers hubs in England in the future and that STEM leaders would demand a salary of £50,000 including on costs.

³ Groups who are under-represented in the STEM workforce include those from lower socioeconomic backgrounds, disabled people and those with Special Educational Needs, and those from certain ethnic minority groups. In certain sub-sectors such as engineering, women are also vastly under-represented

Covid-19 has fundamentally changed the learning environment and is likely to have a long-term impact on how learning is delivered. Schools have tried to embrace the opportunities that come with the rapid acceleration of digital learning. However, our survey suggests that digital access continues to be a barrier for many disadvantaged students.

When asked how the Covid-19 pandemic had caused challenges for careers provision, almost half of the respondents cited a lack of technology or internet access as a barrier. The issue was particularly concerning in schools and colleges with high proportions of pupils eligible for free school meals (FSM). 68% of schools with above average FSM said this was a barrier, compared to 36% of schools with below average FSM.

A digital learning strategy should focus attention on addressing the digital divide in this country and look at how schools and colleges are supported to integrate a digital approach, including for work experience and other employer engagement activities. We believe that in the long run this could also help to address the current patchiness of STEM careers provision in schools.

5. We ask that the government urgently develops a fully funded digital learning strategy for schools.

Among schools and colleges which took part in our survey, 70% of respondents said that lack of staff time was a barrier to delivering STEM careers provision.

STEM careers provision is currently delivered in various ways across schools and colleges in England. Some schools appear to offer STEM careers provision mainly as an extracurricular activity, with participation being optional and for a small group of pupils rather than available to all. Some schools highlighted the potential issues associated with offering 'opt-in' STEM careers activities, which tends to attract those pupils with an existing interest in STEM. One of our case studies illustrates an example where participation in STEM careers activities is directly linked to subject choice (e.g. STEM careers activities are targeted at those taking triple-science at GCSE).

This raises questions about whether the approach used by some schools and colleges, taken against the backdrop of a lack of funding and pressures on time, may be reinforcing perceptions about the kinds of pupils likely to succeed at STEM and unintentionally exclude those who might benefit the most from STEM careers activities. It also raises questions around equality of access to such initiatives.

All young people should get the opportunity to be inspired by what a career in STEM, including engineering, can offer. This could be achieved by including STEM careers as an explicit 'item' in the STEM curriculum, giving teachers time to bring STEM employers and ambassadors into the classroom, making it a core activity. Finland, a country that is performing well in international PISA studies, offers careers provision as part of its core teaching programme.

6. We ask that the government embeds careers into the subject content of the STEM curriculum and ensures that it highlights the diverse range of roles and people in science and engineering.

26% of respondents indicated that staff not being knowledgeable enough about STEM careers was a barrier to their school's ability to deliver STEM careers provision. This resonates with previous research by EngineeringUK, which found that only 30% of STEM secondary school teachers surveyed reported they knew quite a lot or a lot about what engineers do and only 45% felt confident giving careers advice in engineering [3].

That lack of knowledge risks careers leaders and teachers falling back on narrow and stereotypical perceptions of engineering, including pre-conceived ideas about which pupils are suited to careers in STEM.

Teachers, including careers leaders, need to be equipped and supported to bring real-world context into the classroom, and STEM subject teachers need to be knowledgeable in what a modern STEM career looks like.

7. We ask that teacher training and continuous professional development includes information and training on STEM careers, including careers in modern engineering.





2. Introduction

This report is the second in a series exploring the importance of careers provision in the context of encouraging more and more diverse young people into engineering as a career. Whereas the first report – ‘Our careers, our future’ [4] – focused on young people and their experiences of receiving careers provision, this report explores how well schools and colleges feel able and equipped to deliver that provision, and in particular what they can, or struggle to, offer in terms of insights into STEM careers.

The UK has long-standing skills gaps in areas of STEM, especially engineering, and a lack of diversity in associated industries. Even during these uncertain times business leaders still report skills shortages [5]. New challenges such as how to deliver on the government’s ambitions around net-zero are high on employers’ agendas. With that come concerns that we do not have enough, or a diverse enough, group of young people coming into engineering. Schools and colleges play a vital role in addressing this skills shortage and lack of diversity, including through the careers support they provide. Under the government’s careers strategy published in 2017 all secondary schools and colleges in England have to provide their pupils with insights into the world of work, and the strategy and associated guidance were clear that young people should have the opportunity to learn about careers in STEM.

With a review of the careers strategy on the horizon in the context of the government’s white paper Skills for Jobs [6], it is now vital to understand how well schools are able to provide this support. We need to understand what more government could and should do to ensure that schools can offer young people the insights into the opportunities that a career in STEM, and engineering specifically, presents and help address the diversity challenges in the sector. Young people have been dramatically affected

by the pandemic with their education disrupted and unemployment among young people rising sharply over the last year. That is why careers provision is more important than ever and not just a ‘nice to have’.

This report puts forward a series of recommendations for the government to consider. In light of the government’s ambitions on net-zero, R & D investment, infrastructure, building back better as well as levelling up we urge the government to take these recommendations forward to ensure that the UK has the talented young engineers and STEM professionals that will support the UK’s growth and prosperity in a post-pandemic, post-Brexit world.





3. Methodology

Research approach

The findings used in this report are based primarily on EngineeringUK's 'STEM careers provision survey', in field from 30 November 2020 to 24 January 2021. The survey was designed by the EngineeringUK research team with input from our research partners.

Quantitative

The survey was open to careers leaders⁴ and school staff working on careers provision in English secondary schools and colleges (including independent schools) and disseminated through a variety of channels, including various networks of EngineeringUK, Sprint Education – an educational market research agency – and other partners. EngineeringUK also collated publicly available contact details from school websites and, using this information, directly invited careers leaders to participate in the survey.

Numbers of responses to each question ranged from 138 (excluding open text questions) to 205, with 179 respondents overall completing the survey start to finish. To make best use of the data collected, any survey response providing answers to the first set of substantive questions in the questionnaire was considered to be valid. Surveys without a response to a given question were treated as missing during analysis of that particular question.

Where two or more contacts from the same school have responded, one of these respondents was excluded from the analysis, so that results from each school have equal weight and the data was analysed at a school level.

See **Appendix II** for the role and school types of survey respondents.

Qualitative

Survey respondents were also given the option of participating in a follow-up qualitative interview with EngineeringUK to discuss the issues raised in the survey.

Qualitative research took place between 8 and 19 February 2021 with 5 careers leaders and teachers from secondary schools and colleges in England. The interviewees were chosen based on thematic analysis of open-text responses from the survey and in line with predetermined policy themes.

Summaries of interviews are included in this report to contextualise the quantitative findings. We have also included quotes from open text responses to the survey where relevant.

Other insights

The report also refers to external research and a series of policy workshops we undertook with our partners on this project for evidence.

Limitations

Our survey findings reflect how schools and colleges in our sample responded and cannot be taken to be representative of all schools across England. Schools and colleges that participated in our research were more likely to be achieving the Gatsby benchmarks, than average schools across England [7], suggesting that those who took part were better performing than average schools across England in terms of careers provision.

For example:

- 83% of the schools in our sample were achieving Gatsby Benchmark 2 (learning from career and labour market information), compared to 56% of all schools in England
- 90% of schools in our sample achieved Gatsby benchmark 5 (encounters with employers and employees), compared to 62% of all schools in England

The fact that the schools that engaged in our survey tended to be more engaged in both general and STEM-specific careers provision than English schools overall suggests that the challenges noted in this report may be even more acutely felt than are reported.

Nevertheless, caution should be taken in drawing conclusions about the national population of schools from our results due to the lack of representativeness and relatively small sample size, especially when comparing subgroups.

Differences between subgroups have been included in this report only if they were found to be statistically significant. To determine whether results were statistically significant, we examined 95% confidence intervals based on the mean scores for indicators and conducted chi-squared tests (based on 95% significance).

Unless otherwise stated, statistics provided in this report exclude respondents who selected 'I don't know' or were missing in the data in question.

⁴ Careers leaders are based in schools. The role of the careers leader is to plan and implement a strategy for developing a careers programme for the school that meets all eight of the Gatsby benchmarks of good practice and prepares young people for the choices and transitions in education, training and employment.



4. Context

Careers Strategy England

At the end of 2017, the government launched its new careers strategy in recognition of long-standing inadequate careers provision across England. The careers strategy focused on promoting high quality technical education and improving knowledge of where different qualifications can lead, supporting the vision of the UK's industrial strategy.

The strategy acknowledged that careers advice had, for some time, been unevenly distributed across the country, hindering opportunities for some groups to gain insights into different careers options. Its aim was to make Britain a fairer place and promote social mobility by ensuring that everyone, regardless of background, has the opportunity to build a rewarding career. It also promised to assess the breadth and effectiveness of current careers provision in schools and colleges on STEM and test new approaches if necessary.

Careers and Enterprise Company

The strategy provided a central role to the Careers and Enterprise Company (CEC), tasking it with coordinating support for schools and colleges across all the Gatsby benchmarks. In its action plan the government stated that the CEC would be responsible for a new £5 million investment fund for the most disadvantaged pupils, support the development of careers hubs and triple the number of cornerstone employers committing to work with schools and colleges.

The Gatsby benchmarks

There are eight Gatsby benchmarks covering all aspects of careers provision and the strategy made it clear that all schools and colleges will be asked to meet these standards. To support this, the government published statutory guidance providing examples of how schools can approach this task, and ensure they provide the best support to their pupils in choosing a career. STEM is mentioned in some sections of the statutory guidance, yet absent in others.⁵

Careers hubs

Careers hubs were first stipulated in the careers strategy and associated guidance and have over the last three years become central to the way careers provision is delivered in England. There are 20 to 40 secondary schools and colleges in each hub, within a specific Local Enterprise Partnership (LEP) area. They work together to deliver the Gatsby benchmarks. Careers hubs have access to some funding, including bursaries for schools and colleges to

train careers leaders and a central hub fund equivalent to £1k per education provider. They also each have a hub lead to help coordinate activities.

There are currently careers hubs across 32 LEP areas around the country covering around 2,000 secondary schools, or 45% of all secondary schools in the state sector in England [8] [9].

National Careers Service

Another central pillar of the 2017 Careers Strategy is the National Careers Service, which is aimed at adults and provides careers information via a website, which provides users with the opportunity to explore careers, find courses and assess their skills. In addition the service offers access to local advice from a National Careers Service adviser, with more bespoke advice and support available when needed.

In light of the pandemic, the government recently announced an additional £32 million funding to increase the capacity of the National Careers Service for two years [10].

Skills for Jobs white paper

With the 2017 Careers Strategy officially coming to an end at the end of 2020, the government said that it would use the further education white paper as the vehicle to outline its plans for careers provision in England going forward. The Skills for Jobs white paper was finally published at the end of January 2021 and includes a section entitled 'clear and trusted information, advice and guidance for careers and education choices.' In this section, the government promises the following actions:

- Ofsted will undertake a thematic review of careers guidance in schools and colleges and provide recommendations to improve practice.
- The DfE will continue to extend coverage of careers hubs across England and use the Enterprise Adviser Network to connect business volunteers with schools, colleges, special schools and alternative provision.

⁵ See **Appendix I** for overview of Gatsby benchmarks.

- The DfE will invest in more high-quality training for careers leaders.
- There will be a new three-point-plan to enforce the Baker Clause⁶ with tougher formal action against non-compliance.
- The DfE will lower the age range of the duty on schools to provide independent careers guidance, requiring schools to offer this support from year seven.
- Guidance will be published setting out what is expected of secondary schools and colleges as a requirement for funding.
- DfE will equip the teaching profession to support a whole-school or college approach to careers education by building careers awareness into every stage of their professional development, from initial training to education leadership.

While certain elements of the proposals were welcomed by those working in the careers sector, concerns were raised that the careers section in the white paper is not ambitious enough given the current environment. It provides no information about the funding that will be made available for careers provision in schools, nor does it provide any timelines for delivery and there is no detail about STEM specific careers provision and the government's plans to improve this across all secondary education.



⁶ The Baker Clause (Technical and Further Education Act 2017) stipulates that schools must allow colleges and training providers access to every student in years 8- 13 to discuss non-academic routes that are available to them.

Why careers provision?

The economic argument

There is extensive evidence which finds that career guidance can be effective in supporting young people in their education, in making transitions and in achieving long term success in their lives [11]. There is also evidence which shows that not only does good career guidance support individuals to achieve better salaries and greater financial stability, it also supports economic policy goals, contributing to both the effective functioning of the labour market and to increased returns for the exchequer [12]. 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 [13]. The recent evaluation of the Gatsby benchmarks supports many of these findings from the wider literature in relation to the model of school career provision that is proposed in this report [14], a model which has been taken up in the careers hubs approach that has been rolled out by the CEC and positively evaluated. [15].

The importance of STEM careers provision for engineering

Improving the overall knowledge of engineering, what careers it offers and the pay you can expect, among young people 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 [16]. 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 career in engineering [17].

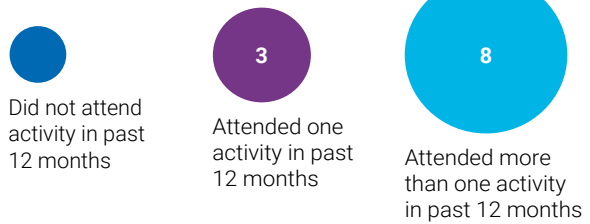
Furthermore, the number of STEM activities attended made a difference. Those who had attended two or more STEM activities were 8 times more likely than those who hadn't attended any to know about what people working in engineering did, and those who had attended just one, were three times more likely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

Associations between attending STEM careers activities, and knowledge and consideration of engineering careers

Knowledge (1)



Knowledge (2)



Consideration



Source: Engineering Brand Monitor 2019. Pupils in the UK aged between 11 and 19.

Q - How much do you know about what people working in the following areas do? Engineering. Responses on a 5 point Likert scale with 1 representing 'know almost nothing', and 5 representing 'know a lot'.

Q - Would you consider a career in engineering? Response options 'yes' and 'no'

Chart displays the output from three logistic regression models, using the two questions above as outcome variables. The associations were between attending STEM careers activities and knowledge and consideration of engineering.



5. Careers provision in schools and colleges – what we have learned



EngineeringUK's recent survey with schools and colleges was aimed at understanding how secondary education providers are currently delivering STEM careers provision to pupils, and the challenges and opportunities facing schools in doing so. We were keen to explore the impact of Covid-19 and we wanted to understand what schools think needs to be done to ensure that all young people in England can and do access careers provision, including provision focused around STEM.

1. The impact of Covid-19

Findings and discussion

Covid-19 has had a profound impact on STEM careers provision in schools and colleges. Schools and colleges have found it much more difficult to engage with employers because of the pandemic and many told us that they put careers activities on hold. Our research also raises serious concerns about the equality implications for young people who do not have access to the digital devices, quiet space to learn or adequate internet connectivity needed to participate in online STEM careers activities.

Pandemic pressure

Our survey shows that the pandemic has in many ways stopped the clock when it comes to careers provision in schools and colleges. While schools were already struggling to deliver STEM careers activities due to time and funding pressures before the pandemic, our evidence suggests that Covid-19 has amplified these problems. When asked how, if at all, the Covid-19 pandemic has caused challenges for careers provision at their school, **91% of respondents said 'lack of opportunity to organise in-person visits' and 86% selected 'lack of opportunities to organise work experience'. A further 76% told us that it had become 'more difficult to engage with employers'.**

Respondents to our survey also talked about the many challenges facing schools as they shift priorities including trying to catch up on lost curriculum learning and rebuilding pupil confidence, all whilst operating in a way that is Covid-safe for pupils and staff. All this comes at a time when careers advice and guidance are critical in helping concerned young people navigate a volatile and ever-changing labour market.

“We're trying to do all these things, but the problem is because of Covid lots of planned events have been paused nationally. We were just getting to the stage where we were starting to build it [STEM careers provision] and there was the pause, which is quite sad but understandable.”

Careers leader, East Midlands



The digital divide

It is clear that over the last year schools have tried to embrace the opportunities that came with the rapid acceleration of digital learning. Respondents to our survey talked about the chance to offer careers sessions to more pupils, opportunities to work with employers further afield and instances of greater involvement from parents. At the same time, our findings echo evidence from the Sutton Trust [18] and others, which suggest digital access continues to be a barrier for many disadvantaged pupils.

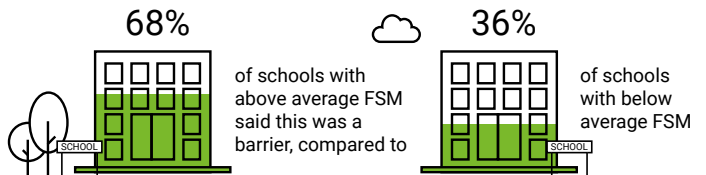
“Outreach from organisations that may have offered in-person activities is limited, and availability of projects that could be completed and submitted is limited, as well as becoming more difficult to do if students are working from home. However, the virtual Big Bang event was accessed by more students than would have been if we had actually attended the event in person.”

STEM teacher, South West

When asked to select from a list of challenges to their careers provision caused by Covid-19, **49% of respondents said that pupils not being able to access online or virtual careers provision due to lack of technology or internet at home was a barrier.** Strikingly, schools with a higher percentage of pupils eligible for free school meals (FSM) were more likely to say that a lack of technology or internet at home was a barrier to pupils participating in careers provision. **68% of schools with above average FSM⁷ said this was a barrier, compared to 36% of schools with below average FSM.**

The digital divide and access to careers provision during the pandemic

Not being able to access online or virtual careers provision due to lack of technology or internet at home was a barrier.



The importance of face-to-face engagement

As pupils, teachers and parents start to work through the longer-term implications of increased digital learning, the ability to use face-to-face careers activities mixed with remote engagement will be important. Respondents were keen to highlight in the open-text responses the value of face-to-face careers support and encounters with employers. Many felt strongly that remote engagement should not be a substitute for in-person learning, highlighting the disadvantages of remote encounters for those students who find it challenging to learn online. Research with schools commissioned by the Gatsby Charitable Foundation [19] also highlighted a similar finding. It stated that “many respondents mentioned the perceived difficulties of ‘engaging’ with young people over the telephone or through Teams or similar, emphasising that ‘face-to-face’ contact is essential”.

“We have tried as best we can to provide virtual alternatives, but they do not replace face to face, so we adapted as best as we can.”

Careers leader, Yorkshire and the Humber

⁷By ‘above average FSM’ we mean the average proportion of pupils eligible for FSM in schools within our sample, as opposed to the national average.

Why does this matter?

Young people are concerned about the future. A survey conducted by EngineeringUK in the summer of 2020 [20] showed that 62% of young people surveyed agreed or strongly agreed that finding a job in the future has become more difficult since the pandemic. Among 15 to 19 year olds who were asked the question, there was also concern that going to university or becoming an apprentice would become more difficult as a result of the pandemic (with 52% and 41%, respectively, agreeing or strongly agreeing with these statements). Recent evidence from The Prince's Trust [21] and BBC Children in Need [22] show these fears persist, with young people fearful about their career prospects within an ever more competitive labour market.

The STEM sector is able to offer young people opportunities and secure jobs but the current challenges to careers provision in schools as, identified in this chapter, risks leaving some young people behind as they will lack the knowledge and insight into what a career in STEM, and specifically engineering, can offer and how they can access them. This in turn will have implications on the numbers and diversity of those able to join the STEM and engineering sectors.

While long periods of lockdown have brought into sharper focus the immediate digital inequalities relating to home-working, digital inclusion is nevertheless likely to be an enduring challenge which requires long-term policy solutions. We remain concerned that without action now, wider issues of inequality of access to careers provision will be compounded. For policy makers considering the future of digital learning, there needs to be a clear vision setting out a path for schools combined with a package of financial and practical support to tackle digital poverty among pupils.

“There is potentially a generation of children missing vital pathways to careers they deserve to be aiming for.”

Head of STEM subject, West Midlands

Case Study - Diane

Careers leader at a non-selective, state funded secondary school, 1,300-1,400 pupils, East Midlands.

In September, Diane's school hired a STEM lead practitioner, who would collaborate on delivering STEM careers provision. However, their plans came to a halt due to Covid-19. Even though many careers activities have been cancelled, Diane continues to promote information, resources, and virtual events through weekly newsletters. She points out that it is challenging to keep up with the number of resources now available. It can be hard to know how to relay information efficiently to teachers, students and parents without overwhelming them. Diane also recognises that many students only use phones and do not have access to laptops or computers. In other cases, young people's ability to take part in careers activities is limited as they share one device between various members of their family.

Overall, funding can be a barrier in offering STEM careers provision at Diane's school. Careers provision is reduced as pupils from different years cannot mix. Workshops have also been converted into classrooms to accommodate Covid-19 restrictions. These aspects have been prioritised to run a school safely and for students to access virtual lessons when at home. Despite these challenges, Diane has recently seen that younger students are accessing more careers resources compared to pupils in later years. She finds this encouraging and is hoping to maintain the momentum and interest throughout students' educational pathway.

In her experience, Diane has noticed that students who perform well at school tend to be more interested and engaged in STEM careers activities. However, students with special educational needs and disabilities (SEND) and those receiving pupil premium tend to lack confidence in their own abilities. She thinks this belief can be reinforced when students see that higher performing pupils are those who get more involved in STEM.

To support student participation in STEM careers activities, Diane's school is looking into offering opportunities targeted to pupils who might need it most and girls. Staff try to address stereotypes related to gender bias, encouraging girls to pursue subjects and careers related to engineering or the motor industry. During parent evenings, Diane also asks parents to be supportive of their children's STEM interest at home. She thinks this is important as she sees that parents' limited knowledge of STEM can also affect students' engagement with these subjects.

2. Time

Many careers leaders and teachers lack the time needed to deliver STEM careers provision in schools and colleges. Indeed, lack of staff time was the most common barrier identified by respondents to our survey. Our research suggests that many schools offer careers provision as an ‘extra-curricular’ activity to be fitted in outside of lessons where possible. For this reason, careers activities (including STEM careers engagement) can sometimes get squeezed out of the school timetable. Our evidence also indicates insufficient time is a key barrier in careers leaders’ efforts to engage with local STEM employers.

“Time, time and more time”

70% of respondents to our survey said that lack of staff time was a barrier to delivering careers provision.

This should raise alarm bells with policy makers. Our research suggests that there are a range of factors at play. For example, in our open text survey responses some respondents highlighted challenges in staff giving up the time to run STEM careers activities due to competing demands – a problem that appears to have worsened since the pandemic. Some participants also highlighted the need for more time to be made available for STEM careers activities within the school week, including lesson time.

“Curriculum pressures and being unable to organise face to face careers activities internally or externally are the biggest challenges we currently face.”

Careers leader, North East

Finding the time to deliver STEM careers provision

Insights from our survey suggest that for a variety of reasons many schools and colleges offer STEM careers education as an extra-curricular activity with participation being optional and for a small group of pupils rather than available to all. Some schools and colleges taking part in our research highlighted the potential issues associated with offering ‘opt-in’ STEM careers activities, which can tend to attract those pupils with an existing interest in STEM. One of our case studies also illustrates an example of where participation in STEM careers activities is directly linked to subject choice (e.g. STEM careers activities are targeted at those taking triple-science at GCSE).

“[We] need more curriculum time, as pupils [are] reluctant to attend sessions in their free time. They also leave decision-making too late.”

STEM teacher and careers leader, Yorkshire and the Humber

While we acknowledge that our research is based on a small sample of schools, both of these models raise questions about equality of access. These issues have also been highlighted by the Aspires project (UCL) which concludes that “self-referral models of careers education provision” exacerbate inequalities [23].

“It is very difficult to find enough staff who are willing to give up their free time (lunchtimes, after school) to offer STEM clubs etc).”

STEM teacher and careers leader, North West

Forging relationships with local employers

Time also seems to play a part in whether or not schools are able to engage with STEM employers in their area. When asked **what barriers prevent their school from engaging with more STEM employers, the most common response – with 44% of respondents indicating it to be the case – was ‘not enough capacity within my school’**. Employer engagement is a vital element of careers provision, enabling young people to make the link between what they learn and the world of work. Schools lacking the time to engage with employers in a meaningful way risks young people missing out on getting exposure to new and emerging roles in, for example, net-zero, engineering and the tech sector.

Why does this matter?

The way STEM careers provision is currently delivered in schools and colleges has an impact on what kind of pupils are accessing this provision, including STEM clubs and inspiration events. Often, it seems, such activities are only accessible to pupils who already have an interest in STEM or are considered to be 'brainy' rather than those pupils who haven't yet made up their mind or just don't know about careers in STEM.

We believe that this needs to change to ensure that all young people, whatever their gender, ethnicity, socio-economic background or any other characteristic, and whatever their prior knowledge or interest, get the opportunity to find out what a career in the STEM sector can offer. We believe that this can be done by making careers an integral part of the STEM curriculum.

Finland – international example [24]

- Careers education is a compulsory element of the curriculum.
- It comprises around 76 hours of scheduled "careers ed" activities in the students' timetables during the equivalent of years 7-9.
- There is an entitlement for individual and group guidance together with compulsory work experience periods.
- For younger children in Finland (grades 1-6/primary school), careers guidance is embedded within the classroom.
- Strong involvement from employers and industry.

Case Study - Matt

STEM subject teacher and STEAM coordinator⁸ at a non-selective, state funded secondary school, 1,500-1,600 pupils, East of England.

Matt's school has strong links with a range of local employers who provide support on STEM projects, especially those requiring specialised skills beyond teachers' knowledge. In addition, the school offers several STEM related extra-curricular clubs and supports students in accessing an engineering scholarship. However, Matt highlights that lack of funding is a major challenge in delivering any larger or longer-term STEM projects. He has applied for many grants, but as a teacher he finds the process can be discouraging and time-consuming. He has also noticed that some companies or grants are not flexible on the dates when initiatives can be delivered. This can be a big limitation for schools with other activities already set in the school timetable, such as mock exams.

Time limitations are another challenge for STEM careers provision at Matt's school. There is not much time available for anything that is not included in the curriculum. Students can access careers support during their tutor time, but tutors come from a variety of disciplines. Their knowledge of STEM can be limited, or they may lack the confidence or experience to deliver sessions on these subjects. Further, STEM clubs are run after school, are optional for students and are unpaid work for teachers.

In his experience, Matt has noticed that after school STEM clubs tend to attract students who are already enthusiastic about these subjects. Stereotypes of the type of students who are interested in STEM can be a challenge in trying to engage more pupils in STEM activities. Matt thinks that sparking interest in these subjects at a younger age could help identify students who are curious about STEM. These students could then be better supported in exploring various pathways in later stages of their education. He notes that this is especially important for subjects like engineering which is not typically offered at GCSEs.

Matt had started planning for more engaging STEM activities with the support of the STEM ambassador scheme and other external providers. However, due to Covid-19, these plans have been cancelled. The school is not able to host any external visitors and none of the after-school clubs are running. Matt has adapted to delivering remote STEM activities, but he is concerned that students are not getting enough practical and hands on experiences. Encouragingly, Matt has noticed that many teachers are sharing ideas and resources on STEM activities. In the past, he has found a teacher network a helpful forum for sharing what works and for boosting his confidence. However, he highlights how this is extra work for teachers. It all comes down to the goodwill of individual teachers as there is no additional funding to support them.

⁸STEAM stands for Science, Technology, Engineering, Arts and Maths, a grouping that captures the idea that STEM concepts need to be better integrated with the arts across the wider curriculum.

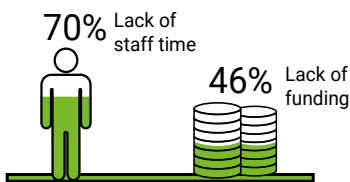
3. Funding

A lack of funding at school level is preventing school leaders and teachers from properly embedding STEM careers into their plans. Competing pressures mean that in many cases STEM careers activities only take place once a year, at most. Participants in our research highlighted various financial barriers, from not being able to afford pupil travel costs for employer visits, to difficulties paying for teacher cover to attend careers fairs with pupils. On a brighter note, our findings seem to indicate that where targeted government investment has taken place, in the form of careers hubs, it appears to be having a positive impact.

Funding pressures

46% of respondents to our survey said that 'lack of funding for STEM careers provision' was a barrier. This was the second most common barrier selected after 'lack of staff time' (70%). Respondents to our survey repeatedly mentioned funding as a barrier to delivering careers provision, and our research found that funding in schools and the time available to teachers and careers leaders are inextricably linked.

Most common barriers to delivering careers provision



Indeed, those who said that 'lack of staff time' was a barrier were 2.3 times more likely to also say 'lack of funding' was a barrier, compared with those who did not say that lack of staff time was a barrier.

A number of the schools and colleges taking part in our research also cited the challenges of not having a dedicated staff member to scope out, plan and organise STEM careers activities, including opportunities for careers activities with employers.

Financial barriers

Financial barriers cited by some respondents ranged from schools and colleges not wanting to pass on travel costs to pupils through to lack of funds to pay for the kit needed to run STEM clubs. Some schools touched on the fact that external STEM careers engagement often came with a price tag, making it harder to justify to senior colleagues. It seems that cost implications factor heavily in decision-making at schools and colleges. As referred to earlier in this report, schools also told us about the additional financial pressures brought about by the pandemic.

The value of investment – careers hubs

Our evidence confirms previous research showing that where government investment has taken place, in the form of careers hubs, it is making a tangible difference on certain aspects of STEM careers provision. For example, among schools and colleges who completed the survey, **83% of those in careers hubs said they delivered work experience with STEM employers at least once in a typical academic year and 57% said the same of STEM ambassadors programmes. 80% of these respondents also said their pupils received at least one employer encounter every year with STEM employers. This compares to 60%, 33%, and 53% respectively among schools and colleges not in careers hubs.** Careers hubs seem to offer a valuable place-based partnership approach which in turn can also facilitate greater involvement of STEM employers in local school and college careers activities.

“Lack of funding and resources for STEM activities means that we are only able to hold larger projects, or projects that come with a cost, once a year.”

STEM teacher, London



Why does this matter?

Developments in the national infrastructure for careers in England over the last five years have played an important role in supporting schools to connect with employers and helping to establish the role of careers leaders in schools. However, the policy aspirations of the careers strategy were not matched with a dedicated careers budgets for schools.

Even before the pandemic, academics and others were warning of the patchiness of careers provision, with funding playing a key part in that, and highlighting the consequences for young people. The ASPIRES research project [25], for example, indicated that 'careers education provision in England is not just 'patchy', but 'patterned' – with those students who might benefit most from high quality, supportive careers education and support being the least likely to receive it.' An inquiry by the APPG on Diversity and Inclusion in STEM also reported [26] that 'the present availability of good careers education is patchy, inadequate or provided too late, and this is exacerbating inequity'.



4. Employer Engagement

Too many schools and colleges lack the time, funding and practical support needed to engage with local employers. Only a third of respondents to our survey said that pupils at their school or college had at least one experience of a workplace every year with a STEM employer. This needs to change. All pupils should have the chance to hear from and meet those working in STEM careers. Given the impact the pandemic has had on youth employment, it is crucial that young people are exposed to the wide breadth of future STEM career pathways – from green jobs through to digital, health-tech and sustainable food.

Barriers to employer engagement

Our research found that while **90% of survey respondents said their pupils have at least one employer encounter every year, only 71% said the same when asked about STEM employers, and 64% when asked about engineering employers.**

Similarly, **55% of respondents said their pupils had an experience of a workplace with any employer compared to just 33% with STEM employers and 30% with engineering employers.**

Based on our survey findings, **the main barriers relating to engaging with more STEM employers were: 'Not enough capacity within my school' (44%) and 'not enough funding allocated to careers programmes' (34%).** Interestingly, about a quarter (24%) of respondents said they did not know how to go about engaging with STEM employers. Our research findings also suggest that Covid-19, including the economic fallout, has had a role to play – with some schools and colleges finding it more difficult to establish relationships with employers in the current climate.

Building local business links

Our research highlights a range of reasons why schools and colleges are struggling to engage with STEM employers. Alongside capacity and funding issues, some respondents told us that they simply tried but failed to identify the right person to talk to in local STEM firms. They also told us that Covid-19 had made it more challenging to generate interest from STEM companies, many of whom have had to put their school engagement and wider talent related efforts on hold. In fact, **when asked about any challenges to careers provision caused by Covid-19, 76% of respondents said it was 'more difficult to engage with employers'.**

When given the option to further elaborate in the open-text responses, schools and colleges told us how the move to more digital employer engagement, accelerated by the pandemic, presented both challenges and opportunities. For example, while online careers encounters have the potential to involve more pupils, it can be logistically challenging to slot them into the school day at a time which suits both teachers and employers. They can also require additional planning and preparation such as refreshing safeguarding training and policies or adapting careers materials for digital use. This can be seen as an unwanted pressure on time for firms who were already struggling to justify spending time on school engagement.

“Trying to get STEM employers to come in is difficult and we struggle to get them in even for careers fairs once a year.”

Careers leader, North West

Our findings chime with those of SQW [27] who conducted a recent evaluation of the Enterprise Adviser Network on behalf of the CEC. They reported fundamental challenges in connecting schools and colleges to businesses, which were largely centred around time constraints and competing priorities within schools, colleges and businesses. The evaluation concluded that the impact of Covid-19 has led to additional pressures and highlighted issues around different working cultures and practices as well and the challenges posed by the varying levels of business leader availability in different geographies.

Why does this matter?

As highlighted by the APPG on Diversity and Inclusion in STEM 'direct experience of the workplace by young people can play an important role in changing perceptions and raising aspirations around STEM but more and better opportunities are needed'. We also know from other research (for example, evidence from a study conducted by Education and Employers), that encounters with the world of work can have a positive effect on young people – changing attitudes and quantifiably improving academic achievement [28].

Bridging the gap between schools, local employers and FE providers could make an important contribution to the government's ambitions to 'build, back, better' ensuring local talent pipelines whilst also supporting the goals of the Skills for Jobs white paper. According to a recent survey by the Institution of Engineering and Technology [29], 93%

of engineering companies in the UK with a sustainability strategy say they do not have the skills needed to fulfil it. Among engineering employers currently experiencing a skills gap or limitations in their internal workforce, engineering skills is where they are seeing the greatest skills gap, with one in two (53%) reporting this.

With more time and funding, schools and colleges would be better resourced to tailor their careers programmes to reflect the local labour market and more likely to engage with Local Skills Improvement Plans.⁹ In turn, young people would be more equipped to navigate their careers options and capitalise on new and emerging engineering roles in sectors such as net-zero.

Case Study - Maria

Careers leader, subject teacher and timetabler at a non-selective state funded school, 900-1,000 pupils, South West.

Maria is the sole member of the careers department at her academy, which did not have a careers programme before she took over the role. She is an electromechanical engineer by trade, with past work experience in the sector and as a vice principal at a FE college. To deliver STEM careers provision, she relies on her own knowledge and support from her network of friends who work in STEM related fields. Within the academy, STEM departments are supportive and understand the importance of careers provision. Some subject teachers even held job positions in STEM related fields before becoming educators. Maria believes that it is their enthusiasm for careers that really is helpful for delivering engaging STEM activities. The academy is also supporting that need to push STEM careers by appointing a STEM coordinator.

Considering the high number of local STEM employers, Maria thinks her academy should be in a good position to deliver STEM careers provision. However, she would like to be able to involve more of these employers throughout the careers programme. For example, the academy runs both science and technology after-school clubs delivered by teachers. Maria notes that engaging STEM employers in these activities would be helpful to improve the quality of the clubs. In her past work experience, she has seen how successful it can be to work with employers on STEM projects. Maria believes that when students interact with STEM employers, they are more likely to see the relevance of the subjects they are studying. However, she is aware that employers also have time constraints which can limit their engagement.

Maria has tried to involve students in external STEM activities or competitions, but a major challenge she faces is the logistical costs. She knows that her Local Authority does have a STEM Ambassador and she does receive emails from the CEC highlighting available careers activities. However, it is difficult to manage the logistics for these initiatives, for example, the cost of transport and the costs of covering the teaching staff.

Due to the pandemic, Maria's school is not able to deliver its usual career programme. Careers provision is also limited as academic work has become a higher priority. However, recently Maria has had more time to research and access online careers resources. She notes that a way to improve the quality of STEM careers provision could be through having access to a central resource bank. This platform could signpost to various websites, specifying what information is available and most relevant based on the level of careers provision in a school.

⁹Local Skills Improvement Plans are one of the key commitments within the Skills for Jobs white paper. They will bring together employers, colleges and other providers, and local stakeholders – improving links and providing a clear articulation of skills needs in an area, based on local labour market information. They build on the work of Skills Advisory Panels.

5. Training and knowledge

Careers in science and engineering are continuously changing and evolving. This is why careers leaders and teachers need access to regular careers training and up to date labour market information if they are to talk confidently about new and emerging STEM jobs. Our qualitative insights suggest that while some careers leaders and teachers are accessing STEM careers training and information, more could be done to widen this offer throughout careers, including both initial teacher training (ITT) and ongoing professional development of STEM teachers.

Talking with confidence

Previous research by EngineeringUK (Engineering Brand Monitor 2019) [30] found that only 30% of STEM secondary school teachers surveyed reported they knew quite a lot or a lot about what engineers do and only 45% of teachers felt confident giving careers advice in engineering. There is a risk that careers leaders and teachers who only have a limited knowledge of STEM careers fall back on narrow perceptions of engineering, including pre-conceived ideas about which pupils are most likely to pursue careers in STEM.

The ambitions within the Skills for Jobs white paper provide a good opportunity to provide a wrap-around continuous profession development (CPD) and training offer to careers leaders and teachers. Better and more training will help teachers and careers leaders to address stereotypes around engineering and to make the link between classroom learning and real-world employment pathways for young people.

Gaining 'real-world' insights

One of the discussion points emerging from our policy workshops was the importance of careers leaders and teachers having regular interaction with businesses through for example STEM work placements or encounters. While this is happening in some cases, **24% of respondents to our survey said, 'I don't know how to engage STEM employers for careers provision'** when asked about the barriers preventing their school from engaging with more STEM employers. With this in mind it is clear that a significant proportion of careers leaders and teachers need practical support in bridging the gap between their school or college and employers in the local community.

Given the rapidly changing labour market and emergence of new roles within science and engineering, it is important that staff delivering STEM careers provision are fully equipped to describe and answer questions on the types of roles available in net-zero and tech, sustainable food or artificial intelligence. Ongoing training and CPD provides a good opportunity for careers leaders and teachers to brush up on their knowledge of the labour market, which in turn helps to ensure that young people get to hear about the breadth of different careers available in STEM.

Accessing information and sharing learning

Our evidence suggests that too many careers leaders and STEM teachers struggle to navigate the array of STEM outreach resources available and that 'it can be difficult to know what [providers] offer' (respondent). We asked respondents to elaborate on any additional resources, information or training for staff to help their school in delivering STEM careers provision. While a majority of schools delivered careers and labour market information, the responses to this question indicated mixed knowledge about how to search for it most effectively. In terms of resources, some respondents highlighted the need for more information on current or future opportunities in STEM, suggesting that short virtual presentations, videos by employers or STEM posters and leaflets could be helpful. Some also suggested that enabling more shared learning between schools on STEM careers would be a useful way to increase insights and knowledge. Time and cost constraints appear to be hampering efforts to share STEM careers knowledge, but several respondents proposed having a dedicated STEM lead for each area, which in turn could bring cost savings and efficiencies in the longer term.

“There is a general lack of accessible information i.e. a lot that is available is too complicated for the students and is a turn off! The opportunities are vast but we need information in small bite size chunks and fun quizzes, games and activities.”

Careers leader, South East

Why does this matter?

As careers leaders establish their roles within schools and colleges it is important that they, as well as teachers, have a broad understanding of the diversity of roles within science and engineering. This will enable them to break down stereotypes and misconceptions. In light of this, it is important that there is sustained investment in training and professional development for careers leaders as this will further develop the role and increase the capability and careers knowledge of those in post.

Not all careers leaders have had access to training through the CEC and we would like to see this as a given. We would also like to see STEM careers play a stronger part within the Early Career Framework so that all teachers, not just STEM teachers, are knowledgeable of what a career in STEM industries can offer to their students. The aspirations around teacher training and CPD in the Skills for Jobs white paper provide a good springboard to make this a reality.



6. Diversity and inclusion

The way STEM careers provision is currently delivered risks narrowing careers pathways for certain groups of young people. Respondents to our survey cited a variety of barriers to accessing STEM careers provision in schools for young people from groups currently under-represented in STEM sectors. These include the lack of visible role models in STEM, stereotypes of who works in STEM or a limited understanding of what STEM careers could entail. While the approach used by schools and colleges varies, our research suggests that many schools and colleges require pupils to opt into STEM careers activities while others focus on encouraging pupils already interested in STEM to take part. This raises questions about equality of access that need to be explored further.

Barriers to reaching young people from diverse backgrounds

Role models

When asked about barriers affecting participation in STEM careers provision for certain groups of pupils currently under-represented in STEM¹⁰ a lack of visible role models was highlighted by many respondents to be an issue. Indeed, **this was the most frequently cited barrier for girls (at 46% respondents) and pupils from minority ethnic backgrounds (38%). 38% of respondents also reported a lack of role models to be a barrier for pupils with special educational needs and disabilities (SEND) and a third said the same for pupils from lower socioeconomic backgrounds.**

Linked to this, stereotypes of the kind of people who work in STEM were considered to also be an issue, with 45% of respondents raising this, for example, in the context of girls. Some of those we spoke to highlighted the fact that pupils tend to think of careers in the context of their direct experience, including jobs held by close family members and friends. In cases where a pupil has never met a scientist or an engineer, STEM employer encounters become all the more important in helping to address issues of low 'science capital' and dispelling myths about what it is like to work in STEM.

Understanding of STEM careers

A limited understanding of what STEM careers could entail ranked in the top 5 barriers for all groups, with **more than two in five respondents perceiving this to be the case for pupils from lower socioeconomic backgrounds (45%) or with SEND (44%) and just over a third for girls or boys from minority ethnic backgrounds (34% respectively).**

Confidence and encouragement

A lack of confidence in their abilities to pursue relevant pathways into STEM careers was commonly cited by respondents as a barrier to participation in STEM careers provision for certain groups. **Almost half of all respondents (48%) said that this was the case for young people with SEND, 46% said this in relation to young people from lower socio-economic backgrounds and 39% about girls.** Similarly, respondents also indicated that a lack of encouragement and support at home was a barrier to participation in STEM careers provision in schools and colleges, with for example more than half of the respondents saying this in relation to young people from lower socio-economic backgrounds (54%), and 31% for young people with SEND.

Lack of awareness of STEM careers provision available

It was clear that respondents also felt more could be done to promote STEM careers provision to diverse groups, **with a lack of awareness of what was available featuring in the top five reported barriers to the participation of pupils with SEND (38%), from lower socioeconomic backgrounds (37%), or minority ethnic backgrounds (30%).**

¹⁰ Groups who are under-represented in the STEM workforce include: those from lower socioeconomic backgrounds; disabled people and those with Special Educational Needs; those from certain ethnic minority groups. In certain sub-sectors such as engineering, women are also vastly under-represented.

Unique barriers

Although a number of barriers were felt to be challenges to the participation of girls, pupils with SEND, or those from lower socioeconomic or minority ethnic backgrounds alike, respondents also identified particular challenges for certain groups. For example, **39% reported the perceived cost of pursuing pathways into STEM careers to be a barrier for pupils from lower socioeconomic backgrounds taking up related careers provision opportunities, and a similar proportion noted perceived difficulties in physical accessibility of STEM careers to be a barrier for those with SEND (38%). At the same time, 36% of those responding also felt a lack of interest in STEM careers to be a barrier for girls.**

“It really makes a difference if students can meet people like them who are doing STEM jobs.”

Careers advisor, London

Widening participation and starting earlier

When asked their opinion on how STEM careers provision could be made more inclusive, participants' responses were varied. However, most suggestions from respondents related to promoting a diverse representation of who works in STEM at events, in careers resources or subject curriculum, as well as diverse pathways into and roles within STEM fields. Nearly one fifth of the responses specifically mentioned engaging with role models, with some schools and colleges indicating the importance for pupils to see and hear from role models that they can relate to and connect with.

A recent study published by Teach First [31] found that the curriculum and supporting teaching resources often focus too heavily on male role models, perpetuating unhelpful stereotypes around STEM careers. For example, in a sample analysis of three Double Award GCSE specifications from the major exam board, a total of two female scientists were named compared to over 40 male scientists or concepts or materials named after them.

Some also felt that it was important to draw on speakers from a wide range of experiences and show different routes into engineering in their employer encounters, including technical pathways such as apprenticeships. Furthermore, respondents felt that the STEM careers activities should take place earlier in pupils' schooling as pupils form their views about careers at a young age. This is in line with previous research highlighting the importance of acting early in STEM education [32]. Others also reported the need to embed careers education within the curriculum so that all young people have opportunities to participate and learn about the broad range of jobs within STEM.

Why does this matter?

STEM professions and in particular the engineering sector have long struggled to increase the diversity of their workforce and are therefore missing out on the important insights that people with different lived experiences can bring to a profession. At the same time, women, people from some ethnic minority groups, disabled people and those from lower socio-economic backgrounds miss out on the opportunities of well-paid, sustainable jobs in this sector. To ensure that the UK can fill its skills gaps and truly level up, all young people need to be able to think that a career in STEM could be for them and be able to access those careers. This will require all young people being given the opportunity to be inspired by the idea of working in STEM. Worryingly, current approaches to how STEM careers provision is delivered in schools and colleges seem to focus on pupils already interested in STEM subjects rather than reaching out to all pupils. More needs to be done to support young people who are typically not engaged. Young people must be offered insights and mentors they can relate to.





6. Securing the future – recommendations

Careers provision must not be an afterthought.

We need a new cohesive and ambitious government vision for careers provision in schools, with the funding to make it happen. Without this, we risk limiting STEM employment opportunities for young people at a time when the UK needs scientists, technicians, technologists and engineers more than ever.

Apart from the wider economic benefits, careers education, advice, and guidance can make huge differences on an individual level too by giving people from all backgrounds the opportunity to reach their full potential and dispelling myths about what STEM jobs entail.

We call on the government to urgently address the issues identified in our report – giving schools the time, funding and support needed to deliver effective STEM careers provision. Given the need for accelerated advancements in areas such as health-tech, infrastructure, transport, net-zero and digital technology, the government needs to move quickly and invest in careers provision before it's too late.

Recommendation 1

We ask the government to urgently publish a new careers strategy for England.

The previous careers strategy has come to an end and the Skills for Jobs white paper offers only limited insights into what the government wants to do next to support careers provision in schools and colleges. We believe that an ambitious new careers strategy that builds on the previous strategy and the Gatsby benchmarks is urgently needed not only to take account of the changing school environment during and after the pandemic but also to address the apparent lack of comprehensive STEM careers provision in many of the schools and colleges we have heard from. For the government to succeed in making the UK a global science superpower and achieve its ambitions around net-zero, it needs many home-grown scientists, technicians, technologists and engineers from a diverse range of backgrounds. For this to happen, young people need good STEM careers provision as much as they need good STEM teaching.

We also ask that this strategy is accompanied by statutory guidance to schools as soon as possible to avoid careers provision being sidelined in the flurry of school catch-up activities, and we urge government to link the new strategy in with a greater focus on workforce planning, so as to ensure that the demand and supply side are closely interlinked.

Recommendation 2

We ask that careers hubs are rapidly expanded to cover all secondary schools in England by mid-2022.

In its Skills for Jobs white paper the government outlined its commitment to continue with rolling out careers hubs in England. This has been welcome news as our research and that of others has shown that careers hubs can make a real difference in how schools and colleges engage with careers provision. Our own survey has revealed that schools that are currently in a careers hub are more likely to engage with employers and programmes such as the STEM Ambassadors programme.

However, the white paper is much less clear on the timelines and the extent to which it hopes to expand the network and how it is funded, and this is why we are calling on the government to provide a clear timeline confirming rollout of careers hubs to all schools and colleges in England by mid-2022, support the CEC in this effort and make a public commitment to fully fund the roll-out.

Recommendation 3

We recommend that there is a dedicated STEM leader within each careers hub.

Respondents from schools and colleges in careers hubs were more likely than those not in these areas to offer to their pupils at least one encounter with STEM employers every year (80% and 53% respectively). However, while this finding is encouraging, it also shows that a considerable minority of schools and colleges in careers hubs have not been able to offer STEM employer encounters.

The main barriers for working with employers identified by respondents included limited capacity within their school (44%), limited funding for their careers programme (34%) and not knowing how to engage with STEM employers for careers provision (24%). Several respondents to our survey suggested that enabling more shared learning between schools on STEM careers would be a useful way to increase insights and knowledge, but time and cost constraints appear to be hampering efforts to do this.

We therefore ask that each careers hub is given a new coordinator – a STEM leader – whose role it is to build up the capacity of schools and colleges around STEM careers and facilitate joint STEM careers activities with employers, including work experience. This would help to alleviate some of the time constraints and barriers to employer engagement highlighted in our research and help with bringing currently under-represented employers, such as engineering employers, into schools. STEM leaders would have a pivotal role in supporting strategic efforts across a careers hub to improve STEM careers provision in schools, as well as in enabling schools to engage with College Business Centres and Local Skills Improvement Plans as proposed in the Skills for Jobs white paper.

The cost for this is calculated at £3.5 million per annum and is part of the wider investment package outlined in **recommendation 4**.

Recommendation 4

We recommend that government provide additional funding in the region of £40 million annually to support careers activities in schools.

Our survey, as well as other research [33], has highlighted that careers provision in schools is underfunded, limiting what schools can offer to young people in a time when they need guidance, insights and inspiration more than ever. As a result of the pandemic, young people are more than ever at risk of becoming NEET¹¹ and therefore need information about the options available to them in a fast-changing labour market.

The government has already acknowledged that young people leaving school and job seekers over the age of 18 will require more careers advice and support over the coming years. It has therefore committed to an additional £32 million for the National Careers Service over the next two years.

We now ask that the government also invest more in careers provision in schools to ensure that young people have the knowledge to navigate the pathways into a variety of roles and careers giving them the opportunity, for example, to better understand what a career in STEM has to offer and how to get there. **We recommend an investment of about £30 million annually, an average of £8k per secondary school or college, to ensure that schools are better resourced to support all young people with their careers choices.**

In addition to this additional general funding, we ask that the government fill the funding gap that has been identified by this report and others particularly in relation to STEM, and invest an additional:

- **£3.5 million annually to pay for STEM leaders in careers hubs¹² (see recommendation 3)**
- **£10 million annually for a 'STEM Diversity Fund' for careers provision activities.**

It is envisaged that this fund would be held by careers hubs and administered and distributed to schools by the new STEM leaders. This funding should be predominantly made available to schools with more young people from groups who are under-represented in the STEM workforce enabling them to address some of the additional challenges that such schools may face and to support the greater diversification of the STEM, and in particular, the engineering workforce. The funding would help schools broaden their offer and enable them to buy in further resources as required. We believe that this would also help address some of the patchiness in provision that our survey identified.

Careers provision can act as a great leveller for many young people, who otherwise would not be able, or know how, to access the information that supports them with deciding what career path is right for them, as a recent UCAS report confirms [34]. Ensuring, therefore, that schools have the capacity to fulfil their statutory duties in a meaningful way is vital for the future of young people as well as the economic success of this country and its citizens. STEM careers provision specifically will ensure that young people are inspired to move into and know about careers in what is likely to be a growing sector in the UK, ensuring that the UK has the necessary workforce to make its ambitions around net-zero and 'building back better' a success.



¹¹NEET stands for Not in Education, Employment or Training.

¹²This is based on an assumption that there will be around 70 careers hubs in England in the future and that STEM leaders would demand a salary of £50,000 including on costs.

Recommendation 5

We ask that the government urgently develops a fully funded digital learning strategy for schools.

Covid-19 has fundamentally changed the learning environment for the foreseeable future and is likely to have a long-term impact on how learning will be delivered. According to our survey, it has also had a huge impact on the ability of schools and colleges to deliver careers provision, with just under half of the respondents highlighting issues with accessing virtual careers provision for young people due to a lack of technology available to students.

There are many things to be learned from the pandemic and it is vital that the government now strategically plans for how young people will be able to continue to access learning and careers provision going forward.

As our survey and work by others such as the Sutton Trust have highlighted, the digital divide in this country and the challenges that exist in overcoming it are vast, with government policy needing to catch up and set a long-term vision. The focus of this digital learning strategy must be on closing the digital divide in the first instance to ensure that certain groups of young people are not left behind. Then it must look at how schools are supported to integrate a digital approach into their school offer, with the view that it will in the long-run also help overcome the current patchiness of STEM careers provision in schools amongst other things.

Recommendation 6

We ask that the government embeds careers into the subject content of the STEM curriculum and ensures that it highlights the diverse range of roles and people in science and engineering.

We believe that in order to ensure that all young people get the opportunity to be inspired by what a career in STEM, including engineering, can offer, STEM employers and ambassadors need to be brought into the classroom, ensuring a focus on representation from diverse groups and different careers paths. Our survey has highlighted the importance attributed to role models in inspiring young people from a diverse background to go into engineering and more widely into STEM careers. This will ensure that any young person, whatever their background, gender or ethnicity will be able to see what a career in STEM could look like for them, have the opportunity to be inspired and become informed about how to get there.

STEM careers provision is currently often seen as an extracurricular activity fitted in during lunchtimes or after school where time and resources allow it. Introducing STEM careers into the curriculum will provide subject teachers with the opportunity to connect classroom learning to the real world of work and give them the time to do so more easily.

Not necessarily highlighted by this survey, but borne out by other research, we think that this should be applied to the STEM curriculum from year 7 to ensure that pupils get exposure from a young age. In fact, we would ask the government to explore in their new careers strategy how primary schools could be brought into its fold.

Recommendation 7

We ask that teacher training and continuous professional development includes information and training on STEM careers, including careers in modern engineering.

In light of the call for a STEM curriculum review we support the ambition in the Skills for Jobs white paper to equip the teaching profession to support a whole-school or college approach to careers education by building careers awareness into every stage of their professional development, from initial training to education leadership. Ensuring that teachers know how to link careers provision to teaching will enable them to link more easily the world of learning to the world of work.

In order for teachers to be able to fully integrate careers into their teaching they need to be equipped and supported to bring real world-context into the classroom, and STEM subject teachers need to be knowledgeable in what a modern STEM career looks like. Previous research by EngineeringUK [35], shows that many teachers lack confidence when answering questions from pupils about STEM careers. We also know that engineering roles are continuously evolving and changing in areas like net-zero.

With this in mind, we would like all careers leaders have access to training through the CEC, something that currently is not the case. We would also like to see STEM careers play a stronger part within the Early Career Framework so that all teachers, not just STEM subject teachers, can have a broad understanding of the diversity of roles within science and engineering, which in turn will help to break down stereotypes and misconceptions. The aspirations around teacher training and CPD in the Skills for Jobs white paper provide a good springboard to make this a reality.

Furthermore, it is important that all subject teachers and careers leaders regularly update their STEM careers knowledge and skills as part of the proposed plans within the Skills for Jobs white paper. Better training and support but also opportunities for 'employer encounters' for teachers and careers leaders themselves can help with this, ensuring that teachers and careers leaders are up to date during times of rapidly changing labour market needs. While there are already a number of resources available to support teachers, more needs to be done to ensure they engage.

Take home messages for the STEM and engineering sector

Addressing the fact that many schools still find it difficult to engage with employers and find information about careers in STEM will not only require government to act on the recommendations in this report but will also demand action by the STEM outreach community and STEM employers. The survey clearly highlighted a number of take-home messages.

We urge STEM employers and those who fund, design and/or deliver STEM outreach to:

- **Ensure that STEM mentors and volunteers going into schools and colleges are from a diverse background and relatable to young people's own experiences, and that they understand how to engage with young people.**
- **Commit to outreach activities delivered in schools being of good quality, for example meeting the Neon¹³ quality standards, and where appropriate offer such activities via the Neon platform to confirm that commitment.**
- **Collaborate to enable teachers and careers leaders to easily find and access digital resources showcasing careers in STEM and in particular modern engineering by utilising existing platforms such as Neon and other established channels such as STEM Learning's e-library.**
- **Sign up to the Tomorrow's Engineers Code¹⁴ and thereby commit to work towards common goals to increase the diversity and number of young people entering engineering careers.**
- **Commit to restart the delivery of face-to-face STEM activities alongside any digital offers once the public health situation allows.**

[Neon](#) is a virtual platform that brings together the UK's best engineering experiences and inspiring careers resources and stories to help teachers bring STEM to life with real world examples of engineering.

The [Tomorrow's Engineers Code](#) is a commitment to work toward common goals to increase the diversity and number of young people entering engineering careers.

To achieve these goals, Signatories make four pledges about their approach to funding, designing, delivering, and learning from engineering-inspiration activities (including STEM programmes dedicated to inspiring young people into engineering).

Signatories form the Code Community which is made up of engineering firms, professional institutions, government departments, subject associations, universities, museums, third sector organisations and more.

¹³ Neon is a project organised and run by EngineeringUK, working in partnership with the engineering community.

¹⁴ Co-created by and for the engineering community, The Code is 'owned' by its [community of Signatories and Supporters](#). An [Advisory Board](#) and informal [Thinking Group](#) support EngineeringUK, which has been chosen to manage and deliver The Code and its community.

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Appendix I

Gatsby benchmarks		
1. A stable careers programme	Every college should have an embedded programme of career education and guidance that is known and understood by learners, parents, teachers, employers and other agencies.	<ul style="list-style-type: none"> • Every college should have a stable, structured careers programme that has the explicit backing of the senior management team, and has an identified and appropriately trained person responsible for it. • The careers programme should be published on the college's website in a way that enables learners, parents, college staff and employers to access and understand it. • The programme should be regularly evaluated with feedback from learners, parents, college staff and employers as part of the evaluation process.
2. Learning from career and labour market information	Every learner, and their parents (where appropriate), should have access to good quality information about future study options and labour market opportunities. They will need the support of an informed adviser to make best use of available information.	<ul style="list-style-type: none"> • During their study programme all learners should access and use information about career paths and the labour market to inform their own decisions on study options. • Parents should be encouraged to access and use information about labour markets and future study options to inform their support to the learners in their care.
3. Addressing the needs of each student	Learners have different career guidance needs at different stages. Opportunities for advice and support need to be tailored to the needs of each learner. A college's careers programme should embed equality and diversity considerations throughout.	<ul style="list-style-type: none"> • A college's careers programme should actively seek to challenge stereotypical thinking and raise aspirations. • Colleges should keep systematic records of the individual advice given to each learner, and subsequent agreed decisions. • The records of advice given should be integrated with those given at the previous stage of the learner's education (including their secondary school) where these are made available. Records should begin to be kept from the first point of contact or from the point of transition. • All learners should have access to these records to support their career development. Colleges should collect and maintain accurate data for each learner on their education, training or employment destinations
4. Linking curriculum learning to careers	All subject staff should link curriculum learning with careers, even on courses that are not specifically occupation-led. For example, STEM subject staff should highlight the relevance of STEM subjects for a wide range of future career paths. Study programmes should also reflect the importance of maths and English as a key expectation from employers.	<ul style="list-style-type: none"> • Throughout their programme of study (and by the end of their course) every learner should have had the opportunity to experience how their subjects help people gain entry to (and be more effective workers within) a wide range of occupations.

Gatsby Benchmarks

5. Encounters with employers and employees	<p>Every learner should have multiple opportunities to learn from employers about work, employment and the skills that are valued in the workplace. This can be through a range of enrichment activities including visiting speakers, mentoring and enterprise schemes, and should include learners' own part time employment where it exists.</p>	<ul style="list-style-type: none"> • Every year, alongside their study programme, learners should participate in at least two meaningful encounters* with an employer. At least one encounter should be delivered through their curriculum area. • Colleges should record and take account of learners' own parttime employment and the influence this has had on their development. <p>*A 'meaningful encounter' is one in which the learner has an opportunity to learn about what work is like or what it takes to be successful in the workplace.</p>
6. Experiences of workplaces	<p>Every learner should have first-hand experiences of the workplace through work visits, work shadowing and/ or work experience to help their exploration of career opportunities, and expand their networks.</p>	<ul style="list-style-type: none"> • By the end of their study programme, every learner should have had at least one experience of a workplace, additional to any part-time jobs they may have.
7. Encounters with further and higher education	<p>All learners should understand the full range of learning opportunities that are available to them. This includes both academic and vocational routes and learning in schools, colleges, universities and in the workplace.</p>	<ul style="list-style-type: none"> • By the end of their programme of study, every learner should have had a meaningful encounter* with a range of providers of learning and training that may form the next stage of their career. This should include, as appropriate, further education colleges, higher education and apprenticeship and training providers. This should include the opportunity to meet both staff and learners. <p>*A 'meaningful encounter' is one in which the learner has an opportunity to explore what it is like to learn in that environment.</p>
8. Personal guidance	<p>Every learner should have opportunities for guidance interviews with a career adviser, who could be internal (a member of college staff) or external, provided they are trained to an appropriate level*. These should be available for all learners whenever significant study or career choices are being made. They should be expected for all learners but should be timed to meet individual needs.</p> <p>* The college should ensure that access to a level 6 adviser is available when needed.</p>	<ul style="list-style-type: none"> • Every learner should have at least one such interview by the end of their study programme.

Source: Department for Education, Careers guidance and access for education and training providers: Statutory guidance for governing bodies, school leaders and school staff, October 2018

Appendix II

TABLE 1 – RESPONDENT ROLE

Role at school	Percentage of responses	Number of responses
Careers leader	45%	92
Careers advisor	25%	52
Subject teacher – STEM	24%	50
Careers co-ordinator	17%	34
Senior leadership (non-headteacher)	13%	27
Other (please specify)	13%	27
Head of subject – STEM	11%	22
Work-related learning co-ordinator	8%	16
Subject teacher – Non-STEM	7%	14
Careers administrator	6%	12
Head of subject – Non-STEM	4%	8
Headteacher	1%	2
	Answered	205

Note: Figures presented in this table are based on respondents who answered the first substantial survey question. We excluded any responses that failed to reach the question 'which of the following statements apply to your school?'. However, there was attrition throughout the survey so base numbers for each question fluctuate between 138 and 205 (excluding open text questions).

TABLE 2 – RESPONDENT SCHOOL TYPE

School type	Percentage of responses	Number of responses
Non-selective state-funded school (including academies, multi-academy trusts, free schools and University Technology Colleges)	71%	145
Private/independent school	10%	20
Grammar school	6%	13
SEND/special school	4%	9
General further education college	3%	7
Other (please specify)	3%	6
Sixth form college	2%	5
	Answered	205

Note: Figures presented in this table are based on respondents who answered the first substantial survey question. We excluded any responses that failed to reach the question 'which of the following statements apply to your school?'. However, there was attrition throughout the survey so base numbers for each question fluctuate between 138 and 205 (excluding open text questions).

Who we are

Established in 2001, EngineeringUK is a not-for-profit organisation, funded predominantly via the professional registration fees of individual engineers, as well as the support of a range of businesses, trusts and foundations, and a corporate membership scheme. Our ambition is to inform and inspire young people and grow the number and diversity of tomorrow's engineers.

We work locally, regionally and nationally with a wide range of organisations across business and industry, education, professional institutions and the third sector to understand the engineering skills required by engineering companies and in the wider economy, and work in partnership to develop and promote effective initiatives to inspire young people to consider a career in engineering.

www.engineeringuk.com

Driven by data

We base everything we do on evidence and we share our analysis and insight widely.

For more than 20 years, we've published a comprehensive report on the state of engineering in the UK – providing a detailed examination of engineering's economic contribution and the composition of its workforce, as well as the extent to which the supply through the education and training pipeline is likely to meet future needs and demand for engineering skills.

Our interactive Engineering Insights dashboards allows you to explore research and data on issues important to the engineering sector and the Engineering Brand Monitor establishes the national benchmark for public perceptions of engineers and engineering.

We evaluate all our activity to help ensure our engagements with young people have as much impact as possible. It is through this evaluation that we have identified the degree to which we are winning hearts and changing minds through our programmes, with positive impacts on young people's understanding of engineering, perceptions of a career in it, and the extent to which they view engineering as a career for both boys and girls. And we have learnt that if young people meet an engineer and know they have done so, they come away with higher levels of knowledge of what people working in engineering do and higher levels of perceived desirability of engineering careers.

