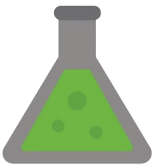
THE CAREERS & ENTERPRISE COMPANY

STEM LEARNING

This guidance is provided as part of the STEM Careers toolkit[1] produced for Careers Leaders in secondary schools and colleges. It provides ideas and practical suggestions on how STEM-specific content can be used to support achieving the Gatsby Careers Benchmarks[2]. For wider advice and guidance on the Gatsby Careers Benchmarks, visit the Careers & Enterprise Company website[3].

All references and weblinks are provided in full at the end of this document.



Gatsby Careers Benchmark 4

Linking curriculum learning to careers

For schools

All teachers should link curriculum learning to careers.

For colleges

All subject staff should link curriculum learning to careers, even on courses which are not specifically occupation-led.

What this means for STEM

Top tips

1. Support your colleagues to bring career learning into their classrooms by sharing STEM careers resources[4], like posters, job profile examples, further study route information and LMI.
2. Use themed awareness events[5] like British Science Week and Ada Lovelace Day to shine a spotlight on the people that work in STEM sectors.
3. Collaborate with your colleagues across all subjects to explore how STEM careers can link to their curriculum. STEM careers are not exclusive to STEM subjects. STEM industries need a broad range of skills and qualifications to be successful with roles available for both STEM and non-STEM skilled employees.

Useful resources

1. Careers & Enterprise Company (2017) *Careers in the curriculum: what works*[6]
2. Free online training: Linking Curriculum Learning to STEM Careers[7]
3. Learn more about Essential Skills with the Skills Builder Framework[8]
4. Find out about Gatsby Benchmark 4[9]
5. Make links with STEM employers with STEM Ambassadors[10]
6. **Curriculum-specific resources:**
   - STEM Learning's free STEM careers resource collections: www.stem.org.uk/stem-careers/
   - Institution of Engineering and Technology: www.education.theiet.org/
   - Institute of Physics: www.iop.org/careers/index.html
   - Royal Society of Chemistry: www.edu.rsc.org
   - Royal Society of Biology: www.rsb.org.uk/teachers
   - Institute of Mathematics: Maths Careers: www.mathscareers.org.uk/
   - Royal Academy of Engineering: www.stemresources.raeng.org.uk/resources/
7. **Ideas for enrichment resources and STEM-themed events and competitions:**
   - Resources and training to support STEM Clubs: www.stem.org.uk/stem-clubs
   - Neon - inspiring engineering experiences & careers resources: www.neonfutures.org.uk
   - The Big Bang Fair and The Big Bang Near Me: www.nearme.thebigbangfair.co.uk/home/
   - Royal Institute Masterclass: www.rigb.org/education/masterclasses
   - TeenTech Awards and events: www.teentech.com/
   - IET Faraday Challenge: www.education.theiet.org/faraday-challenge-days/
   - F1 in Schools: www.f1inschools.co.uk/
   - VEX Robotics Championships: www.vexrobotics.com/
   - FIRST LEGO League: www.education.theiet.org/first-lego-league-programmes/
   - FIRST Tech Challenge: www.firstuk.org/
   - BP STEM Challenge: www.bpes.bp.com/ultimate-stem-challenge
   - UK Youth Rocketry Challenge: www.ukroc.com/
   - Greenpower Challenge: www.greenpower.co.uk/
   - Biology-focused competitions: www.ukbiologycompetitions.org/uk-biology-competitions/
   - British Physics Olympiad: www.bpho.org.uk/

Develop high-quality STEM career learning within your curriculum

STEM career learning can be delivered through specific career lessons, PSHE, curriculum lessons and through extra-curricular activities. It provides awareness of STEM further study routes, the range of careers available in STEM industries (including both STEM and non-STEM skilled roles) and supports students to see the wider transferability of STEM skills, such as mathematics and digital skills.

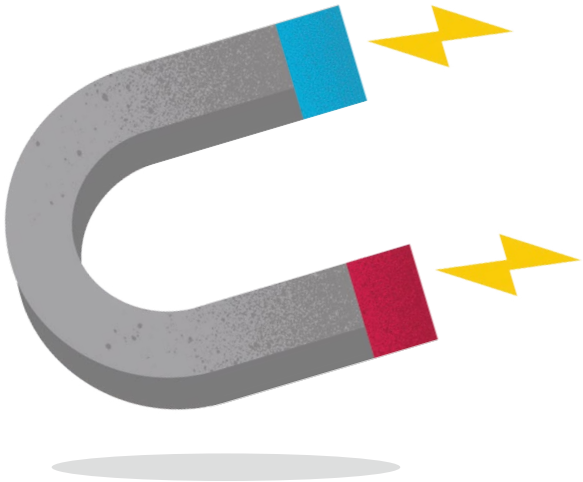
Support colleagues to understand how STEM career learning can be developed in their curriculum:

- Communicate the importance of STEM career learning in the curriculum with your Leadership Team, colleagues and governors by delivering STEM-specific content in your leadership careers training.
- Provide training for colleagues[1] about what good STEM career learning looks like and how each department has a role to play in its delivery: whether that be creating wall displays, sharing personal career stories, planning career-themed lesson content, facilitating meaningful encounters, competitions[11] or extra-curricular clubs[27]. Content from this online training from STEM Learning[7] will support your STEM colleagues to better understand how to build careers links into their lessons.
- Work with colleagues to review what STEM career learning is already taking place:
  - do the learning environments make careers visible?
  - is STEM career learning planned into the taught curriculum? Where can you see evidence of this?
  - are a range of STEM careers and sectors used in examples or are departments providing a narrow range of experiences for students?
  - do colleagues know where to find STEM careers resources[4]? Do they have their own STEM experiences that they can use to inform lesson content?
  - use your STEM career learning review to identify where additional activity is needed (ie curriculum, pastoral or extra-curricular).
- Broaden your colleagues' knowledge of STEM careers and further study routes by providing opportunity for colleagues to visit employers and find their own examples of their curriculum being used outside of the classroom.

Embed STEM career learning into department planning:

- Share STEM-specific careers resources and information with your colleagues, including posters[12], videos[13] and curriculum-linked resources[4].
- Avoid overloading colleagues by gradually developing career learning into lesson planning. Test what works and encourage your colleagues to share good experiences during training or meetings.

- Start with the easy wins and introduce small tweaks to lessons that can be replicated across subjects:
  - use a video profile to set the scene for a lesson topic, identifying careers that use the skills and knowledge developed during a project
  - show an image that links the topic you are teaching in a world of work setting (ie architects using geometry to design structures such as bridges or skyscrapers) and ask students to make links between the two
  - show an advert for a local job or apprenticeship, linking a skill or task that the job involves to the content of the lesson
- Establish a careers champion for each STEM subject or across the STEM faculty (ie STEM coordinator). Use these contacts to share resources and work with colleagues outside of STEM, developing a broad range of STEM careers experiences for students.
- Encourage colleagues to make a wide range of STEM careers visible and challenge STEM-specific stereotypes in teaching material or displays (see Benchmark 3).
- Encourage colleagues to emphasise the transferability of mathematics and digital skills across all subjects.
- Use existing recording methods where possible to record career learning in the curriculum, ie lesson plans and learning journeys.
- Introduce STEM-related career learning into your PSHE curriculum:
  - the WISE 'My life, my skills'[14] quiz engages girls to explore STEM careers linked to their skills and interests (linked to PSHE Core Theme: Living in the wider world)
  - NHS Health Careers resources[15] provide a wide variety of materials to help with career decision-making (linked to PSHE Core Theme: Living in the wider world)
- Work with your STEM colleagues to organise STEM-themed enrichment days. These can be run internally (for example, using materials from DIY Faraday Challenge[16] or Practical Action[17]) and potentially supported by STEM volunteers or delivered by an external provider (for example, The Smallpeice Trust[18] or IET Faraday Challenge Days[28]).
- Use STEM-themed awareness events[5] as an opportunity for tutors and colleagues to share information about STEM careers, for example, British Science Week[19], Ada Lovelace Day[20], Pi Day[21].



Offer extra-curricular STEM activities

STEM extra-curricular activities help students to develop their employability skills as well as their interest in a subject. Typical activities might include a STEM Club[27], Code Club[22], robotics competitions[11], attending STEM-themed events, Engineering Club and Science Club.

Incorporate STEM enrichment into your careers strategy:

- Work with your STEM departments to understand your current enrichment provision and which colleagues are responsible. Record this as part of your annual careers plan.
- Are your colleagues aware of the STEM-specific extra-curricular support available to them? Signpost resources[27], funding[24], competitions and events that you may be aware of through your careers networks.
- Raise awareness of STEM extra-curricular activities in the local community through your website, social media, newsletters and blogs.
- Support the sustainability of your STEM extra-curricular provision. Is your Senior Leadership Team aware of the importance that STEM enrichment plays in careers learning? Does enrichment form part of workload planning or is it in addition to the teaching timetable? Are there specific members of a department at risk of overloading?
- Encourage your colleagues to keep an attendance record for all STEM-related enrichment activities and competitions. These records can be used to profile which students are engaging in extra-curricular activities and support targeting of underrepresented groups in future activities.

Develop career learning in the curriculum with support from STEM employers

STEM employers can help to bring the subjects to life, giving real applications for the knowledge learnt in both STEM and non-STEM lessons.

Incorporate STEM employers into career learning:

- What STEM employer contacts do your colleagues already have and how are they used (ie presentations, activities, collaborative lesson planning)? Encourage your colleagues to share their contacts with you as they make new connections, helping to keep your STEM employer database up to date.

- Do your STEM employer contacts cover a wide range of different STEM sectors (ie healthcare, life sciences, engineering, manufacturing, digital, construction, finance and logistics)? (See Benchmark 5 for ideas to develop your network.)
- Support both your STEM and non-STEM colleagues to make their own contacts across STEM industries. Help them to consider how best to use employers in their curriculum; some employers will be able to provide student activities, others may be better suited to supporting curriculum planning with teachers.
- Work with your departments to plan STEM employer engagement opportunities within subject lessons, enrichment days and extra-curricular activities.
- Include curriculum-linked STEM employer activity as part of your careers strategy and review annually.

AN EXAMPLE OF ...

A STEM-themed challenge day

IET Faraday Challenge Days[28] are cross-curricular STEM activity days that draw upon and reinforce learning from science, maths, and design and technology lessons. The challenges give students the opportunity to research, design and make prototype solutions to genuinely tough engineering problems, encouraging the development of students' problem-solving, teamwork and communication skills within a real-life STEM context.

Recent challenges have included developing applications for the micro:bit, sports engineering linked with the Land Rover Ben Ainslie Racing America's Cup challenge, designing a new attraction for Thorpe Park Resort and assisting the engineering mission of the James Webb Space Telescope.

By taking part in an IET Faraday Challenge Day, students meet the criteria for achieving a CREST Discovery Award[24] and an Industrial Cadets Challenger Award[25].

IET Faraday Challenge Days also provide opportunities for students to work with STEM volunteers, who share their experience and insight into working in a STEM career.

To take part in an IET Faraday Challenge Day you can either:

- take part in an IET Faraday Challenge Day delivered challenge as a visiting school[28]
- apply to host an IET Faraday Challenge Day delivered challenge day in your school[28]
- run a DIY IET Faraday Challenge Day[16]. DIY Faraday Challenges enable you to run your very own challenge in your own time and on a theme that suits your students. Electronic resources and guidelines are provided by the IET for free.

AN EXAMPLE OF ...

An employer-linked programme of study for science

Parkside School[26] worked with a local engineering company, GESIPA, to develop careers links in their key stage 4 science curriculum. With support from their Careers Leader, colleagues made contact with a rivet manufacturer and arranged for a tour of their factory, as a training activity.

Following the tour and after discussions with the employer, the science department created a list of key stage 4 curriculum links to focus on for further development. These included:

Unit	Link content
Organic chemistry	Use of oil as a lubricant in machines
Chemistry of the atmosphere	Emissions from the employer site/machines, carbon footprint
Using resources	Life cycle assessment of engineered products
Energy	Energy costs and the efficiency of site machinery

The learning plans for each topic were updated, highlighting the employer careers links and planned opportunities to develop employability skills.

For example:

Year 11 GCSE Combined Science: Using Resources (six-week plan)

- student visit to the employer to look at the factory. Focus on the purpose of rivets and manufacturing process
- choosing the best metal to make a rivet
- life cycle assessments of a rivet
  - extracting of raw materials - to make wire coils
  - cost of metal and availability
  - manufacture of rivet (including energy costs)
  - manufacturing and packaging to suit customer
  - distribution of production – worldwide
  - use and operation during its lifetime - length of time a car is used for
  - disposal - most of the product is waste, scrap metal and recycling

References

[1] www.stem.org.uk/rxgajd

[2] www.careersandenterprise.co.uk/schools-colleges/gatsby-benchmarks

[3] www.careersandenterprise.co.uk

[4] www.stem.org.uk/stem-careers/

[5] www.stem.org.uk/lxfq39

[6] www.careersandenterprise.co.uk/our-research/careers-curriculum-what-works

[7] www.futurelearn.com/courses/linking-stem-curriculum-learning-to-careers

[8] www.skillsbuilder.org/

[9] www.careersandenterprise.co.uk/schools-colleges/gatsby-benchmarks/gatsby-benchmark-4

[10] www.stem.org.uk/stem-ambassadors/

[11] www.stem.org.uk/enrichment/competitions-challenges

[12] www.stem.org.uk/lxfq32

[13] www.stem.org.uk/lxfq35

[14] www.wisecampaign.org.uk/what-we-do/expertise/welcome-to-my-skills-my-life/

[15] www.healthcareers.nhs.uk/career-planning/resources

[16] www.education.theiet.org/faraday-challenge-days/diy-faraday-challenge-day/

[17] www.practicalaction.org/stem/

[18] www.smallpeicetrust.org.uk/

[19] www.britishscienceweek.org/

[20] www.findingada.com/

[21] www.piday.org/

[22] www.codeclub.org/en/

[23] www.stem.org.uk/lx656p

[24] www.crestawards.org/crest-discovery

[25] www.industrialcadets.org.uk/experience/challenger-award

[26] www.parksideschool.net/

[27] www.stem.org.uk/stem-clubs

[28] www.education.theiet.org/faraday-challenge-days/

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.

www.stem.org.uk