

WHERE CAN SCIENCE TAKE ME?

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Between 14 and 18 you are starting your career journey. You have the chance to experiment with different ideas and options, and construct a future that makes the most of your skills, interests and the available career opportunities. There are a huge number of opportunities in science. Some you have heard of, some you possibly haven't. For instance in healthcare everyone has heard of doctors, midwives and nurses but what about biomedical engineer, radiologist or orthotist?

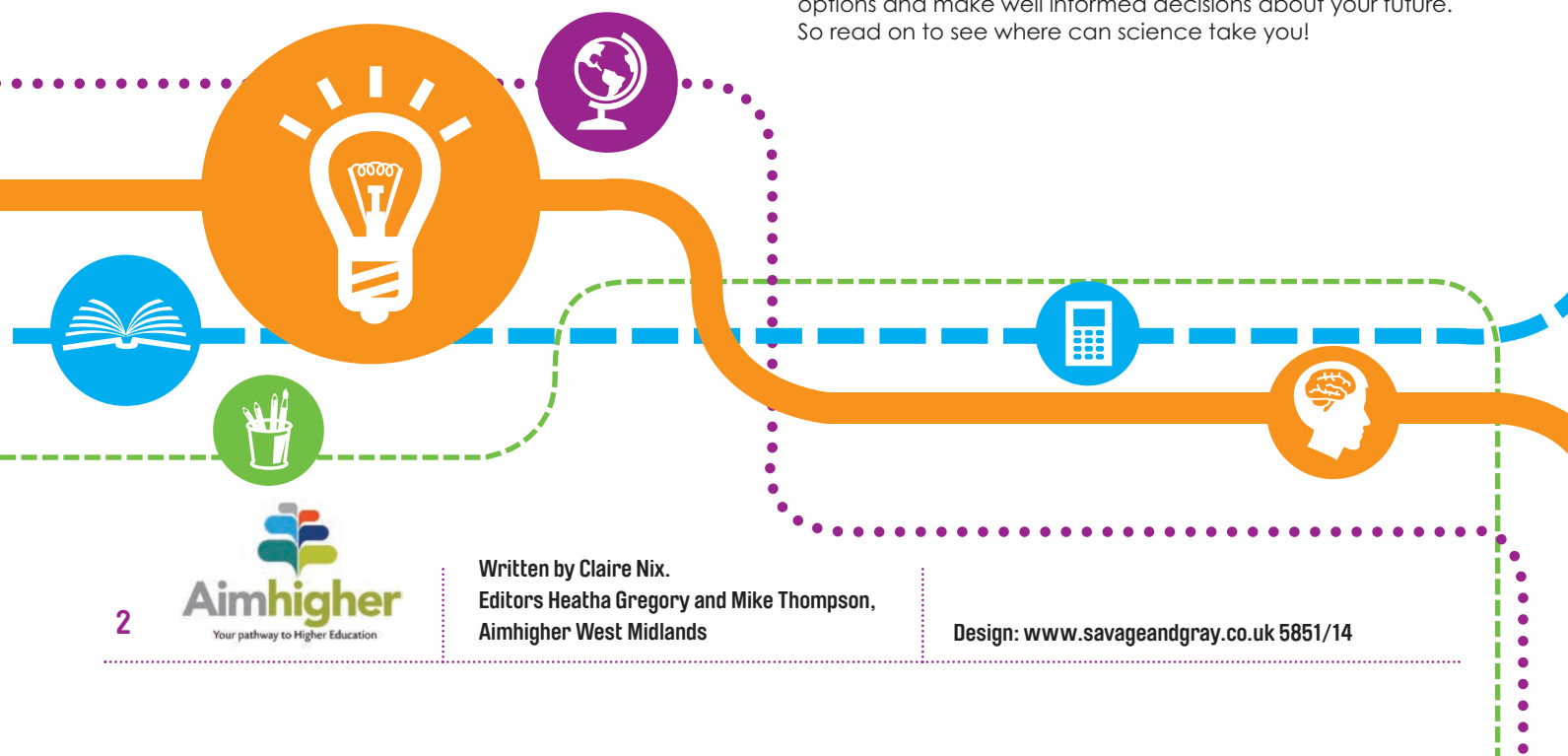
This booklet aims to:-

- Open your eyes to the wide range of careers and show how these can build on your school subjects
- Demonstrate the benefits of studying science, technology, engineering and maths (STEM)
- Show the different pathways available and encourage you to develop tactics for career exploration that maximise your success.

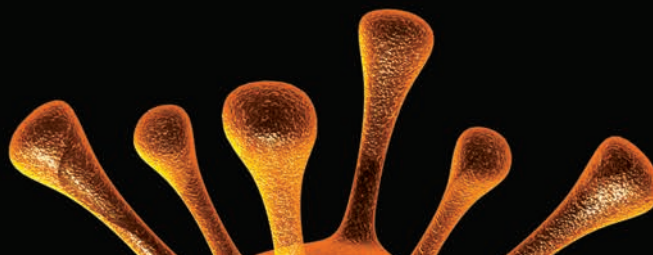
Many of the world's key challenges rely on innovations in science, engineering and technology, such as developing new sources of energy and improving fuel efficiency, discovering cures for diseases, feeding the world's growing population, providing access to clean water and preserving species and ecosystems.

In the UK, we are world leaders in robotics and autonomous systems. Our video games industry has had a string of recent international successes and IT professional occupations have doubled over the last two decades. We have businesses working at the cutting edge in space, aerospace, defence and pharmaceuticals. There are exciting jobs at all levels for young people with the practical, creative and problem solving skills of STEM. And yet, employers report widespread shortages of STEM skills - 43% of firms say they have difficulty recruiting staff with these skills!

This booklet is designed to help you investigate these exciting options and make well informed decisions about your future. So read on to see where can science take you!



THE NATIONAL QUALIFICATIONS FRAMEWORK



Whatever you choose to do in life, there is likely to be a qualification and pathway to help you do it. Three A levels and a degree is one option, but there are plenty of others! Getting the best possible qualifications will help you maximise your opportunities, so have a look at the courses on offer. See where science could take you!

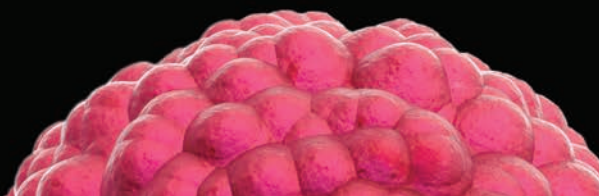


THE CAREER CHALLENGE

Most schools build links with employers, universities, and others to help you explore options and ensure you have the support you need to develop a great career. Even so, it can sometimes seem that there is a high wall between the world of work and you.

Make sure you use the careers support at school or college and hear first-hand from employers what jobs are like. This will help you build a clearer understanding of what's out there. Information in this booklet can help you make a start too...keep reading to see where science could take you !





Planning a future takes effort – but understanding and getting to grips with some of these key statistics will help you see that YOU must be INVOLVED and ACTIVE in making your future something you are happy with !

BUSINESS	YOUNG PEOPLE	
735,000 businesses report a skills shortage.	There were 853,000 unemployed 16 – 24 yrs olds in April 2014. ¼ million young people have been jobless for more than 1 year.	
British business will employ 1.86 million workers with engineering skills by 2020..... That's a lot by the way !	In a recent survey 19% of young women said they would consider engineering. 51% of young men said they would. There must be some good rewards in engineering to make 70% of our young people interested... reading the case studies later will help you spot some.	
67% of employers see working with secondary schools, to improve young people's employability, as a key priority.	Make sure you get direct experience of the world of work – find a work experience placement. Ask school and college to help you. If people you know work, ask them too.	
Science, technology, engineering and maths (STEM) skills are in short supply with 43% of firms reporting difficulty recruiting people with these skills.	Skills in science and maths open up huge career opportunities, many in areas that are not obviously science related, such as finance, marketing, teaching, the media, law and even food technology. That's why we've listed so many job ideas in the subject pages of this booklet.	
Two thirds of employers believe Apprenticeships should be a priority for government funding	Vocational training opportunities and Apprenticeships exist but you may not have been told much about them – ask questions at school or college, read through this booklet and search online to find out more.	
Men outnumber women in the IT industry by nearly 4:1. Opportunities are growing and the industry would like to encourage more females to be involved.	Numbers of girls taking IT GCSEs has fallen 26% since 2001	In higher education, only 15% of students on computing courses are women.
Numbers applying for higher education courses that offer a clear route into employment are growing. ■ Computing science up 12.3% ■ Engineering up 8.4% ■ Physical sciences up 6.6%	You need up to date information on competition for places, entry requirements and new routes and pathways. The information is out there – on the university and college websites, on the Apprenticeship websites – you have to look or call, or drop in and ask.	
New graduate engineers can expect to earn £22,000 while the average wage of a chartered engineer is in excess of £50,000.	The number of 24-30 year olds living with their parents has increased by 25% since 1996. Getting on helps in getting out.	
There has been a huge growth in trainee and Apprenticeship schemes in the science, technology, engineering and maths (STEM) sector including aerospace, healthcare and IT.	60% of young people think you have to have a degree to obtain a job in STEM..... Maybe you would like to find out otherwise ? Have a look at some of the case studies later in this booklet.	

WHERE ARE YOU NOW?

It probably does not seem long since you were starting out in Year 7 and now, here you are, about to make a decision about your Key Stage 4 options. Luckily there is a lot of help for you, your teachers, careers adviser and family in this booklet!

MOVING ON – WHAT NEXT?

A good foundation in English, maths and science is really important, so everybody studies these subjects at Key Stage 4 along with other subjects you choose. Many people stay at school to study where they have a good range of subjects to pick from. Some schools have strong links with local further education colleges so that they can offer a wider range of practical and technical courses. There are also two other places to study – there are not so many of these, so they may not be as near as your school or local college.

- Studio schools are where you can study a combination of vocational and academic qualifications which offer practical, project-based study alongside work experience placements.
- University Technical Colleges specialise in technical studies such as engineering, science, technology or manufacturing and offer a combination of vocational and academic qualifications.

“ I read the option booklet and talked to my subject teachers about what was involved in the courses. I wanted to make sure I would enjoy the subjects I picked and that they would help open doors in the future. The careers coordinator advised going for a broad range of subjects and to pick subjects that you are good at.

My parents were really keen that I studied a modern foreign language. I chose music, french and history. I really like maths and physics and hope to develop a career in sound recording. My advice is to really research the options and talk to as many people as possible about your choices. ”

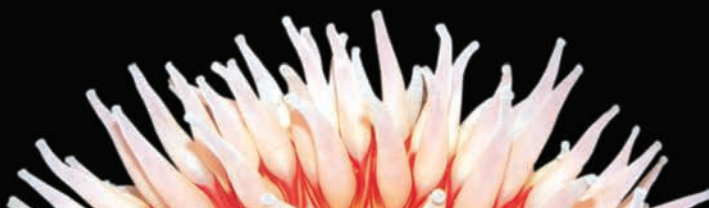
Lucy

HINTS AND TIPS TO HELP SET YOUR DIRECTION

- List 10 things that are important to you in life. Money? Being interested? Caring? Supporting? Creating? Leading? Following? Investigating?
- Talk to people who know you well. Teachers, form tutors and your family want the best for you and to help you think things through... show them your list of 10 things from above as a starting point
- What do you want to know about careers you're interested in? Make a list of 5 careers related questions you would like the answers to – How many years does an architect study? Does a nurse have to work night shifts? How many employers need ethical hackers?
- If you have a particular career in mind ask school what subjects you will NEED to get into the career. Do some online research. If you think you would like to go to university one day then www.prospects.ac.uk can help you find careers and explain which course you would need to get into them. If you want to study to be a Doctor – some universities need you to have 5 A*s at GCSE so do look into it soon!
- Pay lots of attention to subjects you like and are doing well in, but recognise that some subjects are compulsory and they can benefit you - nearly all employers are looking for good English and maths skills as a minimum for even the simplest of jobs
- Take opportunities you see around you. The British Science Festival, college and university open days, Future Finder events etc. to find out as much as you can about course and career opportunities. It's never too early! Many of them are free too.
- Get involved in STEM clubs, CREST awards and other extra-curricular activities. They are fun, challenging and often lead to other things you'd find interesting.

IMPORTANT

- Don't forget to check the entry requirements for higher level courses and jobs that interest you
- Don't underestimate the importance of qualifications – the number of jobs you can get without any qualifications is shrinking
- Don't choose a subject just because a friend is doing it
- Don't go for a subject on the basis of a teacher you particularly like – they may not be teaching you next year.



WHERE ARE YOU NOW?

By now you will be finding out which subjects you really enjoy, are interested in and good at! Working well, keeping organised and up-to-date will help you achieve in your current qualifications. These are the stepping stones to your next stage, so it really is worth trying your hardest. Good grades mean more opportunities later on.

MOVING ON – WHAT'S NEXT?

You are nearing the next stage of your learning journey and will soon need to make decisions about what to do after Year 11. The law says that all young people will continue with education and training until they reach 18, so what knowledge, skills and qualifications do you want to develop? This is the time to start thinking about what next.

There are some big decisions to make about what to study, where to study and what route will suit you best.

OVERVIEW OF OPTIONS

Full time education – you have a range of different courses to consider

Many colleges and schools enable you to combine A levels with more work related options.

ACADEMIC QUALIFICATIONS	OCCUPATIONAL QUALIFICATIONS	GENERAL WORK RELATED QUALIFICATIONS
AS and A level courses	Job related qualifications such as City and Guilds, BTEC or OCR Nationals or the new Tech Levels.	Qualifications that help you find out about an area of work such as engineering, sports or construction.
You can normally choose 3 or 4 subjects A levels are classroom-based and there is quite a lot of theory and written work.	Young people aged 16-19 normally work towards occupational qualifications at Levels 1 to 3.	These combine classroom learning with practical activities. You may be able to study these qualifications at Levels 1 to 3.

Apprenticeships - You can start work and get training on the job. You can earn while you learn. You can do Apprenticeships in nearly every industry from business to construction, information and communications technology to engineering and veterinary nursing to healthcare. The Apprenticeship website (back page) lists over 1,500 different job roles in over 170 industries.

Traineeships - You undertake work preparation, work experience and continue to develop your skills in English and maths, preparing you for the world of work.

HELPFUL HINTS AND TIPS TO SET YOUR DIRECTION

- Think about your choice of courses as a passport to work, training and maybe university – consider carefully which post-16 options will give you the best chance of success
- Speak to your teacher or a careers adviser and other young people who have followed the routes you are looking into
- To find out as much as possible about your options, look at prospectuses for 6th form and college. Go along to open days, taster days or other information events
- If you are considering higher education, check the entry requirements for the courses that interest you on the UCAS site www.ucas.co.uk. It will help inform your choices for post 16. In some universities, to study architecture, not only do you need science and maths, they are also looking for a visual arts qualification too. Do your research now to avoid getting caught out
- Try to build connections with people already doing the options that interest you – through face-to-face discussion at events such as the Skills Show or the British Science Festival or through email and online communities. LinkedIn can be a great place for this too. (see page 9)

IMPORTANT

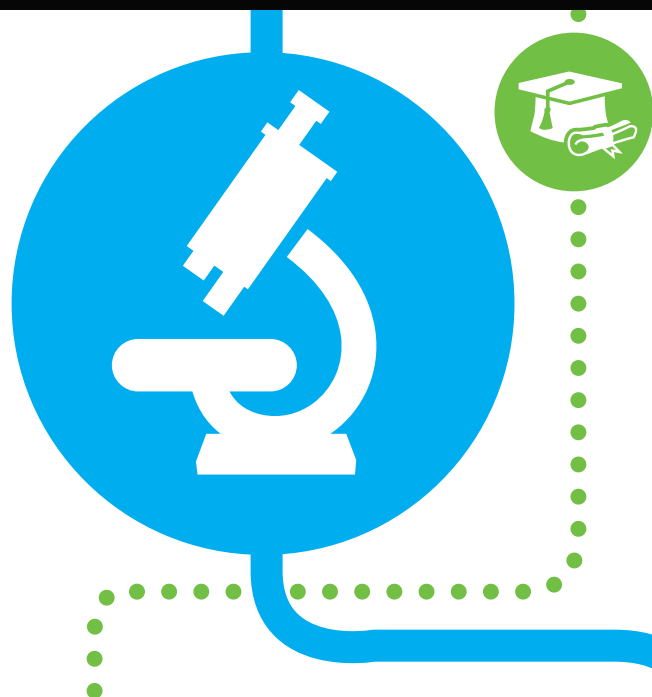
- Don't forget the importance of research – it is the only way you can find out what you need to know!
- Don't just 'google' your career ideas! Instead, browse the websites from this booklet and other ones recommended by your teachers. Not only will you get appropriate information, it will save you time too
- Don't just go with the flow – build a programme of learning that will keep you interested, motivate you and help you achieve your goals. The range of things you do (qualifications, work experience, volunteering etc.) should help you develop and get on!
- Don't forget most people say that there is a huge leap up from GCSEs to A level. You will have to do more independent learning and be under pressure to keep up. Those frees on your timetable really mean study time!

YEAR 12 AND 13

WHERE ARE YOU NOW?

Year 12 and 13 is a very short phase in your career journey, often a concentrated programme of only about 22 months. It is a time of growing independence and maturity and, for many, thinking about when you may leave home for the first time. There is a lot to pack into a short time – working to ensure you do as well as possible in your qualifications whilst seizing opportunities to gain experiences that will help you on your chosen route, testing out and talking through the range of opportunities open to you.

MOVING ON – WHAT'S NEXT?



APPRENTICESHIPS	HIGHER EDUCATION	OTHER EMPLOYER LED OPPORTUNITIES
<p>Apprenticeships are available at three levels:-</p> <ul style="list-style-type: none"> Intermediate (Level 2) Advanced (Level 3) and Higher Level (Level 4 and above). 	<p>Options include</p> <ul style="list-style-type: none"> Full time Honours degrees A growing range of part-time degree courses Foundation year courses may be available if you do not get the correct entry requirements first time round. These one year courses get you up to the level to take an honours degree e.g. Engineering, computer science or even dentistry. Remember though that it will mean paying an extra year of HE tuition fees 	<p>A growing number of employers offer opportunities for direct entry to work at 18 for students with good Level 2 and Level 3 qualifications. These vary from trainee quantity surveyors with construction firms to accountancy opportunities.</p>
<p>Apprenticeships are very competitive so you need to start to apply early in the spring term of Year 11.</p>	<p>There are around 37,000 different degree courses at 370 different UK institutions. That is without even considering the option to study in the US or Europe!</p>	<p>Talk to your careers adviser or teacher about these opportunities, also see back cover for useful links.</p>





HINTS AND TIPS TO HELP SET YOUR DIRECTION

- If you are interested in higher education make sure you attend HE Fairs and open days (look on Opendays.com) Several universities also offer master classes which give you an excellent insight into degree level study – search on their websites
- Check out the entry requirements – find out what you need to get on
- Check out a MOOC (Massive Open Online Course) These give you a completely free taster before considering a full-time degree course. See the Futurelearn website for 'discovering dentistry' or 'exploring our oceans' as well as courses that help you through interviews and study techniques
- Read magazines, journals and websites for sectors that interest you, such as New Scientist, Astronomy and Astrophysics, The Mole (for those studying chemistry) and Planet Earth
- Consider joining relevant professional institutions as a student member – e.g. The Royal Society of Chemistry, The Institution of Engineering and Technology or the Society of Biology. This will unlock a huge amount of specific information on the profession you are interested in
- Make the most of opportunities to give you an insight into different careers and opportunities. For instance ChemNet run by the Royal Society of Chemistry offers events, networks and practical help with tricky problems
- Consider using LinkedIn to establish contacts and research careers profiles and latest vacancies. You could use the network to connect with people who can help with work experience and give first hand insights into what it is like to work in their sector. There is a new area of the site specifically for students <https://www.linkedin.com/edu/?tab=prospectiveStudents> You can "Search Companies" under the Companies Tab and this leads you to the Company Profile page which is full of useful statistics on employee skills, what the employer does and where to find opportunities.

IMPORTANT

- Don't forget key deadlines you need to meet; Assignments, exams, interviews, application deadlines. Keep them on a calendar or in a diary that you see regularly!
- Don't think you can write your CV or personal statement overnight. Keeping a record of achievements and evidence will help prompt you. Liaise closely with your tutors and the careers team to get the best advice and support on how to present yourself effectively.

“ I am studying chemistry, maths and further maths and have also taken an Extended Project Qualification. (EPQ)

I have applied through UCAS for a Biochemistry degree, but I am also researching Higher Level Apprenticeship options in laboratory and health care science.

I am making a lot of use of LinkedIn to research companies and look at jobs that interest me. This also helped me find a two week work experience with a local healthcare company in their quality assurance department. ”

Chris



WHERE CAN MATHS TAKE ME?

MATHS is part of just about everything and maths skills are used in nearly all professions in some form or other, including architecture, science research, medicine, manufacturing and business to name but a few.

MATHS AT WORK

Maths and its applications have transformed the world. If we didn't have people with maths skills, we would be without these things...

The Turing Machine, developed by Alan Turing, set the direction for computer science and introduced the concepts of computation and algorithms. Search engines such as Google and Yahoo rely on maths and algorithms to manage data on a global scale – at a conservative estimate there are 182 million websites today.

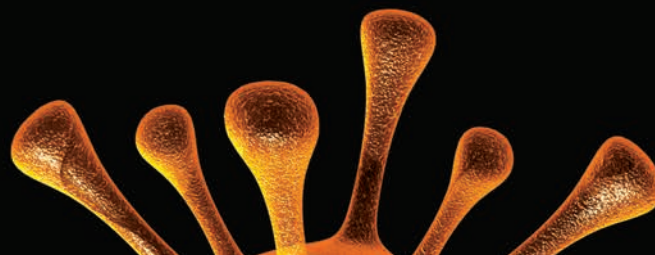
Forecasting of weather patterns and climate change indicators rely on mathematical skills...this information is used by the food production industry, the building industry and to alert the emergency services of extreme weather conditions that may threaten human lives.

Navigation systems for flights, shipping or space exploration - which use geometry, probability, algebra and calculus.

Maths is used in a variety of ways in business and finance for instance to analyse services and set costs at the correct level for profit.

Mathematical techniques are behind goal line technology and Hawk-eye is used in a growing number of sports.


$$(2+3)-1$$



SOME PROFESSIONS THAT USE MATHS

Maths teacher

Data analyst

Statistician

Investment analyst

Economist

Tax lawyer

Forensic accountant

Mathematical modelling analyst

ALSO...

Actuary

Architect

Structural engineer

Chemical engineer

Chartered surveyor

Bioinformatics researcher

Environmental Services Engineer

Aerospace Engineer

Hydrologist

Radiographer

Computer games developer

Fire engineer

Cybercrime analyst

Roller coaster designer

Cryptographer

To name just a few !



CASE STUDY

ALICE BELCHER – JAGUAR LAND ROVER HIGHER APPRENTICE

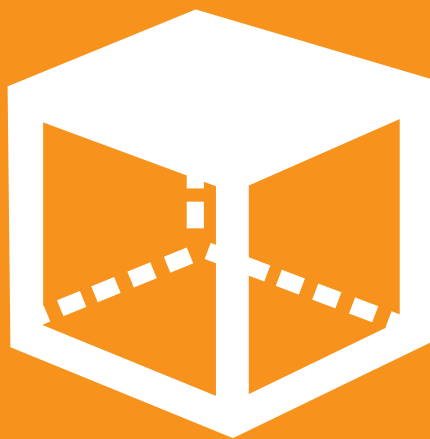
Alice joined Jaguar Land Rover's Higher Apprenticeship programme after completing A levels in maths, biology and physical education. She was offered places at Warwick and Leicester Universities but also looked at a range of apprenticeship programmes in automotive engineering. Alice now works in the Jaguar Land Rover Vehicle Configuration and Testing Systems Department. She spent her first year full time at college studying for a foundation degree and a series of NVQs. Now, Alice is back in her department and says "Now I have been integrated into my department full time, I absolutely love it. I enjoy the business of a manufacturing plant and being able to see the final product on a day-to-day basis."

Over the next five years, Alice will finish her foundation degree before going to the University of Warwick to complete a degree in Applied Engineering. She is also looking forward to being on placements in other departments to broaden her knowledge.

WHERE CAN MATHS TAKE ME?

Why not take a look at www.mathscareers.org.uk – here you'll find specific information that will be of interest. For links to lots more useful sites see back cover.

WHERE CAN DESIGN AND TECHNOLOGY TAKE ME?



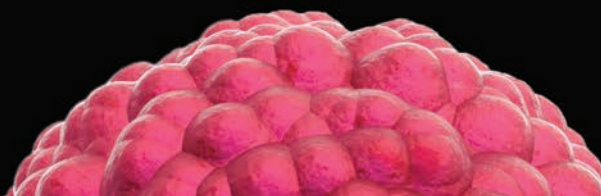
In **DESIGN AND TECHNOLOGY** you undertake creative and practical work using a range of different tools and materials. This covers a wide range of areas from food to engineering. The subject helps you develop in areas that are required in many professions, such as problem solving, working to a brief, logical thinking and attention to detail. Design and technology goes very well with maths and science subjects.

DESIGN AND TECHNOLOGY AT WORK

Design and technology covers a very broad range of work areas, from jobs where you design and develop products to practical jobs where you are responsible for making and maintaining things. Some jobs can be entered with a few GCSEs including technician level entries for those with around four GCSEs at grades A*-C.

Some designers work in technical areas such as engineering or industrial design, where they need to understand manufacturing processes. Others work in sectors such as textile or fashion. All will be faced with real and relevant problems to solve through design.

In a small engineering firm, designers may take their initial ideas all the way through to the final product. In larger organisations, designers will specialise in particular aspects of the product, being part of a much larger project.



SOME PROFESSIONS THAT USE DESIGN AND TECHNOLOGY

Computer aided design technologist
Design and technology teacher
Food science developer
Furniture designer
Medical engineer
Materials scientist
Production designer
Automotive design engineer

AND ALSO...

Sustainability design engineer
Engineering technician
Chemical engineer
Occupational therapist
Sound and lighting engineer
City and urban planner
Sports developer
Textile and surface designer
Naval architect
Architect
Aerodynamics developer
Quality assurance technologist
Land-based engineer
Technical support engineer
Industrial designer

To name just a few!



CASE STUDY

ZOE HAYCOCKS – ADVANCED APPRENTICE – RED BULL TECHNOLOGY

Zoe gained a National Diploma in Engineering at college and was keen to further her studies while earning at the same time. She went through a very competitive selection process with Red Bull Technologies to become one of ten apprentices taken on by the company. There were around 700 other applicants all interested in designing, engineering and building Formula one cars! She is now an Advanced Apprentice working on rotation around a range of manufacturing departments including the machine shop, inspection and composite departments. Zoe attends college to complete a Level 3 National Diploma in Engineering and says "It's very useful to put what I learn into practice at work."

WHERE CAN DESIGN AND TECHNOLOGY TAKE ME?

For more specific information try www.newdesigners.com, www.e-skills.com and www.bigambition.co.uk
For links to lots more useful sites see back cover.

WHERE CAN GEOGRAPHY TAKE ME?

In **GEOGRAPHY** you learn about the Earth's landscapes, peoples and places. It covers both social sciences; the study of cultures, societies and economies AND natural sciences; the study of physical forces and the environment. Geographers use scientific and mathematical methods to gather measurements for a variety of professions and to advise on a range of important issues such as sustainability, population trends, flood defences and alternative energy sources.

GEOGRAPHY AT WORK

Many jobs use geographic knowledge and skills. Some use specialist knowledge of aspects of physical or human geography such as: town and transport planning, chartered surveying, land and water management, sustainability, environmental consultancy, development, tourism, conservation, demography, housing and social welfare. A wide range of other jobs draw on the transferable skills geography develops, including fieldwork techniques, research and interpretation of data, report writing and environmental and social awareness.





SOME PROFESSIONS THAT USE GEOGRAPHY

Geographical information systems specialist

Geography teacher

Urban and city planner

Cartographer or photogrammetrist

Environmental consultant

Earth scientist

Ecologist

Climate change analyst

AND ALSO...

Conservation officer

Environmental scientist

Transport manager

Waste management officer

Environmental compliance inspector

Geologist

Meteorologist

Environmental health specialist

Hydrologist

Tourism officer

Architectural technician

Botanist

Climatologist

Expedition leader

International aid worker

To name just a few!



CASE STUDY

PERRAN HUTTON – OPERATIONAL UNIT CONTROLLER VEOLIA WATER (UK)

Perran Hutton is an Operations Unit Controller for Veolia Water (UK). He is based in Inverness but is also responsible for sites out in Fort William. He completed an MSc in Hydrogeology in 2010 following an undergraduate degree in BSc (Hons) Resource & Applied Geology (2008) at the University of Birmingham in the School of Geography, Earth and Environmental Sciences.

Talking about his experiences after his degree, Perran said

'During my MSc, I really benefited from the practical aspects of field work and visiting working sites where active remediation, operation and monitoring were taking place. Combined with in-depth lectures, the programme gave me a solid grounding in the technical industry. After graduating I successfully gained entry to the Veolia Water UK graduate training programme. This is a two-year project-based scheme where I worked on private finance initiatives as far north as the Highlands as a Process Engineer. The excellent technical knowledge and insights into the water industry I gained on the MSc made it much easier to jump right into projects and learn quickly on the job.'

WHERE CAN GEOGRAPHY TAKE ME?

These two sites have some really interesting information – why not give them a try ?

www.prospects.ac.uk/options_geography_job_options.htm
– a useful guide to careers using geography including a comprehensive list of contacts and resources.

www.rgs.org/OurWork/Study+Geography/Careers – the Royal Geographical website provides a range of career profiles and helpful careers advice.

For links to lots more useful sites see back cover.

WHERE CAN COMPUTER SCIENCE TAKE ME?

COMPUTER SCIENCE teaches skills and creativity in digital media and information technology. You learn how to use the principles of computer science, including logic and algorithms, to create products and solutions. There are strong links to maths, science and design and technology. It is a fascinating and exciting subject to get into and can deliver some great rewards to those who study and do well.

COMPUTER SCIENCE AT WORK

Digital technology is now used across industry and in millions of businesses and homes worldwide. We see how computer science has transformed our daily lives from the computer networks that connect up businesses and individuals across the world to computer controlled robotics that can lay cables deep under the sea, spray paint cars or defuse bombs!

If you understand computing you could be involved in so many ground breaking developments and innovations – 'bionic' limbs, hydrogen powered car, instant translation programmes or thought controlled devices!

The digital revolution has created jobs for computing professionals across the world, so in which country would you like to live?





SOME PROFESSIONS THAT USE COMPUTER SCIENCE

Computer forensics investigator

Artificial intelligence developer

Recording engineer

Software programmer

Computer software engineer

IT Systems designer

Technical architect

Cyber security officer

ALSO...

Database manager and analyst

Web designer

Computer systems analyst

Business analyst

IT consultant

Geographical information systems officer

IT teacher or trainer

Computer games developer

Graphic designer

Computer hardware engineer

Network engineer

Animator

Ethical hacker

Malware analyst

Remote sensing scientist

To name just a few!

WHERE CAN COMPUTER SCIENCE TAKE ME?

Have a look at these two websites for some great info. www.e-skills.com www.TheBigAmbition.co.uk

For links to lots more useful sites see back cover.



CASE STUDY

NIKITA PAL – APPRENTICESHIP IN SOFTWARE DEVELOPMENT WITH CAP GEMINI

Nikita Pal, from Sale, Manchester, has started a Higher Level Apprenticeship in Software development with Cap Gemini – one of our leading technology services company. After finishing A levels in chemistry, computer science and economics Nikita decided to apply for an Apprenticeship working in a team who develop and deliver Oracle software. "I like the hands-on experience I get. I'm using what I know and I can learn from my colleagues. I also get a lot of support." As part of her Apprenticeship Nikita is working towards a Level 4 City and Guilds Diploma in IT and Telecoms and an HNC in Computing and Systems Development. Nikita is looking forward to progressing onto a full degree in Computing and IT with the option to specialise.

WHERE CAN BIOLOGY TAKE ME?

BIOLOGY is the science of all living things, from tiny single cells to whole organisms. You study how things interact with each other and with their environment. The subject covers plants (botany), humans (physiology and anatomy) and animals (zoology). Biology is often studied with chemistry at A level for careers in healthcare but can work well in a range of other combinations.

BIOLOGY AT WORK

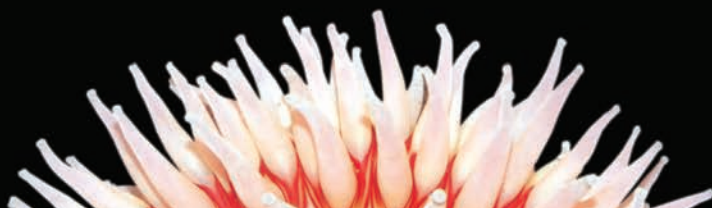
Biology offers a huge range of career opportunities across diverse sectors including healthcare, pharmaceuticals, food, agriculture, sports and the environment.

There are many different ways you could get involved. Think about the search for a cure for malaria...how different types of biologist would be involved to approach the challenge from a range of angles. Entomologists will study ways to control the mosquito population, immunologists will be studying how to help the body fight disease more effectively and pharmacologists will be looking at how to develop new drugs to treat the disease. Recently botanists found the plant *Artemisia Annua* to be worth researching further as a possible way to treat malaria!

Which area would you be most interested in?

Biologists also work in a range of roles in the food industry on the storage, transportation and packaging of food. They also look at how to develop and manufacture new products and how to manage crops in a range of different growing conditions. Biologists work with technologists and engineers to develop new forms of energy or biofuels from waste, algae or microbes. It's an exciting world out there!





SOME PROFESSIONS THAT USE BIOLOGY

Biomedical research scientist

Veterinary surgeon

Dietician

Entomologist

Sport scientist

Environmental health officer

Food technologist

Human / animal nutritionist

ALSO...

Physiotherapist

Biotechnologist

Microbiologist

Toxicologist

Botanist

Podiatrist/Chiropodist

Operating department practitioners

Medical laboratory technician

Nurse

Zoologist

Arboriculturalist

Exercise physiologist

Oceanographer

Public health communicator

Environmental consultant

To name just a few !



CASE STUDY

KIRAN MCLOUGHLIN – BIOMEDICAL SCIENTIST WITH EXOVA

Kiran McLoughlin's interest in biology at school led him to a work placement at a hospital laboratory in Peterborough. Inspired, he chose A Levels in biology and chemistry, followed by biomedical science at Aston University. Here Kiran's placement in the Cytology and Histopathology laboratory at New Cross Hospital in Wolverhampton gave him hands-on experience in the diagnosis of cancers and other cellular diseases.

Kiran now works for Exova, a multinational testing and assurance company based in Edinburgh, where he tests water for the presence of micro-organisms. He intends to start an MSc in Stem Cell Technology shortly, and then go on to a PhD.

Kiran's university friends have entered a wide range of careers. "I'd recommend biology to anyone who wants to develop theoretical knowledge and practical skills, and to anyone who doesn't know quite what they want to do as a career yet. A biology degree will prepare you for just about anything."

WHERE CAN BIOLOGY TAKE ME?

The following sites have some great specific information for you – take a look

www.biology-careers.org www.societyofbiology.org/education/careers www.sciencecareerpathways.com

For links to lots more useful sites see back cover.

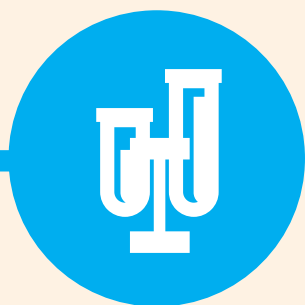
WHERE CAN CHEMISTRY TAKE ME?

CHEMISTRY examines materials in terms of their structure and their physical and chemical properties, how they interact and what role they play in the living world. Studying chemistry develops valuable knowledge as well as key skills in problem solving, numeracy, creativity and data analysis. Chemistry goes very well with the study of maths, and also works well alongside biology (if you are interested in a career in the health sector) or physics (if you are interested in engineering.)

CHEMISTRY AT WORK

The global challenges in relation to human health, energy and natural resources create opportunities for people who study chemistry. There are jobs in a range of sectors including energy and the environment (such as waste and water management), life style and recreation (such as cosmetics), human health (such as the pharmaceutical industry) and process industries (such as polymer and petro-chemical processing)

The UK is home to two of the world's largest pharmaceutical companies together with a large number of smaller world-class companies specialising in research and development and manufacturing and supply.





SOME PROFESSIONS THAT USE CHEMISTRY

Biochemist

Medical chemist

Chemical engineer

Forensic examiner

Cosmetic scientist

Dental technician

Nanotechnologist

Doctor

ALSO...

University lecturer

Environmental chemist

Food scientist

Dietician

Forensic scientist

Materials technologist

Cancer researcher

Bacteriologist

Clinical scientist

Pharmacist

Pharmacologist

Process engineering technician

Science journalist

Environmental consultant

Toxicologist

To name just a few!



CASE STUDY

STUART JAMES CANTRILL – CHIEF EDITOR OF NATURE CHEMISTRY

Stuart James Cantrill is Chief Editor of Nature Chemistry. He undertook a BSc in chemistry and bioorganic chemistry at the University of Birmingham and then went onto to do a PhD. When his supervisor relocated his research group to the University of Pasadena, Stuart went too!

As well as Nature Chemistry, Stuart and his team communicate regularly with the chemistry community through Twitter and their blog. Stuart says "We hope to inspire chemists to push the boundaries of our science even further and to think critically about the role that chemistry has to play in today's society. The efficient generation of clean and renewable energy is a challenge that chemistry is well equipped to tackle. And when it comes to the topic of human health, chemistry will continue to be a major player; vital not just for making and developing drugs, but also for providing us the tools that will help us gain a better understanding of the molecular basis of how the body functions."

WHERE CAN CHEMISTRY TAKE ME?

These sites are a great source of extra information www.sciencecareerpathways.com/life-science-careers/ www.bps.ac.uk/careers www.careers.abpi.org.uk www.rsc.org/careers/future www.whynotchemeng.com For links to lots more useful sites see back cover.

WHERE CAN PHYSICS TAKE ME?

PHYSICS is the science of matter and motion, as well as space and time. The subject deals with force, energy, mass and charge and helps us understand how the world around us behaves. Physics is often studied alongside maths.

PHYSICS AT WORK

Physics is a valuable step in training for most engineering disciplines and the broader telecommunications industry. As a subject it is seen as a strong indicator of problem solving ability and can open up a very wide range of career options including the energy industry, oil and gas production, engineering, manufacturing, health services, the computer games industry and the finance sector. Physicists are found in medical environments in areas such as diagnostic imaging and therapies. They are also found working on development software for the game and film industries. Sound engineering makes use of the skills and knowledge developed in physics and it is a critical foundation for careers in the space and satellite industry.


$$e=mc^2$$





SOME PROFESSIONS THAT USE PHYSICS

Aerospace engineer

Astrophysicist

Civil engineer

Geophysicist

Electronics engineer

Games designer

Structural engineer

Gravity researcher

ALSO...

Design Engineer

Lighting engineer

Astronomer

Manufacturing engineer

Audiologist

Automotive engineer

Medical physicist

Meteorologist

Sustainable energy researcher

Nanotechnologist

Sound engineer

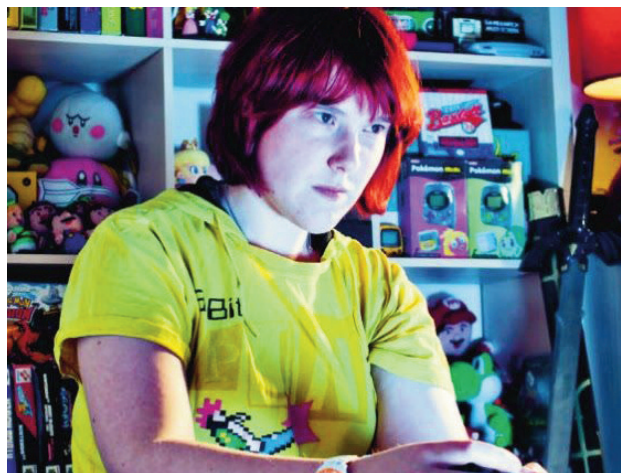
Ice scientist

Safety engineer

Armed forces and defence solution analyst

Radar project manager

To name just a few!



CASE STUDY

CATHERINE GOODE – GAMES DESIGNER WITH SONY COMPUTER ENTERTAINMENT EUROPE

Catherine Goode is a Games Designer with Sony Computer Entertainment Europe. She undertook a BSc in physics and space research at university and after graduating secured a position at Frontier Developments as a Junior Designer. Since then she has worked on Xbox360, PlayStation 3, PlayStation Vita and Android/iOS titles. "Games design is exactly what I love doing in life. I'm coming up with a problem I wish to solve, set up prototypes to try finding a solution, then testing out the results. The skills I learnt on my course are surprisingly transferable."

WHERE CAN PHYSICS TAKE ME?

The Institute of Physics is a great place to start looking for more physics related info, try www.iop.org/careers
For links to lots more useful sites see back cover.

FOR PARENTS AND CARERS

As a parent or carer you will want to help your teenager to succeed, whatever they want to do in life. It may not always feel like it, but research shows parents have a key influence on their teenagers' career choices!

You are in a great position to help them identify their interests and abilities. You will also be able to take a longer term view and help them consider the implications of their choices. In general, better qualifications bring a

return and there is still a significant gap in pay, exciting opportunities and job satisfaction between people with good qualifications and those without.

This booklet shows the value of STEM qualifications, not simply for careers in science, technology and engineering, but also as a sound foundation for a wide range of other satisfying jobs.

KEY STAGE 4 CHOICES

Courses – The General Certificate of Education (GCSE) is a key part of education at KS4. Some schools also offer the international GCSE (iGCSE). As well as full GCSEs, there are Double Awards and Triple Awards which are equivalent to two / three full GCSEs – science subjects are often offered like this.

The English Baccalaureate or EBacc is the name given to a group of GCSEs that provide a rounded general education, and is used by the Government to compare results between schools. The EBacc is made up of English, mathematics, history or geography, the sciences and a language.

Where to study – most people continue to study Key Stage 4 at their current school. In some areas, there are options to attend a 14-16 centre at a local further education college, or to move to a University Technical College or studio school. Be sure to check these options out to see if they would suit you.

POST 16 CHOICES

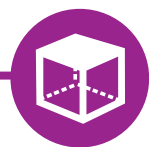
Courses and Pathways – The law now says that young people must continue with some kind of education or training until 18. So what is your young person going to do? Here are some options you could take a look at together:-

- Academic qualifications – The A level has undergone a bit of a change – A level exams will be taken at the end of two years' of study. AS levels will still exist, but will be a stand-alone qualification rather than a way of progressing to the A level.
- Technical level qualifications can help a young person with a specific career route into areas such as engineering, hospitality, computing or accounting.
- Applied general qualifications offer a broad preparation for a vocational area such as applied science, sports or business.
- An Intermediate Level Apprenticeship route is available should your teenager be aiming to gain qualifications, progress in a chosen career and earn a salary! Traineeships involving work preparation, work experience, maths and English are available for those not ready to start the Apprenticeship route.

Where to study – Young people can study in the 6th form at school, 6th form college, a further education college or with employers.

CHANGES AHEAD

BTEC (which stands for 'Business and Technology Education Council') is the name commonly used for a group of qualifications taken in more than 100 countries, at all levels, from pre-GCSE to Degree equivalent. BTECs are vocational and work-related courses, designed to accommodate the needs of employers and allow students to progress to further and higher education. From September 2014 Level 3 BTECs will become part of the new Technical Level qualifications (or Tech Levels), giving 16 to 19 year olds the specialist knowledge they need for a specific occupation, such as engineering, computing, accounting or hospitality. Tech Levels will have to be supported by professional bodies and employers, and students who take 1 or more Tech Levels, plus a maths qualification at level 3, and an extended project, will achieve the Technical Baccalaureate or TechBacc standard.





What can I do to help my teenager with their course and career choices?

Most schools provide an options booklet and there is a wide range of printed and online material available. Talk to them about the information and encourage them to go to open evenings and other events. It is great if you can go with them to listen, but let them do the talking. Make a list of questions together, including where the courses they are considering may lead. Check they are clear about any application deadlines and have them written on a calendar. Encourage them to make the most of exhibitions, university summer schools, talks and festivals – many of them are free!

How can my teenager afford to go to university?

No-one can deny that student finance sounds daunting – but it needn't be. No-one has to find the cash up front. Student Finance England (SFE) is there to help and students only repay their loan once they have finished their university course and are earning over £21,000 a year. Anytime their income is less than £21,000 they will not have to make repayments. There is also financial support in the form of bursaries from universities. Full maintenance grants are available for students with a household income of under £25,000 or partial maintenance grants available for household incomes under £42,611. These figures do change each year, so please be sure to check the current amounts.

www.moneysavingexpert.com/students

www.gov.uk/student-finance

What can I do if I am concerned about their choices?

Not aiming high enough? Overestimating their ability in a subject? Not done enough research? Being too heavily influenced by their friends? Common things to worry about. Show them that you want what is best for them and encourage them to talk through the reasons for their plans. It is important to accept it is their choice, but do gently share any concerns you have with them. It is always good to encourage them to have a back-up plan!

www.parentalguidance.org

My teenager sometimes finds science and maths difficult – how can I encourage them?

Helping them to see how these subjects are used in the work place and how employers value them can be motivating. For instance, graduates in chemistry, maths, physics and engineering will earn on average 30% more in their lifetimes than other graduates – and can access great travel opportunities and job satisfaction!

www.careersadviceforparents.org

www.futuremorph.org

How can I help them find work experience ?

You have contacts...the people you know have contacts – use them! Professionals are quite often pleased to help a young person with ideas of 'getting on'. If they cannot help you directly, they may be able to point you in the right direction. Many schools also have good links – but don't underestimate your links too. Ask around on your teenager's behalf and when you find a contact pass it over to them.

They don't play a musical instrument and don't enjoy sport – what else can they do ?

Employers and universities like to see well rounded candidates but this doesn't necessarily mean musical achievers or sports stars. Young people can show their dedication and team-working in many different ways; working at a youth club, dog walking, having a part-time job, writing a popular online blog, being a member of a gaming group. The key is something they do regularly, involving others, that they enjoy!

Look through the rest of this booklet – so much of the information is relevant to you and your young person and indeed their school and college too.



“What is clear is that no-one has found the magic bullet to providing good careers guidance: quite simply it is about doing a number of things, consistently and well”.

Sir John Holman Emeritus Professor of Chemistry, University of York, senior education adviser and former headteacher

Schools and colleges want to help students make well-informed decisions about their futures, and yet careers provision is quite regularly criticised. This booklet has lots of information that will be useful to you, your learners and their parents/carers.

This section is mainly for teachers and advisers and should help you ensure your STEM-related careers support is up-to-date and effective.

What can be done to help young people identify their interests and maximise their opportunities? How can we inspire them and give them the concrete information and personal support to put their plans into action? A recent Gatsby Foundation Report set out eight benchmarks for good careers work.

This table provides a checklist for reviewing your provision and provides pointers for development – with STEM always in mind !

A KEY MESSAGE

Young people are more likely to continue with STEM if encouraged to do so by a “significant adult” like a teacher, careers adviser, mentor or family member!

(from this year’s annual Targeted Initiative on Science and Maths Education (TISME) conference).

EIGHT BENCHMARKS

- 1 ENCOUNTERS WITH EMPLOYERS AND EMPLOYEES** - employers are often keen to provide the ‘pull’ to complement the ‘push’ from you at school/college.
- 2 EXPERIENCES OF WORK PLACES** - provide a powerful insight into different work sectors and jobs. Placements provide invaluable opportunities to hear adult’s career stories first hand and help young people develop fresh insights and practical plans.
- 3 ENCOUNTERS WITH FURTHER AND HIGHER EDUCATION** - pupils’ immediate concerns are often their next stage of study and there is huge value in visits to different institutions as well as contacts with older students from universities, colleges or Apprenticeships.
- 4 PERSONAL GUIDANCE** - every young person needs to sit with a trained professional to discuss their course and career choices. These should take place to support key stage 4, post-16 and post-18 transition choices.
- 5 A STABLE CAREERS PROGRAMME** - schools need a planned and progressive programme of careers education as part of the curriculum to help young people develop the skills and knowledge to explore options and put plans into action.
- 6 LEARNING FROM LABOUR MARKET INFORMATION** - access to up to date information is a key aspect of any good provision, along with the skill to use the information in a discriminating way.
- 7 ADDRESSING THE NEEDS OF EACH STUDENT** - it’s good practice to analyse the differing needs of students to target support effectively. Tracking student career hopes and achievement is an important aspect of good provision.
- 8 LINKING CURRICULUM LEARNING TO CAREERS** - subject teachers in your school/college have a powerful role to play in attracting pupils towards their subjects and the careers that flow from it.

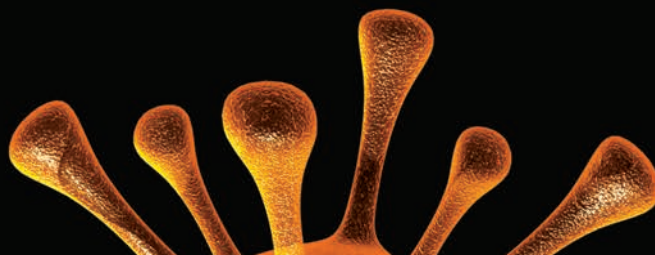


GOOD PRACTICE IN ACTION

- 1** A wide range of enrichment and enhancement activities involve employers. The STEM ambassador programme provides inspiring role models to excite young people. www.stemnet.org.uk and www.inspiringthefuture.org aims to get 100,000 employers into schools.
- 2** Many organisations support schools on STEM work related learning schemes and placements, for instance **Go4SET** for students in Years 8 through EDT (www.etrust.org.uk) the largest STEM enrichment provider in the UK. **LinkedIn** is increasingly a helpful tool to look at careers profiles and connect with individuals. Go to <https://www.linkedin.com/edu/?tab=prospectiveStudents>
Try your local **Chamber of Commerce** to forge great links too.
- 3** Do you use your powerful alumni to talk to students and provide stories for your school/college? They make very effective role models, and offer proud moments for all involved!
Use your universities! Many have outreach programmes, residential courses or student ambassadors. The national **Skills Show** and network of local events offer tasters and insights into vocational skills www.theskillsshow.com
- 4** Many schools make use of local and national organisations with trained specialists – why not ask them to deliver specific activities sharing their knowledge of labour market information and STEM careers?
- 5** **The Career Development Institute** www.cdi.net publishes a practical guide to careers and work related learning which explores learning outcomes and activities over the key stages.
The comprehensive framework provides a blueprint for integrating careers education into the curriculum of all learners.
- 6** How about strengthening links with your **Local Enterprise Partnerships** to help offer insights into jobs and trends?
The National Careers Service site has 130 job market information factsheets.
icould.com includes data on salaries, employment trends, gender balance, trends etc.
- 7** Some schools offer differentiated provision with partner support e.g. Birmingham University's **Academic Enrichment Programme** reaches out to young people with no family history of HE.
Schools that track aspirations and look at data on subject take-up and destinations are informed and can evaluate the impact of provision including equality and diversity support.
- 8** Teaching materials are available to raise pupil awareness of the applications of STEM and STEM career pathways. www.nationalstemcentre.org.uk/elibrary
www.futuremorph.org has a great range of supporting materials for schools and colleges
Prospects Education Resources carry a range of useful subject posters to purchase.

The National Quality in Careers Standard recognises local quality awards which validate excellence in provision. (www.careersengland.org.uk/quality) – if the work being carried out at your school isn't recognised already, why not look into it further?

LOOKING FOR MORE INFORMATION?



The following sites have some really interesting and inspiring information to help you find where you want to go, and how to get there...

INFORMATION, ADVICE AND GUIDANCE

<https://nationalcareersservice.direct.gov.uk> – Straight forward, impartial advice to help you take the right steps towards a great career. There are two channels available for young people – a helpline available from 8am to 10pm seven days a week – 0800 100 900 (There is a call back service if you are using a mobile) or browse information on more than 130 industries and nearly 800 job profiles online. You can also download a free Career Advice app.

www.apprenticeships.org.uk – This website helps you check out Apprenticeship training opportunities in over 1,500 job roles in a wide range of industries including engineering, financial advice and veterinary nursing.

www.ucas.com – A comprehensive source of information and advice about higher education. You can check out different subjects and the qualifications and grades that you would need to achieve. The site offers information on how to choose courses, different types of study, a personal statement mind map and even sources of information for studying abroad
<http://www.ucas.com/how-it-all-works/explore-your-options/alternatives-uni/studying-overseas>.

www.futuremorph.org – A comprehensive website that offers teachers, young people and parents information and advice on career opportunities from science and maths. The site keeps an up to date list of science and maths websites including:-

- **www.planet-science.com** – Articles, ideas and free activities for secondary science plus career ideas
- **www.wisecampaign.org.uk** – Helps promote female talent in science and technology
- **www.whystudymaterials.ac.uk** – Explores careers in materials science from motorsports to medical applications – who knew there was so many?
- **www.rsc.org/careers/future** – The careers site for the Royal Society of Chemistry
- **www.iop.org/careers** – The Institute of Physics has some informative careers resources
- **<http://careers.abpi.org.uk/Pages/default.aspx>** – Association of British Pharmaceutical Industry careers website explains what you need to know
- **www.tomorrowsengineers.org.uk** – Is a one stop shop on exciting careers in engineering and a source of information on events for schools
- **www.whynotchemeng.com** – A great inspiring site that provides all the information you need for a career in chemical engineering
- **www.mathscareers.com** – A range of resources and career profiles showing maths at work.

www.direct.gov.uk/studentfinance – Application forms can be completed online for the tuition fee and maintenance loan when moving on to higher education.

<http://www.moneysavingexpert.com/students/> – For a straight talking introduction to student finance and budgeting.

www.Notgoingtouni.co.uk – Great website for those wishing to look for opportunities other than just university.

www.yourlife.org.uk – A government backed campaign to boost the take-up of science and maths.

www.ukcoursefinder.com – Includes a study interests questionnaire to help you identify degree courses of interest as well as information on 50,000 different degree options.

www.prospects.ac.uk – Has informative pages about jobs for graduates and post-graduate study options.

www.opendays.com – Where most universities and colleges advertise their open days

www.russellgroup.org/InformedChoices-latest.pdf – A guide to making decisions about post-16 education. This covers the value of facilitating A levels which keep more options open for university degrees.

www.skills4uni.bham.ac.uk – A really useful, practical online module to support the transition from school to university.

EVENTS AND EXPERIENCES

www.etrust.org.uk – This site inspires future engineers and scientists through hands on courses and opportunities. There are sections in the website for teachers, young people, parents and carers.

www.theskillsshow.com – The Skills Show offers hands on experiences to inspire young people about skills, Apprenticeships and further education. The free national event usually takes place in Birmingham in the autumn. There are also a series of local Skills Show Experience events, which with the WorldSkills UK Competition, forms the Find a Future organisation. Check them out.

www.careeracademies.org.uk – Links schools with employers to help prepare young people for the world of work. Great support for teachers responsible for taking this forward.

www.thebigbangfair.co.uk – Fantastic annual event to help show the career opportunities for students who carry on with STEM subjects.

www.BritishScienceAssociation.org – Sponsors of the The British Science Festival and National Science and Engineering Week.

www.cc4g.net – Computer Clubs for Girls provides a framework for after school clubs to encourage young women to stay engaged in IT. There is an opportunity for a 30 day trial, after which there is a fee.

www.teentech.com – Run one day events to help young people see the wide range of career opportunities in science, engineering and technology.

OTHER PROFESSIONAL RESOURCES FOR TEACHERS

www.thecdinet.net – The professional body for the careers sector. Produces valuable resources and keeps the sector updated through regular e-newsletters, a magazine and research journal.

www.Prospectseducationresources.co.uk – An online directory of careers resources to support careers programmes.

PEOPLE AND NETWORKS

www.stemnet.org.uk – The STEM ambassador programme provides inspiring role models to excite young people.

www.inspiringthefuture.org – Aims to get 100,000 employers into schools.

<http://sciencegrl.co.uk/about/> – A grassroots organisation celebrating and supporting women in science.

www.linkedin.com/edu/ – Careers profiles and connections.