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DEVELOPING CAREER LEARNING IN STEM

This guide is aimed at teachers of science, design and technology, computing, engineering and mathematics, and those who are passionate about providing STEM career experiences.

It offers immediate ideas to try, longer term solutions and resource recommendations.



This guide will help you to:

- ✓ encourage your students to develop their STEM career aspirations
- ✓ create STEM career links in your lessons
- ✓ link STEM career learning to extra-curricular activities
- ✓ work meaningfully with STEM employers
- ✓ measure the impact of STEM career learning
- ✓ support your Careers Leader to achieve the Gatsby Career Benchmarks

For more detailed guidance on how STEM-specific support can contribute to the Gatsby Career Benchmarks, take a look at the [STEM Careers Toolkit for Careers Leaders](#).



Linking your STEM curriculum to careers is one of the requirements of the Gatsby Career Benchmarks, a framework defining what high-quality careers provision looks like in secondary schools, special schools and colleges.

This guide supports the following Benchmarks:



Gatsby Benchmark 2

Learning from careers and labour market information (LMI)



Gatsby Benchmark 3

Addressing the needs of each student / learner



Gatsby Benchmark 4

Linking curriculum learning to careers



Gatsby Benchmark 5

Encounters with employers and employees

To find out about how STEM can support your school or college's careers strategy, download the STEM Careers Toolkit for Careers Leaders.

Note: Depending on your educational setting, some suggestions in this guide may not be appropriate or may need modification.

Quick wins:

- 1 Share personal career experiences by talking to students about your own study routes and previous jobs.
- 2 Create a [STEM careers display area](#) in your department, include different role models, careers and study routes.
- 3 Start a lesson topic with a link to a career that uses the knowledge or skills your students are about to learn.
- 4 Highlight [STEM employability skills](#) and signpost when students have the opportunity to develop these skills in your lessons.
- 5 Celebrate the wide range of people involved in STEM during a [themed awareness event](#), ie [British Science Week](#), [National Careers Week](#), [Ada Lovelace Day](#), [Women's History Month](#).

Longer term ideas:

- 1 Update your own careers knowledge by attending career events with students and [taking part in careers training](#).
- 2 Review the STEM career learning already happening in your department and share this with your Careers Leader.
- 3 Update your lesson planning to include career learning and collaborate with your colleagues to ensure that careers content is present across your department's curriculum.
- 4 Work alongside employers to collaboratively plan and deliver parts of the curriculum, making reference to the world of work.
- 5 [Measure and track the impact of STEM career learning](#) and celebrate success! Work with your Careers Leader to share your students' STEM career achievements with leadership, employers and parents.



Developing career learning in your STEM lessons

From small tweaks to longer term planning, this section provides a range of strategies to help bring career learning into your lessons.

Top tips!

- start small by making tweaks to your lessons and creating careers-themed displays
- don't struggle alone! Ask your Careers Leader and/or Careers Adviser for lesson ideas
- draw from the experiences of your colleagues, use their previous jobs and training as examples for your own lessons
- keep a record of career links in your lesson planning, feeding into your department's strategic planning where possible



Strategy 1

Help students to recognise the importance of STEM in their lives and the lives of others

Benchmarks 3,4

Use examples from both the inspirational and the everyday to help students understand how STEM subjects are important to their lives and the lives of those around them.

Where to start?

- link subject content to tasks that students might need to do in the future (ie using mathematics skills to help with financial planning, using digital skills to set up a website for their own business)
- use items in the news as discussion topics with friends and family (ie find out what your family are doing to protect themselves from cybercrime, ask your friends their opinions on whether driverless cars are a good idea)
- make links to local and global issues, such as climate change, air quality, healthcare, etc. Help students to see how STEM subjects are part of finding solutions to these challenges

Going further:

- find out about the career aspirations of your students and use this information as a context for an upcoming topic, ie ask students to record their aspirations as a homework exercise or as part of an activity in class
- use student voice to understand how your students (and their families) think your subject will benefit them in the future. Use this information to inform how you frame the subject
- help students find more meaning and relevance in science by finding out about [Science Capital](#) and the [Science Capital Teaching Approach](#)



Strategy 2

Challenge the perception that “STEM isn’t for me”

Benchmark 3

Encourage all students to see the STEM opportunities available to them, regardless of gender, race or academic ability.

Where to start?

- include a wide variety of role models in any content or resources you share, being careful to avoid any references to STEM stereotypes that exclude (ie you have to be clever to work in STEM, computer scientists are all geeks, engineering is for boys)
- find out about gender stereotyping with resources from organisations such as [WISE](#), the [Institute of Physics](#) and [STEMettes](#)
- link your lesson to [apprenticeships](#), showcasing the opportunity that high-quality apprenticeships offer to earn while you learn in the STEM industries, including at degree level

Going further:

- show students a range of STEM role models by arranging for STEM volunteers (ie [STEM Ambassadors](#)) to speak to students in lessons, either face to face or online
- use [student voice](#) to understand your students’ perspectives on who can do a job in STEM, what exam grades they need and whether they think that STEM is an option for them
- invite STEM employed student alumni to meet with students and give them experience of someone from their local area who is successful in a STEM industry





Strategy 3

Promote the value and transferability of STEM skills

Benchmark 3

Highlight the transferability of STEM skills to students, in particular, mathematics and digital skills, and provide examples of how these STEM skills can support their wider employability.

Where to start?

- create opportunities for students to use numeracy and digital skills in lesson activities (ie using the internet to research a topic, using budgets for challenges and competitions)
- work with colleagues to understand where STEM skills are used in non-STEM subjects. Communicate this STEM cross-curricular activity with students
- use resources from [Maths Careers](#) to show students how mathematics is used across a range of job roles

Going further:

- create a display that shows how the skills learned in your subject are transferable to a range of careers
- invite STEM volunteers (ie [STEM Ambassadors](#)) to speak to students about how they and their colleagues use STEM skills in their job, regardless of whether they are working for a STEM employer
- plan a collaborative project with another department, for example linking science to PE by exploring how science can improve sporting performance



Strategy 4

Raise awareness of the wide range of roles available within STEM industries

Benchmarks 2,4

Support students to understand the wide range of jobs available in STEM sectors, including both STEM and non-STEM skilled roles.

Where to start?

- create a wall display showing STEM careers and study routes that link to your subject from a range of sectors (ie digital, logistics, engineering, healthcare, manufacturing, construction, biosciences)
- raise awareness of people using STEM skills in non-STEM industries (ie [operations manager](#): managing the costs and supporting staff management for a chain of hotels; [textile technologist](#): working within the fashion industry to ensure that products meet the standards required of them before going to retail)
- use [STEM career videos](#) as a lesson starter or topic introduction to show students careers that use the skills and knowledge they are learning

Going further:

- focusing on a product or process, ask students to list all of the jobs that are involved. Encourage students to consider both STEM and non-STEM skilled jobs and explore which of these jobs might need to work with each other. There are some great examples of this idea in the food and drink industry [here](#)
- encourage students to do their own research into STEM related jobs that they are interested in by looking at careers websites such as [Future Morph](#) and [icould](#)
- invite STEM volunteers (ie [STEM Ambassadors](#)) who work in non-STEM roles to talk about how their job supports the STEM industry, judge competitions or mentor students, ie a HR manager from a local engineering company



Strategy 5

Signpost and support the development of employability skills

Benchmark 4

Plan time in your curriculum to develop employability skills and highlight these opportunities to students, before, during and after they have taken place.

Where to start?

- make employability skills visible in your classroom by downloading the [Top 10 employability skills](#)
- develop one of these skills during a lesson activity or project. Discuss the skill with students before the activity, teach students how to perform the skill and support students to reflect afterwards on their progress
- use [STEM career videos](#) and STEM volunteers (ie [STEM Ambassadors](#)) to help students understand how employability skills are applied in careers linked to your subject (ie [an engineer talking about resilience](#), [a dietitian explaining why communication skills are important when working with patients](#))

Going further:

- use a framework for developing employability skills, such as the [Essential Skills Framework](#) or [Barclays LifeSkills](#)
- encourage students to feed back during lessons on which skills they are learning and how they are developing them. This progress could be tracked on a passport or skills licence
- assign 'employer' roles to students during group work and challenges (ie project manager, accountant, design engineer, test engineer, etc)



Strategy 6

Provide information on STEM-specific further study routes, careers and the labour market

Benchmarks 2,4

Create space within your curriculum for students to be curious about careers. Share labour market information and help students to learn more about the STEM careers and range of further study routes available to them.

Where to start?

- share your career story with students, including previous jobs and study routes. Extend this by creating a department display showing the career stories of staff in your department
- link lesson content to labour market information by using the [Careerometer widget](#) to look up data for a job, including starting salary, salary progression, typical working hours and predicted workforce change
- provide students with examples of further study routes that link to a topic or lesson (ie A levels, T levels, apprenticeships, degree routes, vocational qualifications etc)

Going further:

- create homework challenges that allow students to research careers linked to your subject (ie a poster exploring the skills needed to become a game designer, a leaflet on how to become an automotive engineer, extended writing on 'a day in the life of... a tree surgeon')
- invite STEM volunteers (ie [STEM Ambassadors](#)) to speak to parents at parents' or open evenings about STEM career options and further study routes linked to your subject
- visit STEM employers with students or as part of a training event and gain first-hand experience of careers in STEM industries

Labour market information can be **quantitative** (eg how much will I earn?) or **qualitative** (what is the company culture like?), **'hot'** (meeting a real person) or **'cold'** (facts on a website) and everything in between!

Recording career learning

The career links in your lessons should be recorded in the same way that you would record any content in your lessons. Use existing planning documents like schemes of learning and lesson plans to record the career videos, activities and resources that you use as you progress through each topic.

✔ Experiment first!

Before you make changes to your long-term planning, test out different career activities and reflect on what went well.

✔ Keep up to date!

Careers information can often change over time as new study routes are released and the demand for skills changes. Work with your Careers Leader to make sure that the information you are providing is up to date and relevant.

✔ Work as a team!

Work with your colleagues to develop a department approach to recording careers. If you are a head of department, include career learning in your strategic planning and work with your Careers Leader to feed your work into their careers strategy.

✔ Make career learning visible!

Find a student friendly way of showing what career learning is happening in your lessons. For example, create a wall display, add a careers section to workbooks, provide a careers section on the subject page of your school or college website.

For ideas, take a look at our example, highlighting ten ways that students learn about STEM careers: [10 ways to find your STEM career](#)

Careers-themed STEM resources to support you with lesson planning:



[STEM Learning's STEM careers resource collections](#)



[STEM teaching resources from the Institution of Engineering and Technology](#)



[Institute of Physics](#)



[Royal Academy of Engineering](#)



[Royal Society of Chemistry](#)



[Royal Society of Biology](#)



[Institute of Mathematics](#)



[Neon - Inspiring Engineering experiences and careers resources](#)



Developing career learning in extra-curricular activities

STEM Clubs, competitions and other enrichment activities are a great way for students to explore their interest in STEM subjects and careers, whilst also developing their employability skills and subject expertise.

Top tip!

Share your enrichment timetable with your Careers Leader so that they can include extra-curricular activity as part of their careers strategy.

STEM Clubs

Benchmark 4

STEM Clubs can explore STEM subjects in ways that a classroom lesson may not be able to. This creates opportunities for different types of career learning, potentially allowing students to explore certain STEM careers in more detail.

Discover STEM heroes who have made a difference in our lives and explore how STEM careers are portrayed in films and TV.

Develop employability skills through exploring how STEM innovations might improve the human body.

Explore the importance of STEM in our lives by completing activities themed around improving our environment.

Use a STEM challenge from [Practical Action](#) or [IET Faraday](#) to develop your students' awareness of real life problems.

For more ideas of careers-linked activities, visit [STEM Clubs resources](#).

Find support and training for setting up and running a STEM Club.

Top tip!

Share your attendance register for STEM enrichment activities with your Careers Leader. These records can be used to profile which students are engaging in extra-curricular activities and support future targeting of underrepresented groups.

STEM competitions

Benchmarks 4,5

As well as developing employability skills, STEM competitions are a good way of linking extra-curricular activity to employers. Many STEM competitions have employer sponsorship and some will provide students with an employer linked challenge to work on.

Examples of national STEM competitions:

- NEON - find engineering experiences and inspiring careers resources
- Ultimate STEM Challenge Ages 9 to 14, BP's cross-curricular schools competition
- The Bright Ideas Challenge Ages 11 to 14, Shell's cross-curricular schools competition
- CanSat Ages 14+, Gain practical experience working on a small-scale space project
- MiSAC Poster competition Ages 11 to 16, Focusing your students' interest in microbiology
- FIRST LEGO League Ages 4 to 16, Robotics-themed STEM challenge
- Maths Careers poster competition Ages 11 to 18, Create a poster on the annual theme linked to mathematics
- FIRST Tech Challenge Ages 12 to 18, Robotics-themed STEM challenge
- The Big Bang Competition Ages 11 to 18, Showcase your students' STEM achievements with the Big Bang Fair
- UK Youth Rocketry Challenge Ages 11 to 18, Design, build and launch a model rocket
- TeenTech Awards Ages 11 to 19, Apply science and technology to solve a real-world problem
- F1 in Schools Ages 9 to 19, Formula 1-themed STEM competition
- VEX Robotics Championships Ages 7 to 19+, Robotics-themed STEM challenge
- Greenpower Challenge Ages 9 to 19+, Design and build an electric car
- Step into the NHS schools' competition Ages 12 to 14, Learn about a range of careers in the NHS

Find out about local STEM competitions by signing up for your local STEM Ambassador Hub newsletter.

When choosing which STEM competition to take part in, think about:

- how much time can staff commit? Some competitions last multiple terms and may need multiple members of staff to be involved
- which student age group are you looking to work with? Some competitions will provide options for multiple age groups to enter at the same time, allowing you to run one competition across multiple year groups. Could this be an opportunity to develop the leadership skills of more experienced students by asking them to support their peers?
- if your chosen competition needs equipment or has a fee for entry, can you use this as an opportunity for students to develop their employability skills by contacting local employers to ask for sponsorship? Some competitions will include this as part of their judging criteria!
- are there student alumni, parents or employers who might volunteer their time to support students who are taking part? You might invite a volunteer to 'judge' the students' work before it is submitted, allowing time for the students to reflect, evaluate and improve their entry

✓ Top tip!

Raise awareness of your STEM competitions and activities through your website, social media, newsletters and blogs. STEM success is worth shouting about!

STEM activity days

Benchmarks 4,5

STEM activity days involve a full or half day of STEM-concentrated activity, typically focused on solving an employer-themed challenge. Students are set a problem to solve and are tasked with working in teams to create and communicate their solutions. These activities promote the development of employability skills, and with employer support can also enable students to gain experience of a work-related project or problem.

To create your own STEM activity day, take a look at these resources:

- [DIY IET Faraday Challenges](#) – STEM activity days that task students with solving a real-world problem
- [Practical Action](#) – STEM challenges themed around solving problems faced by societies around the world
- [HS2](#) – Engineering challenges themed around careers in transport infrastructure
- [CREST Awards](#) – Accredited student participation in a STEM experience day

To apply for a STEM activity day to be run for you, take a look at these funded opportunities:

- [IET Faraday Challenges](#)
- [Energy Quest](#)
- [Royal Institution Masterclass](#)
- [Smallpeice Trust](#)

✓ Top tip!

Invite volunteers (ie [STEM Ambassadors](#)) to support your activity day by delivering a careers talk, coaching students and being a judge.



STEM-themed trips

Benchmarks 4,5

Museums, employer workplaces, STEM fairs, post-16 college facilities and university campuses are just some examples of destinations that you can use for STEM-themed trips.

Things to consider when combining out-of-the-classroom experiences with STEM career learning:

- if you are visiting further or higher education providers, try to give students the opportunity to hear from current students about their experiences and provide opportunity to learn about the range of study routes available
- if you are visiting an employer workplace, ask your host to provide an overview of the company and wider industry, give students experience of the working environment and, where possible, meet employees from a variety of roles and responsibility levels. Before the trip, share your aims for the activity with the employer, for example the chance to visit particular areas of the business or meet employees
- consider which students will benefit most from the trip. Are there student cohorts that need additional support to see the STEM opportunities available to them?
- make your Careers Leader aware of the trip, including which students are attending. They will need to record this information as part of their careers programme
- consider which staff might benefit from additional STEM careers experience and invite them to support the trip
- tell students (and their parents) about what the trip is aiming to achieve and evaluate students' experiences afterwards

Top tip!

Encourage students to keep evidence of their STEM extra-curricular activities as evidence for a CV or portfolio. Taking part in clubs and competitions is great evidence for an employer, college or UCAS interview.



Looking for support with funding?

- request funding from your leadership team to work with target student cohorts
- approach employers to sponsor a competition team or activity. Take time to consider how your approach will stand out above the others that the employer might receive
- apply for [funding from a STEM organisation](#)

Top tip!

Raise awareness of your STEM extra-curricular activities through your website, social media, newsletters and blogs. Great STEM careers work is worth shouting about!



Working meaningfully with STEM employers

Benchmark 5

Providing students with opportunities to learn from employers, further and higher education is an important part of achieving the Gatsby Benchmarks. Working with your Careers Leader, you can use employers to show students how the skills and knowledge learned in your lessons are valued in the workplace.

✓ Examples of employer career activities:

- providing a face-to-face or online careers talk for an assembly or as part of a lesson
- delivering part of the curriculum in collaboration with a teacher, referencing the world of work
- supporting a STEM Club, helping with the delivery of activities
- mentoring a team for a STEM competition
- setting a brief for an employer-led challenge, linked to a lesson topic
- hosting a workplace visit or a virtual workplace tour
- volunteering for a STEM activity day (ie judge, mentor)
- non-STEM staff, such as those working in HR, providing support with CV workshops and mock interviews
- supporting a careers fair
- student mentoring, typically supporting research projects
- being an interviewee for students interested in a particular career
- speed networking, providing students with information about their role, employer and sector
- supporting a themed awareness event, ie British Science Week, National Careers Week, Ada Lovelace Day
- supporting staff careers training by updating knowledge of career routes and labour market information
- delivering a careers session during parents' evening or open events
- find more ideas in the Careers & Enterprise Resource Directory

✓ Top tip!

Employer activity doesn't have to be in person. Why not invite an employer to present to students using a video or online meeting?



Thinking about running an activity with STEM employers?

Before the activity:

Consider if the content of the activity can contribute to the wider career goals of your school or college. [Gatsby Benchmark 5](#) requires students to gain a meaningful understanding of "what work is like or what it takes to be successful in the workplace". Does, or could, your activity be adapted to provide this kind of experience? (More information about meaningful employer experiences can be found in the [Making it meaningful checklist](#).)

Communicate with the employer about the content of the activity, including any relevant curriculum links, keywords, student information (ie previous knowledge, photography arrangements, inclusion arrangements, etc) and what facilities are available on the day. Discuss and share risk assessments, making sure you are both happy about the health and safety arrangements. Leave adequate time for the employer to plan their work with you and be available to provide feedback on their ideas before the event takes place.

Let colleagues know about the event. This will help you to raise awareness of the career learning happening in your department and give them the opportunity to visit or ask about the session. Your Careers Leader will need a register of who has attended the event for their records, as employer activity is included in their careers strategy.

If possible, give students some time to prepare for the activity. This might include things like sharing an overview of the employers involved or helping them to understand how the activity will support their learning.

During the activity:

Welcome the employer and provide refreshments if appropriate. Having someone at reception to receive them and a personal guide to the location of your activity can go a long way to settling in an employer who is visiting you for the first time.

Get involved! Support the employer by being active during the session and helping to engage all students in the activity. Use the opportunity to develop your own STEM careers knowledge as well as providing a career learning experience for students. Capture the activity through quotes and pictures, being aware of photographic permissions for students and the volunteers.

After the activity:

Thank the employer and, if appropriate, provide them with feedback on their input. If you are looking to work with a volunteer again, letting them know that you value their time will help set the foundations for future collaboration.

Gather student and employer feedback on the event and use the results to inform future activity. Send your register of attendance to the Careers Leader and, if they have not already met the employer, make an introduction so that additional support for the school or college can be discussed. Don't forget to share the success of your activity with colleagues, leadership, parents and even local media!



Top tip!

Employers can support staff as well as students. Invite them to a department meeting or a staff training session and use their input to update your own industry knowledge and create ideas for future collaboration.



Finding employers to work with

There are a number of organisations that can support you to find STEM volunteers from industry and education:

- [STEM Ambassadors](#)
- [Inspiring the Future](#)
- [Speakers for Schools](#)
- [Founders4Schools](#)
- [SIP Ambassadors](#)
- [The STEM Exchange](#)

Your Careers Leader will have existing contacts and career networks that they can use to help find STEM employers (ie [STEM Ambassador Hubs](#), [Careers & Enterprise Company Networks](#)). Parents, governors and student alumni are a good source of employer support in addition to circulating a request to your local community. Try contacting further and higher education STEM departments to see what outreach support they offer. Remember to share any new contacts that you make with your Careers Leader!

When contacting employers, take into account the time that they are taking out of their working day to help you. Start with smaller commitments, such as online meetings or career presentations, developing your relationship over time to larger commitments like workplace visits and collaborative projects. Try to avoid arranging activities that require multiple employer volunteers, unless you are sure that you can recruit the number of volunteers needed to be successful.

Once you have employer contacts, keep a record of them for future use and make sure that your Careers Leader has their details on their database. Even if an employer is not suitable for an event you have in mind, their details might be useful for a future activity or different curriculum department.

For more help with finding an employer to work with, [take a look at this guide](#) from the Careers & Enterprise Company.

Top tip!

Help students to gain experience of different employers and workplaces by working with employers from a wide range of STEM industries.



Measuring the impact of STEM career learning

Measure the impact of your STEM career learning programme to make sure that it meets the needs of your students.

✓ Ideas for measuring impact

- baseline survey – measuring student attitudes before engaging in STEM careers activity or a series of careers linked lessons
- regular repeat surveys – measuring student attitudes termly or annually. These must use the same questions for each repeat of the survey to allow for fair comparison
- feedback forms – collecting feedback from students at the end of an activity or lesson topic
- employer engagement – measuring the quality of employer activities and range of different employers that your STEM careers work has enabled students to experience
- speak to your Careers Leader about using [evaluation tools provided by the Careers & Enterprise Company](#) to record career-specific activities

✓ Impact areas to consider

- interest in working in a STEM-related career
- interest in STEM further study routes (ie A levels, T levels, apprenticeships)
- awareness of a range of STEM careers and sectors
- awareness of non-STEM roles within the STEM sector
- awareness of a range of STEM further study routes
- development of employability skills
- enjoyment of a STEM careers activity
- understanding of what STEM careers involve, ie engineering
- perceptions of different STEM careers and who can work in them
- feedback on what types of careers students would like to know more about

Choosing the right question to ask:

Closed questions, like rating an activity, or an answer ending in yes or no, will give you data that is easier to compare across students and to other activities. Open questions, like exploring future career aspirations or asking how an activity could be improved, will require more time to process but will likely elicit more information by allowing students to answer in their own words. Always consider what you will do with the data, allowing yourself or your colleagues time to process the survey results.

For support on creating your own survey, [take a look at this guidance](#).

Find ideas on how to measure impact with [STEM Learning's career resources](#).

Top tip!

Measuring impact doesn't have to focus on students. Try collecting information from parents to see how their opinions of STEM careers might influence student opinion.

What to do with the impact data

- examine the data to see if there are trends that help you to improve future activity
- use your findings to plan future STEM career learning activities (ie challenging STEM gender stereotypes in upcoming lessons or developing awareness of STEM-related apprenticeships through an employer visit)
- present the data to your colleagues and Careers Leader – have they seen similar trends?
- where employers are involved, can you use your data to evaluate the success of an employer activity and provide them with constructive feedback?
- where there are successes, share these with your Careers Leader, students, parents and employers, and support for your department's STEM career efforts

Top tip!

Raise the visibility of your STEM careers work by inviting your leadership team, colleagues and your Careers Leader to STEM career activities and events.



STEM Learning is the largest provider of education and careers support in science, technology, engineering and mathematics (STEM). We work with schools, colleges and others working with young people across the UK.

Our mission is to improve lives through education and ensure that every young person across the UK can access the world-leading STEM education they deserve. Inspirational teaching is vital and supporting teachers, alongside students, is fundamental to our approach. We provide teachers with professional development, educational resources, access to [STEM Ambassadors](#) and support for [STEM Clubs](#).

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[The Careers and Enterprise Company](#) exists to facilitate a world-class careers education, inspiring and preparing young people for the world of work.