

# Getting the message across

Top tips for delivering engineering activities



# Engineering outreach is crucial to inspiring the next generation of engineers, providing opportunities for young people to take part in hands-on activities and experience the world of engineering.

In this guide, you will find top tips for planning and delivering impactful activities that inspire as many students as possible with positive messages about careers in engineering.

The information contained in this guide can provide a useful starting point when planning, delivering and evaluating a session and is intended to enhance, rather

than replace, existing knowledge and guidance. The best outreach happens when a relatable STEM role model or ambassador uses their unique skillset and personality to bring a session to life through their own experiences of the world of work, so above all, be yourself!



## Why do we need to encourage more students to become engineers?

# 203,000

people with Level 3+ engineering skills will be needed every year to meet demand through to 2024



Engineering makes a significant contribution to the economy, to employment and to society. However, the demand for engineers outstrips supply and more needs to be done to showcase the range of exciting and meaningful career opportunities available in 21st century engineering. We need more young people to understand the importance of continuing to study maths, science, D&T, computing and the subjects they'll need to pursue a STEM (science, technology, engineering and maths) career.

**Engineers transform the way we live. Their work cuts across every conceivable area, from renewable energy and medical technology to disaster response and space exploration. It is our job to nurture the engineers of the future and show young people that through a career in engineering they could change the course of history and have an impact on a global scale.**

*Eleanor Eyre  
Head of Careers, EngineeringUK*



## Embedding careers inspiration and information

**Fantastic activities (including talks, presentations, hands-on workshops, demonstrations, challenges, shows and fairs) can be made even more impactful by putting careers inspiration and information at the heart of the session, in an age-appropriate way.**

The Gatsby careers benchmarks in England and the DYW Career Education Standard in Scotland give schools a framework for providing students with the best possible careers guidance. You can support career related learning by providing a real-world context for students' classroom learning, which is invaluable to the school, who may also want to understand how aspects of your work link to the curriculum.

Engineering is a career that may be unfamiliar to students, with many never having had the chance to study it at school. Making links

between the skills involved in the subjects they do study – such as maths, science, D&T, computing, geography, art and languages – and exciting job roles in engineering, can really help students realise the value of these subjects for the future and switch them on to the idea of a career in engineering.

Before starting the session, ask students to come up with examples of engineering from the world around them, then check back in at the end of the session to see how their understanding has changed. Students could draw, write or call out their suggestions.

### **CASE STUDY: Seewomen**

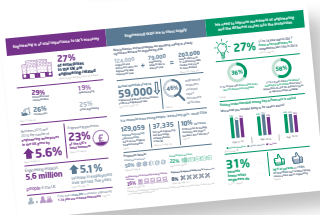
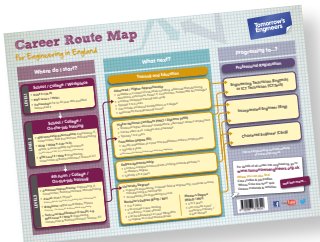
The Seewomen interactive stage show is a project that has been created especially for girls, to place the spotlight on modern STEM female role models in Siemens and beyond. Sharing my career and personal development through this touring schools show helps to demonstrate that engineering is diverse and can really be done by anyone, anywhere. Just because someone isn't the best in the class at maths doesn't mean that an engineering career is out of bounds. I hope to show that engineering is an industry where you can grow and adapt to do what you truly want to, without compromising in your personal life. Seewomen demonstrates that engineering is an exciting career which many won't

have considered before – a multitude of opportunities are available that just might be of interest to the young women within the audience. If just one person considers a career in STEM as a result of the show then I'd definitely consider that a success.

**Amber O' Connor,**  
Seewomen Ambassador

**SIEMENS**

[www.siemens.co.uk/education/en](http://www.siemens.co.uk/education/en)



## Having an impact - points to consider:

- Motivating factors for career decision-making**, e.g. pay, prestige, making a positive contribution to society, opportunities for travel, career prospects, variety and so on. Consult with students and bring out some of these factors during the session.
- Highlighting the skills that engineers use**, to show young people that they already possess and use these skills, such as teamwork, communication, problem-solving, logic, creativity, perseverance, learning from 'failure' and adapting. It is worth stressing to students that 'failing' is a really important part of creating a new product and is part of the development cycle. The Tomorrow's Engineers careers quiz, 'Meet the future you', helps students work out how their own skills and interests relate to different types of engineering. Find out more at: [tomorrowsengineers.org.uk/quiz](http://tomorrowsengineers.org.uk/quiz)
- Speaking about your background and career history.** It is the personal story of your career that will spark an interest in students, so enjoy telling the story! It's worth ensuring students are aware there are different routes into engineering, such as vocational qualifications, apprenticeships (including degree apprenticeships) and degrees. Maths and science (especially physics) are important, but students don't need to be at the top of the class in these subjects. There are lots of other useful subjects too, including design and technology (D&T), computing, art, geography, electronics, construction & the built environment and languages. The 'Make a difference' PowerPoint presentation could help bring out these messages. [tomorrowsengineers.org.uk/makeadifference](http://tomorrowsengineers.org.uk/makeadifference)
- Finding out whether the students are at key decision-making points**, e.g. choosing their GCSE subjects. Make sure you know what the qualifications are called and be aware of the grading system. GCSEs use numbered grading, where 9 is the highest and 1 is the lowest. Grade 4 is equivalent to a 'C' grade or a pass. Check with the school or college in advance if you're not sure. The engineering career route maps could be a useful resource. [tomorrowsengineers.org.uk/careers](http://tomorrowsengineers.org.uk/careers)
- Highlighting different industries** – such as entertainment, sport, the environment, food & drink and power – to show students that whatever they're interested in, there is engineering involved. You could think about using the Tomorrow's Engineers themed postcards in your session or encourage teachers to use them in a follow-up lesson, to facilitate discussions on different topics within engineering, from space exploration to life-saving medical technology. [tomorrowsengineers.org.uk/postcards](http://tomorrowsengineers.org.uk/postcards)
- Reflecting local, regional and national opportunities and growth industries**, where possible. If you recently entered the workplace, you could relate this to your experiences of job-hunting. EngineeringUK publishes a report, which includes statistics on employment and growth industries, broken down by region. The 'key stats' infographics provides a useful overview. [www.engineeringuk.com/research](http://www.engineeringuk.com/research)



Research for Tomorrow's Engineers Week shows that 90% of young people dream of a career that tackles social issues. In your session, show how engineers use their skills to solve some of the big issues young people care about, such as helping people recover from natural disasters, creating renewable energy, tackling homelessness and developing new cures for diseases.

## Chartership

For students still in their teens, chartership and professional registration are unlikely to be of significant concern, so a light touch approach to these conversations is advised. In the Tomorrow's Engineers careers materials, the following phrases are used:

**"Engineers can work towards professional registration, earning the right to use letters after their name, such as CEng (Chartered Engineer) - a status which is recognised all over the world.**

**Like doctors and lawyers, professionally registered engineers are well respected."**

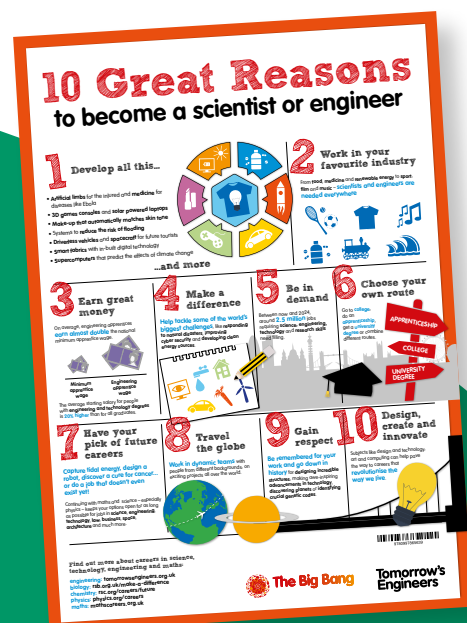
## Key messages

There are so many fantastic reasons to go into engineering and you will be able to demonstrate many of these through your own experiences.

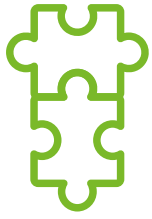
The '10 great reasons to become a scientist or engineer' poster can provide further inspiration: [tomorrowsengineers.org.uk/10-great-reasons](http://tomorrowsengineers.org.uk/10-great-reasons)

It talks about:

- Making a difference
- Finding your own route
- Following your passion
- Earning good money
- Being creative
- Having great career prospects



There is also a collection of diverse engineering case studies on the website - if you have the technology available in your session, you could show one or two of these to the students, to help give a flavour of what the world of work is like: [tomorrowsengineers.org.uk/realjobs](http://tomorrowsengineers.org.uk/realjobs)



# Inclusivity

Whether you are giving a talk or running a hands-on activity, find ways to include everybody in the session. It is good practice to ask the responsible adult whether any of the young people have additional needs, in advance of the session, and seek advice on any adaptations that may be required. Young people learn in different ways - some need visual stimulation, others like to listen, and some students are practical and like to 'have a go'.

Here are some top tips on how to get the best out of young people during your session:

- **Smile, be aware of your body language** and try and look at different people when you are talking (rather than the same few students who seem most engaged).
- **Create an open and supportive environment** in which students feel able to ask questions – however 'silly' they think their question might be.
- **Ask the students what they are interested in** and adapt your activity or talk accordingly.
- **Encourage everyone to participate** and provide opportunities for those who appear less engaged to contribute. Be aware of students who hang back or seem reluctant to put their hands up – these students may need extra encouragement and might prefer small group tasks to whole class discussions.
- **Be mindful of those with additional needs**, e.g. wheelchair users, visually impaired students, hearing impaired students and those with social communication issues. For example, some people don't enjoy being put on the spot. The teacher or responsible adult should be able to identify any students with additional needs.



- **Consider your vocabulary** - make sure it is age-appropriate. For instance, most students won't know what an 'industry' or 'sector' is.
- **Remember that not everyone has access to the latest technology**, either at home or at school.
- **Competitions and challenges can throw up barriers** - if you do run a challenge, bring out the teamwork element and provide opportunities for everyone to be involved and rewarded.
- **Use examples and images that resonate with students** - for example, you could show that engineering is related to film, apps, computer games, sport, food, travel, the environment, fashion, health and beauty. The 'make a difference' presentation can help with this.  
[tomorrowsengineers.org.uk/makeadifference](http://tomorrowsengineers.org.uk/makeadifference)
- **Be wary of stereotyping** - not all boys are into football (and so on).
- **Avoid referencing engineers from history** - use contemporary examples, including women and those from BAME (black and minority ethnic) groups.
- Get the students thinking about real-world applications of engineering and **encourage them to 'think like an engineer'** and come up with their own solutions and designs.
- When describing your own route into engineering, **make it clear that there are different routes into engineering**, e.g. academic, vocational, apprenticeships - and remain impartial as to which route to follow or which institution to study at.
- Many students won't know anything about the university application process and may never have heard of an apprenticeship is - **be open and encourage questions**.

## CASE STUDY: YES! Programme

The Young Engineers and Scientists programme was introduced to our Bristol office in 2018. We invite local Year 8 students to attend our office after school, over a 6-month period, to experience a variety of 2-hour STEM sessions, each covering different aspects of engineering.

The YES! Programme is run with gender parity in mind, so we ask schools to approve applications with a 50/50 gender split. We also request that schools do not only send their most gifted students, but those with a range of abilities, including those with special educational needs, to ensure everyone gets the same opportunities.

By using different volunteers, students get to meet around 20 engineers and apprentices, who can share personal stories and enthusiasm about their specialist subject and answer students' questions in an inspiring way.

As well as opening our doors to year 8 students in the YES! Programme, Atkins continue to work hard at careers fairs, in school lessons and assemblies and out in the community to spread information far and wide about engineering and the opportunities a career can offer.

**Louise Hetherington**,  
Assistant Structural Engineer, Atkins Global

**ATKINS**

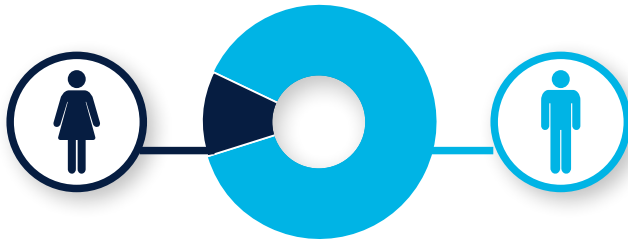
Member of the SNC-Lavalin Group

[www.atkinsglobal.com/en-GB](http://www.atkinsglobal.com/en-GB)



# Under-represented groups

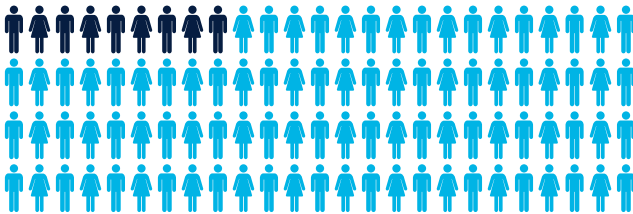
We know that several groups are under-represented in the engineering industry, such as women and BAME groups. Social mobility is also high on the agenda. You can use this knowledge to inform delivery and make a conscious effort to include diverse examples and role models. However, it is generally a good idea to avoid focusing on issues of under-representation with students, who may not be aware that such issues exist and may find it off-putting or see it as a barrier to entering the profession.



Women comprise

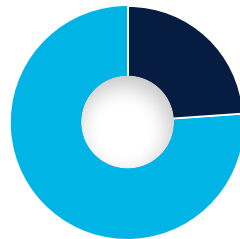
**12%**

of the engineering workforce



**9%**

of those in engineering occupations are of minority ethnic heritage



**24%**

of those working in engineering are from low socio-economic backgrounds



EngineeringUK. 'Gender disparity in engineering', November 2018





## Measuring impact

**Evaluating your session and determining the impact you have had on students' (and teachers') perceptions of engineering is really important. It helps you - and other colleagues - understand what is working well about the activity or engagement, and what needs adapting or re-working. When evaluating your activity, you could ask questions about enjoyment, accessibility, understanding, motivation/inspiration and impact on career decision-making.**

EngineeringUK has a set of evaluation questions that can help you benchmark students' responses against the national average.



If your company would like further support with measuring impact, interpreting data or developing a long-term schools engagement strategy, please get in touch with EngineeringUK's Skills Partnership team:

[skillspartnership@engineeringuk.com](mailto:skillspartnership@engineeringuk.com)

# Staying safe

**A few points on safeguarding have been listed below - you should communicate with the school about these points - along with anything else your company may wish you to check - well in advance of delivering the session. STEM Learning provides useful information and resources for STEM Ambassadors going into schools.**

**Sign up and access resources at:**  
[www.stem.org.uk/stem-ambassadors](http://www.stem.org.uk/stem-ambassadors)

- **Find out what level of clearance you will need for being on site** - you will almost certainly need to show DBS or PVG certification if you are going to be visiting a school or youth organisation - make sure you start the application process in good time.
- **Work with the teacher on their risk assessment** for the activity - templates are likely to exist already.
- **The school will have policies** on safeguarding, photo consent and social media consent - if in doubt on the day, double-check with the responsible adult on site.
- **Due to safeguarding, you should never be left unattended with the students** - check with the school that a member of school staff will always be present.
- **Responsibility for discipline lies with the school** - you should not need (or attempt) to discipline the students yourself.
- **Any follow-up communication with the students should be done through the teacher** and personal email addresses should not be given out.
- **Check with the school** (and if you are an employee, check with your employer) what the requirements are around public liability insurance.



# Preparation checklist

To make the experience as smooth and positive as possible, we have come up with a handy checklist that you can use, when preparing to deliver your activity or engagement. (Please note, this is not an exhaustive list):

- Talk to the school and share expectations about the activity. Establish the following:
  - Name and contact details for the staff member who is responsible (ensure at least one member of staff will be present throughout)
  - Access requirements for students with additional needs
  - Room size and set-up (including access to technology and special equipment)
  - Number of students and year group
  - Timings
  - Expectations for the activity/talk structure – many schools follow a set format, e.g. starter; activity; plenary
  - Appropriate dress
- If you have the opportunity, find out if there are any STEM curriculum links – ask the teacher what the students are learning about this term.
- Ask whether the students are at key decision-making points – for instance they may be in the process of choosing subject options.
- Order any leaflets or resources you need in advance. If you want to order any of the free Tomorrow's Engineers resource packs or student leaflets, go to: [tomorrowsengineers.org.uk/resources](http://tomorrowsengineers.org.uk/resources)
- Work out logistics, such as how to get there, parking restrictions, who to report to, what to bring (e.g. DBS certificate, photo ID, student worksheets, equipment and any other materials you might need).



**Last-minute challenges do tend to present themselves, so whilst thorough preparation is key, it is also important to be flexible, to be able to adapt quickly and to learn from the situation. You could plan an extension activity in case you get through the session more quickly than expected or note down anything that you would be happy to skip in case you run out of time.**



# Useful links and further reading

## **EngineeringUK Skills Partnership:**

EngineeringUK works in partnership with companies of all sizes and in all areas of the UK to inspire young people to become tomorrow's engineers.

To talk to us about how your company might benefit from participation in the EngineeringUK Skills Partnership contact us at [skillspartnership@engineeringuk.com](mailto:skillspartnership@engineeringuk.com)

## **Free engineering careers resources**

[www.tomorrowsengineers.org.uk/resources](http://www.tomorrowsengineers.org.uk/resources)

## **This is Engineering**

[www.thisisengineering.org.uk](http://www.thisisengineering.org.uk)

## **Engineering UK: The State of Engineering report**

[www.engineeringuk.com/research](http://www.engineeringuk.com/research)

## **STEM Ambassador programme**

[www.stem.org.uk/stem-ambassadors](http://www.stem.org.uk/stem-ambassadors)

## **Gatsby benchmarks**

[www.goodcareerguidance.org.uk](http://www.goodcareerguidance.org.uk)

## **Learning to be an Engineer**

[www.raeng.org.uk/ltae](http://www.raeng.org.uk/ltae)

## **Five Tribes: Personalising Engineering Education**

[www.imeche.org/five-tribes](http://www.imeche.org/five-tribes)

## **Gender balance**

[www.iop.org/genderbalance](http://www.iop.org/genderbalance)

**Tomorrow's  
Engineers**



ISBN 978-0-9978820-6-3



9 780997 882063 >

[www.engineeringuk.com](http://www.engineeringuk.com)

 @\_EngineeringUK

 EngineeringUK