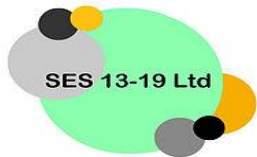


LO1

STEM in Action



L01

We will develop a scheme of work - a STEM Tutorial package which compliments the students main programme of study.

- These schemes of work will be **linked to the curriculum** the students are undertaking and where possible and necessary will be accredited. We will **invite individual partners to seek aligned (and existing) accreditation packages in their respective countries in order to harmonise the learning.**
- Accreditation opportunities will be carefully mapped and at an appropriate level of attainment. **The lessons will cover the 4 areas of STEM: Science Technology Engineering and Maths. There will be 5 lessons in each STEM area. Effectively, this will represent 20 hours of learning. The curriculum package will support Vocational learning in STEM with links to vocational career pathways.**
- The lesson plan will **include a power point which can be delivered and suggested materials. The lesson plan will be customised for each participating country locally. The lesson plans will be deliverable for the 14-19 age group.** The lesson plan will be positive and promote the involvement of underrepresented groups. Each lesson plan will have learning outcomes and will need to be pitched at the appropriate level of learning. This activity will be realized from January 2016 to January 2017.

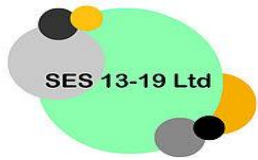


CONTENTS

1) Careers in STEM

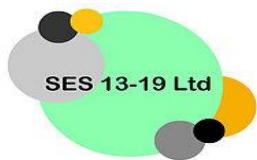
2) STEM Leaders - Understanding the big STEM issues

3) The Lesson Pool



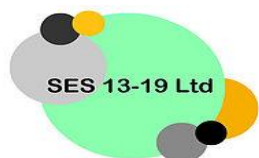
STemp Quest

Stem-Employability Quest



Part 1

Careers in STEM



Introduction

STEM Careers come in all different shapes and sizes. The number of options available to young people (and teachers) is often bewildering.

Many students focus on traditional STEM career goals – this is fine. But we also wanted to show young people the huge range of ‘other’ STEM careers available to them. So for example if you ask a student about careers in health most will reply with Doctor or Nurse. Both fantastic careers! But did you know that in a typical UK hospital there are over 100 related STEM careers available including Radiotherapists, Nuclear Engineers and even Hairdressing and Business roles?

We want to challenge stereotypes. We need more male nurses and more female engineers!

There is a huge STEM shortage for engineers. So for example the proposed new HS2 rail line can only happen once we have trained more engineers. Hence in Birmingham a new HS2 College is being built and this will train tomorrow’s HS2 engineers!

We want teachers and students to explore the wider STEM careers and develop skills and resources to succeed in what is a very competitive STEM world.

We also want teachers and their students to explore career entries into STEM careers. These careers are not just for high flyers but businesses are recruiting high quality apprenticeships at all levels.

We understand that many teachers feel uncomfortable talking about careers that they are not familiar with – we have provided scaffolding to build up activities and links too. Teachers may wish to use our A-Z of UK STEM careers to help them.

The aim of this resource is to provide teachers and students with a free resource that enables them to:

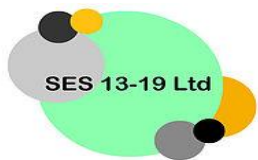
- ❖ Explore careers of the future
- ❖ Understand the changing nature of employment and the need for STEM skills
- ❖ Develop the employability skills to succeed in different STEM sectors
- ❖ Develop the key resources needed to obtain the first STEM job.

This resource can be used systematically or teachers may select items to meet the specific requirements of their students.

The Resource mirrors existing PSE qualifications such as AQA PSE and also supports GCSE and Advanced qualifications.

We recommend that parents/careers are given access to this resource – they can be very influential in helping young people make STEM careers choices.

We know that choosing a career path in STEM can be very difficult and we hope that this resources can help you.



Lesson 1 – Getting Started

What is STEM?

Narrow definition:

S:

T:

E:

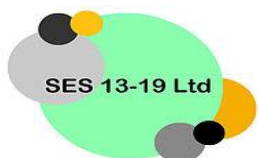
M:

STEM careers include?

Learning Objective:

- 1) To know the broad STEM headings.
- 2) To start a discussion on the wide range of STEM careers

Time: 30 minutes (may be less)



Lesson 2

What is?

What is a	Definition	Key Characteristics and skills
Scientist		
Technologist		
Engineer		
Mathematician		

Discussion

Do you think it is really possible to break careers down into these 4 broad headings?

Think about these careers – do they need skills from across a broad range of STEM?

- ❖ Pharmacist
- ❖ Civil Engineer or architect
- ❖ Games Designer for XBOX

Learning Objective – to explore the STEM headings further and to understand the need for multi skilled STEM people.

Time: 30 minutes



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This project is funded by the European Union.



Lesson 3

STEM is so much more!

Wider definition STEM subjects and careers include:

Medicine, maths, physics, chemistry, biology, geology, geophysics, geochemistry, media & gaming & graphics designers, chemical engineering, digital technology, pharmacy, genetics, micro biology, bioinformatics, computer science, acoustics, electronics, electrical engineering, environmental engineering, business planner, cybernetics/robotics, astronomy, civil engineering, electrical engineering, construction management, environmental science, ecology, mechanical engineering, materials science, plant science, food biosciences, soil science, zoology, marine biology, meteorology, satellite technology, accountants + auditors + actuaries, production management, land management, product design...

Task

Briefly research three of these curriculum and career areas – what do they entail?

Learning Objective: Students start to explore specific career areas and what these careers entail. Let students at least two of the three areas (teachers to select third – coverage of unusual careers will then be ensured)

Time 90 minutes

Resource – National Careers Service website -

<https://nationalcareersservice.direct.gov.uk/Pages/Home.aspx>



Lesson 4

STEM Growth areas are predicted as follows

- **Professional, financial and other services**
- **Advanced manufacturing:** managing businesses
- **Built environment:** designing low energy buildings, energy
- **Food:** improving safety (current issues around salt, fat and sugar), nutrition and ensuring supply for a growing world population
- **Low carbon economy** - sustainable energy businesses and homes
- **Life sciences** - health, pharmacy, disease prevention, age related illnesses
- **Digital media** - **software** writing, design, producing games

Research task

How many people are currently employed in the UK in these industries?

What is the projected growth?

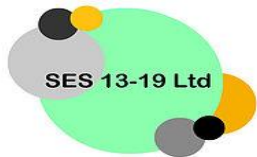
Can you find local examples of these businesses?

Learning Objective: Students to widen search of STEM industries

This task may be better suited to L3 students.

Time – 90 minutes

Suitable for paired working



Lesson 5

STEM Careers

Research Task

STEM Careers offer significant opportunities for young people.

Research

- 1) Average salary in the UK
- 2) Average house price or rental in their own home area and in the UK (look at Zoopla)
- 3) Minimum Working Wage

NOW...

Research the average starting salary for a person with STEM degree?

Learning Objective:

Money is a key driver for many young people. Developing money management skills is essential and also an awareness of pay differentials. This will help young people develop an awareness of their own income generation. AND the cost of living – starting here with house prices and rental values.

Time 30 minutes



Lesson 6

Personal Cash Flow Exercise

Managing cash is an essential business and employability skill needed by all STEM professionals

	Month 1 £	Month 2 £	Month 3 £	Totals £
Cash at start of the month				
Income				
Expenditure*				
Cash at the end of the month				

*** What will be your regular cash expenditure items? (Have you forgotten anything?)**

Did you balance your cash flow at the end of Month 3?

How could you meet any shortfall?

Why is it important to have a career with earning potential?

Learning Objective:

To develop further money management skills (itself a s STEM Skill)

Lesson 7

Earning Potential

Average STARTING Salaries

Table 13.0:

Average starting salary for graduates by subject area
(2012/13) – UK domiciled¹¹⁴⁷

	Mean		Mean
Medicine and dentistry	£31,853	Social studies	£21,482
Engineering and technology	£26,536	Physical sciences	£21,073
Business and administrative studies	£25,230	Law	£19,999
Veterinary science	£24,620	Agriculture and related subjects	£18,102
Architecture, building and planning	£23,499	Historical and philosophical studies	£17,945
Subjects allied to medicine	£23,191	Biological sciences	£17,511
Mathematical sciences	£22,975	Languages	£16,788
Computer science	£22,817	Mass communications and documentation	£16,353
Education	£22,471	Creative arts and design	£14,363
Combined subjects	£22,289	Average for all graduates	£21,725

Source: HESA/Destination of Leavers from Higher Education bespoke data request

Which of these careers are STEM related?

Learning Objective:

To identify STEM and non STEM careers. Making choices will have an impact on future income potential – we want students to understand this when making a career choice (other factors are equally important but this needs to be considered especially when the cost of degrees are factored in).

Time: 1 hour



Lesson 8

Local Labour Market

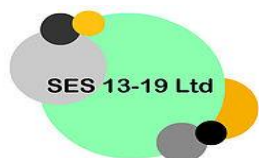
What is Labour Market Information? Why is it important to you?

- Identify 5 reliable sources for researching the local labour market where you live.
- How do you know that these are valid and reliable sources?
- Why is it important to make decision based on valid evidence?

Learning Objective:

Students can benefit greatly from understanding local opportunities. This task could benefit from an outside speaker from your local Chamber of Commerce or LEP.

Time 1 hour+



Lesson 9

Using reliable labour market information; identify three growing STEM employers near where you live.

THINK

How will you know whether they are STEM employers?

They may not appear to be a STEM Employer but they will still have excellent STEM Jobs:

Case Study

BET 365

Bet365 is an online gambling company offering sports betting, poker, casino, games, and bingo, as well as video streams on sporting events. Bet365 also offers an on-course bookmaking service. They are worth £1.5 billion and employ 3000 people.

Chairman [Peter Coates](#) also has the same position at [Stoke City](#) and in May 2012 Bet365 signed a three-year contract with the club to become shirt sponsors.^[7] In April 2016, the company became the new title sponsors for the [club's stadium](#) for the next six seasons, replacing fellow local enterprise the [Britannia Building Society](#).^[8]

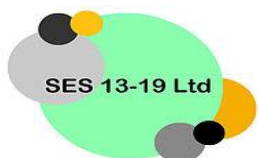
What STEM Careers are available at BET365?

Learning Objective:

1) STEM careers come in lots of shapes and sizes – students should explore large businesses on their doorsteps.

2) BET 365 offers some amazing careers but for some working in a gambling based industry would create ethical and moral dilemmas. This is supplementary area for discussion – there has been much debate about nuclear power, stem cell research, etc.

Time 1-2 hours – depending on the uptake of the ethical debates.

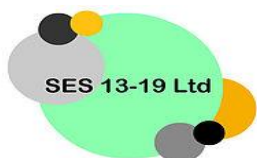


Lesson 10-11

Now that you have found 3 employers identify a STEM Career in each organisation.

Research these careers using the template below

<u>STEM career (1) :</u>	
Entry levels	
Qualifications needed	
Training offered?	
Experience	
Employability Skills needed?	
Professional bodies – an organisation you will be expected to join.	
Prospects – Where will you be in 3, 5 and 10 years time!!	



STEM career (2):

Entry levels	
Qualifications needed	
Training offered?	
Experience	
Employability Skills needed?	
Professional bodies – an organisation you will be expected to join.	
Prospects – Where will you be in 3, 5 and 10 years time!!	

STEM career (3):

Entry levels	
Qualifications needed	
Training offered?	
Experience	
Employability Skills needed?	
Professional bodies – an organisation you will be expected to join.	
Prospects – Where will you be in 3, 5 and 10 years time!!	

Learning Objective:

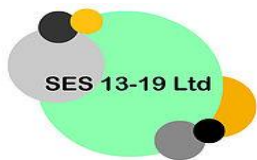
Students undertake Personal Planning activities

Students think about the required entry level, skills and qualifications needed for three future careers.

Students think about future career prospects

Time – 3 hours – suitable as home study.

NB This activity links in perfectly with AQA PSE Unit 1 (at all levels).



Lesson 12

Still need help selecting an appropriate STEM Career?

Take the People Like Me test*

What career areas does the self-review test suggest based on your choices?

Do you agree with the suggested career types?

Materials attached separately

*** This Quiz belongs to WISE and STEM Learning. It has been designed for free delivery in Schools and Academies by locally, trained and DBS approved STEM Ambassadors.**

Highly interactive sessions are aimed at girls and can also be delivered to 'Girls and Mums' sessions. Resources are attached.

Learning Objective:

Students will be able to identify and explore suitable career opportunities based on the PLM quiz.



Lesson 13

Using the National Careers Service Website

Research the career using the National Careers Service

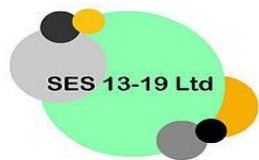
<https://nationalcareersservice.direct.gov.uk/Pages/Home.aspx>

Use the Dream Job function

Find a job you like? REMEMBER to print off/save electronically any searches you complete

Learning Objective:

To explore and research key career choices and options



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Lesson 14

BUT Will a Robot take my Job?

Not surprisingly....

Lots of jobs are being mechanised and replaced by technology.

You can check your career choice here:

Will a robot take my job: <http://www.bbc.co.uk/news/technology-34066941>

These are only indicators so don't PANIC but be aware!

You can research individual careers or search the full listings.

Which careers will most likely disappear?

How will a STEM career profile (your qualifications) help future proof* your employment prospects in the future?

* - What does "Future Proof" mean?

Learning Objective:

To investigate and consider the impact of robots on our future career choices and how this might impact on our choices.



Lessons 15-16

STEM Employability Audit

Complete the attached Employability SKILLS Audit.

Where are your employability strengths?

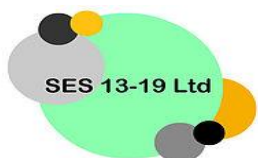
Where are your employability gaps?

How can you improve your employability skills?

Learning Objective:

To map out our own Skills Audit

Self-assessment and gaps in our own skills portfolio – identifying areas for future improvement.



Lesson 17-18

ACTION Plan

Identify three STEM SKILLS that you need to enhance.

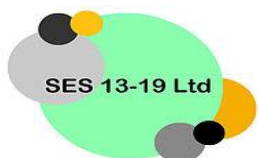
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2

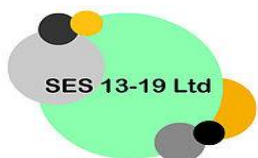
3

For each skill area:

<u>Skill area (1):</u>	
Target and required actions	
Timescale	
Success criteria	
Review Date	

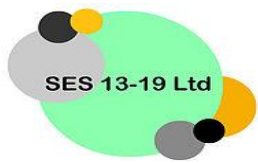


<u>Skill area (2):</u>	
Target and required actions	
Timescale	
Success criteria	
Review Date	



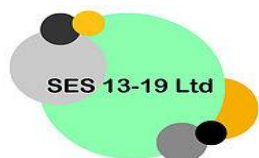
Skill area (3) :

Target and required actions	
Timescale	
Success criteria	
Review Date	



Learning Objective:

To develop an effective careers Action Plan



Lesson 19-20

Employer take notice!

Employers will use a variety of sources to assess your key abilities for a STEM role

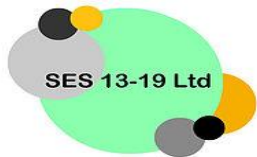
You now need to produce the following professional documents.

- 1) A completed application form that demonstrate the essential information requires**
 - 2) Produce a letter of application for a given job or course in an appropriate format and containing all of the relevant information for your chosen STEM career.**
 - if you are applying to University then you can complete this as a Personal Statement (the main content can always be transferred and adapted)**
 - 3) Produce a CV which includes all relevant personal information plus details of education and experience (USE THE COMPLETED SKILLS AUDIT ABOVE to help you.**
-

Learning Objective:

To develop a professional STEM CV

To Produce a suitable letter of application for a STEM career



Lesson 21

Personal Statement – SELL YOURSELF!

Produce a statement that demonstrates your interest/passion for the career chosen and why you are the most suitable candidate for the role (You wouldn't submit this but you will definitely be asked this question at interview). Be Prepared!!

This is a transferable document – you can use this to apply for a range of jobs and courses – BUT REMEMBER to adapt to suit your audience! (VERY Important!!)

Learning Objective:

To develop and produce a suitable personal statement suitable for a STEM career

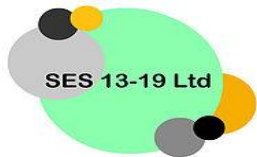
Follow up Task

Keep you CV updated

- Every time you accomplish a new skill, gain a standout experience, undertake some work experience – then UPDATE your CV
- This will save you loads of time in the future
- It will also mean that when a key job appears you will be able to quickly apply and use the updated CV to make your application quickly and professionally and without GAPS

Learning Objective:

To get into the regular habit of updating your CV based on experiences and successes.



Lesson 22

STEM Interview

You have been successful and obtained an Interview.

Preparation is key....

Task

Research the company. Make sure that you know:

1. What they do? What products and services they offer
2. How long they have existed, the journey they have made
3. Review their website – what does it tell you about them and their culture
4. Follow them on Twitter – what do their messages tell you?

Learning Objective:

To research a STEM company

To be prepared to speak confidently about a stem company and appropriate career



Lesson 23

Lifelong STEM Learning

What do we mean by Lifelong learning in STEM careers?

Why is lifelong learning important for a STEM Career?

Research 3 sources of lifelong learning in a STEM career you have chosen.

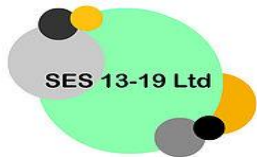
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3

Learning Objective:

To consider long term opportunities to continue STEM lifelong learning and the adaptability to survive in the ever changing STEM environment



Lesson 24



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Using Social Media to promote yourself!

What is social media?

What social media do you use?

How open is your profile on social media?

<https://www.youtube.com/watch?v=F7pYHN9iC9I#action=share>

What can you do to protect yourself online?

What does your online presence say about you?

Learning Objective:

To consider the benefits and disadvantages of a social media and your future career



Links with Qualifications (UK)

This package can be used in conjunction with most STEM Learning programmes:

UTCs with a Science/TECH/Engineering Base can use this as a Tutorial package in KS4 and KS5

Studio Schools who use project based curriculum – will be able to use this programme.

It could also be used within an Academy and school to supplement and enhance their Careers provision.

It can be used to achieve PSE Units with AQA (Units are available at Entry/Level 1 and Level 2) – see for example PSE Unit 1 Personal Planning Unit.

Students who study the Project (Level 1 and 2) and Extended Project (Level 3) will be able to draw on these activities for this purpose.

Part 2

Discussing

STEM in

ACTION



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Discussion topics for Science and Society

Further Discussion Topics (Based on AQA General Studies A Level paper)

Class discussions – could be based on initial group work and research

- **STEM is current/dynamic**
- **STEM is controversial and creates conflicts and tensions**
- **STEM hold the answers to tomorrows problems**

THEREFORE we need students to be excited by STEM and to understand the wider context of their learning

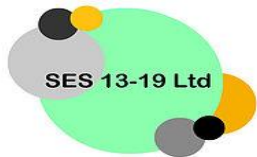
We want to create the STEM LEADERS of tomorrow - and for them to be well informed and to understand the wider implications of their learning and careers.

These discussion topics are a starting point.

We suggest that each topic should take at least around 1 hour to explore.

Students could be given the topics in advance to research and prepare their arguments.

Ground works for discussions should be set out in advance.



Lesson 1

Characteristics of the sciences (physical, life and earth)

- An outline of the nature of, and ideas on, the origins of the universe, space and matter

Faith v science

Links to Big Bang and current scientific research on the origins of the Universe

- Natural forces and sources and forms of energy.

Links to environmental and sustainability issues

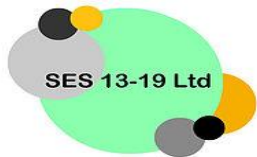
- The origin, extraction, processing, storage and distribution of the earth's resources.

Fossil fuels and impact

Issues around energy consumption

- The concept of life.

Linked to controversial ethical and religious issues such as DNA manipulation (Designer babies), Gene therapy, Abortion and Euthanasia



Lesson 2

Science and religion in society.

- Explanation and evaluation of human behaviour.

Psychological explanations of human behaviour including classical conditioning

How businesses use these theories – Maslow, Herzberg, Taylor, etc

- Characteristics of human and social behaviour and approaches to social studies and policy.

Sociological explanations of behaviour including family, education, socialisation, class, gender and race.

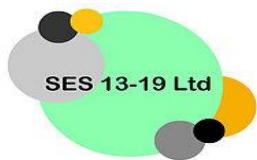
Links to social mobility

- The changing role of the family; class, gender, race, age and disability.

Our understanding of each of these and how each these have changed over time including Post Modernism (e.g. Extended families- nuclear families)

- Approach of different disciplines in social science to how we understand and evaluate people and problems.

Drawing links together.



Lesson 3

Social and economic trends and constraints

- Economic issues on a national and international scale

Classic discussion topics around employment & unemployment – the future nature of work, inflation, economic growth and waste

Impact of Brexit

- The workings of business, commerce and industry;

Profit motive

Impact of internationalism and technology – the WWW

Home working trends

- Impact of political and economic issues on science

Funding and commercial initiatives

- Society and the environment; aspects of employment and unemployment; education; poverty.

- Understanding of scientific methods, principles, criteria and their application.

Role of innovation

Pure v applied research



Lesson 4

The nature of hypothesis and theory in scientific development.

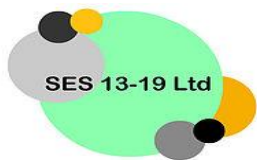
- The nature of scientific investigation
- Design and use of scientific investigations
- Design, manufacture and experience of equipment and technology in contemporary society and explanation of underlying scientific principles.

Trends in engineering

3D printing and impact

Nano technology

Quantum physics

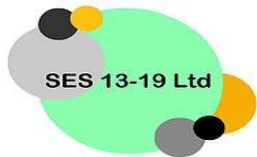


Lesson 5

The nature of scientific objectivity and the question of progress

- The nature and reliability of research methodology in science and the extent to which scientists can be impartial in their methods and contribution to scientific research and development.
- Background to scientific discoveries and emergence and use of scientific ideas.
Historical trends and developments
Women in STEM
- Recent developments in information and communications technology, transport systems, sport and leisure.

Lesson 6



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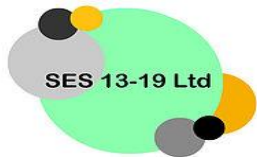


The nature of objectivity in social sciences

The nature and reliability of research methodology in social science and the extent to which social scientists can be impartial in their methods and contribution to society and social policy.

Ethical considerations

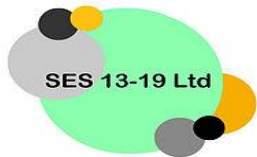
Unintended consequences



Lesson 7

Mathematical reasoning and its application

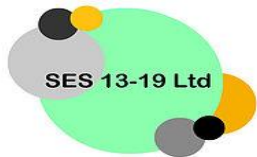
- Commenting on data and representations of data; interpreting results and drawing conclusions. Assessing their implications.
- The social, ethical and environmental implications of scientific discoveries and technological development
- Evaluating the impact and implications of new inventions, developments and techniques, and decisions to put them into practice.
- The influence of scientific applications on the quality of life.
- Developments in genetics and biotechnology, agriculture, food production and conservation; health, fitness and balanced diets; hygiene, disease and everyday medical matters; birth control; the use and abuse of drugs, including alcohol and tobacco.



Lesson 8

Moral responsibility of scientists

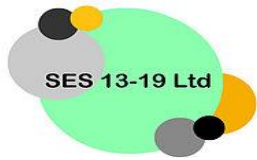
- Moral dilemmas associated with the work of scientists, technologists and industrialists; the application of moral dilemmas in a social and economic context.
- Professional codes of behaviour.



Lesson 9

Past and present relationships between technology, science and society

- The contributions of science and technology to human progress and lifestyles in different societies;
- Effects of industry on ecological systems; consumption of the earth's resources;
- Pollution and methods of waste disposal;
- The protection and conservation of the environment; genetic engineering and medical advances.



Part 3 - The Lesson Pool



LO1 STEM in Action



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Lesson Plans

“MY BEST” - STEM LESSON


We are not looking for detailed lesson plans – just great ideas, lessons that go well (with why) and unusual ideas and approaches The idea is to inspire others

Lesson Title	
STEM Topic	Science – Technology – Engineering – Maths – STEM (ALL) (Circle as appropriate)
Aims of the Session (Links to curriculum and qualifications?)	
Group and Age	
Lesson Description - Key ideas and/or novel approaches	(If you have supporting resources or presentations then please share)
What do you like about this session?	
How does this Lesson cater for women or students from a minority ethnic background	
Any other comments or suggestions	

Lesson 1 - Bar Code Challenge

“MY BEST” - STEM LESSON

Lesson Plans

Lesson Title	 Bar Code Challenge
STEM Topic	Science – Technology – Engineering – Maths – STEM (ALL) (Circle as appropriate)
Aims of the Session (Links to curriculum and qualifications?)	<p>This session introduces the idea of technology labelling and tracking products. Bar codes (and QR codes) fundamentally change Sales/Purchases/Stock Control and Marketing (when used with loyalty cards) through EPOS and related technologies. One code, when recorded, triggers an avalanche of business detail – but what are bar codes?</p> <p>Curriculum Links – Business A Level/ IT GCSE and A Level/ Design qualifications. Also links to maths – Big Data and algorithms.</p>
Group and Age	14 and or 16 (GCSE/BTEC or Advanced Level)
Lesson Description - Key ideas and/or novel approaches	<p>We begin by not stating objectives BUT by setting the student a challenge.</p> <p>The lecturer/teacher provides students with a plastic bag with around 12 personal items (my items typically include CDs/PS game/DVDs/Books/Magazines – they all must have a bar code!).</p> <p>This is a great way for the students to find out a little about your interests and as such can be a good ice breaker with a new class.</p> <p>The students have to agree which item is the ‘odd one out’ and why. I always make sure that the plastic bag is bar code free – they never select the bag!</p> <p>The activity usually takes around 10 minutes.</p> <p>We then move into a discussion about bar codes –what are they/how they work and their uses and purposes.</p> <p>Bar codes are everywhere and they track everything that we do.</p>

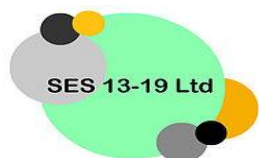


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	<p>We then move into a more formal lecture and session on Bar Codes. EPOS and the use of technology in business.</p> <p>(If you have supporting resources or presentations then please share)</p> <p>- Detailed lesson plan is attached and presentation</p>
What do you like about this session?	<p>I like to be open with students – I find this a very engaging activity. Students always enjoy this simple task. It is a great way for raising awareness. Technology is snooping on our lives.</p>
How does this Lesson cater for women or students from a minority ethnic background	<p>The lesson is neutral and as such can engage with all learners – I always select a range of items to ensure that all students can relate to the task. I never select items likely to cause embarrassment!</p>
Any other comments or suggestions	<p>There is an expectation that lessons start with Objectives – this sessions starts with some simple Discovery learning. It can be an alternate way to start a learning session. Students may expect but can get bored with a formulaic start to lessons.</p>



Digital Bingo (Lesson 2)

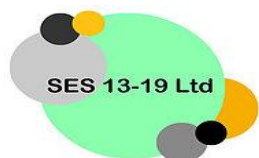
LO1 STEM in Action

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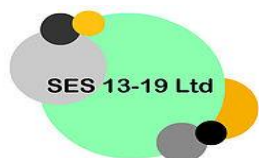
Lesson Plans

Lesson Title	Digital Bingo
STEM Topic	Science – Technology – Engineering – Maths – STEM (ALL) (Circle as appropriate)
Aims of the Session (Links to curriculum and qualifications?)	Students ARE technological experts – more so than their teachers normally. The idea of this game is to make students aware of their expertise – we want them to contribute and appreciate their own expertise! Links to Business/IT/Digital technology
Group and Age	14-19
Lesson Description - Key ideas and/or novel approaches	See Digital Bingo Sheet below (please change to suit your students). Get the students to tick the Aps they are familiar with. THEN Get the students to second tick the items they use on a regular basis THEN Split the students into groups and get them to consider the usefulness of each item in a business context (some more than others) THEN (Being strategic) Get the students to select just 5 items (and why they are essential) for a new start up clothing business. (If you have supporting resources or presentations then please share)
What do you like about this session?	Starts with student understanding and ends with a simple but effective task which tests their strategic awareness
How does this Lesson cater for women or students from a minority ethnic background	Business neutral – selection of Aps is appropriate for a wide audience
Any other comments or suggestions	



Digital Bingo

Uber/Virgin App	Instant Messaging	Word	Adobe Acrobat	Angry Birds
Skype	WhatsApp	Snapchat	Excel	Cashless Card/Loyalty Card
Dropbox	Facebook	Google	Digital camera	Words with Friends
Email	Twitter	Vine	E-Marker	Database
ITunes U	LinkedIn	PowerPoint	Scanner	AVG Antivirus
Pinterest	YouTube	Amazon	Turnitin	Google text to speech
Text	RealCalc Scientific Calculator	Ebuyer	Google Maps	Instagram
Kindle	Moodle/KLE	Ebay	Spotify	BBC News



Lesson 3

LO1 STEM in Action

Lesson Plans

"MY BEST" - STEM LESSON

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Lesson Title	
STEM Topic	Science – Technology – Engineering – Maths – STEM (ALL) (Circle as appropriate)
Aims of the Session (Links to curriculum and qualifications?)	Students to research and identify 10 of the most popular Maths based careers. See worksheet below. Links to students studying GCSE Maths
Group and Age	14-16
Lesson Description - Key ideas and/or novel approaches	Simple matching exercise – students should be encouraged to use the internet to research the jobs. Students asked to select one or two preferred careers and why. (If you have supporting resources or presentations then please share)
What do you like about this session?	Simple and easy task – student are encouraged to research new and often previously unknown career routes.
How does this Lesson cater for women or students from a minority ethnic background	These are accessible careers for all students.
Any other comments or suggestions	

TOP TEN MATHS Careers - Match the Job with the Description	
Job Title	Job Description
10) Hydrologist	a) I use maths, computer science and statistics to design biological solutions. The average starting salary is £80K. Who am I?
9) Pharmacist	b) Working in space –I design and use maths to predict the universe and solve problems in the empty darkness of the skies above. Who am I?
8) Computational Biologist	C) I apply scientific knowledge and mathematical principles to solve water related problems in society. Who am I?
7)Architect	d) My job is a research job predicting how businesses, people and the government will react to problems of scarcity - our wants and needs are greater than our ability to supply them! Who am I?
6) Surveyor	e) This may be the career with the highest employment rate. I measure medicines with precise measurements. I also have to know what the effects of the medicines are. Who am I?
5) Astronaut	f) I measure business performance about financial information, assisting investors and shareholders. This career is designed to keeping track of a company's money. Who am I?
4) Economist	g) I work in an office-like environment discussing plans with consultants and drawing designs for their upcoming building projects. Who am I?
3) Accountant	h) I use the latest technology and education to detect programmes used to transmit secret coded information. I can either create or destroy these encrypted codes that no one else knows about. Who am I?
2) Cryptanalysis	i) I am a problem solver who creates and develops ideas ranging from the new I-Phone to the new Jaguar Land Rover. Despite what some people think I often work in a clean office environment and use the latest technology. Who am I?
1) Engineer	j) I spend most of their time outside measuring roads, fields and lots. Without them, this world would be arguing over who owns what. This is definitely a maths career worth looking into. The more people on the planet, the more I am needed! Who am I?

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ENGAGEMENT EUROPE PROJECT

Course: Drugs of Abuse		Date & Time: TBA	
Topic: Spot test analysis of known and unknown drugs		Number of Students: 24	
Learning Outcomes:	<ol style="list-style-type: none"> 1. To structure own research investigation using the available equipment and resources. 2. Design a suitable (general) IR and/or NMR (analytical) method for relevant samples. 3. Using previously recorded spot test observations determine the possible identity of unknown drug samples. 4. Support and confirm the possible identity of all unknown drug samples and chemicals. 5. Provide a detailed analysis and interpretation of results (can also be done post-lab). 		
Time:	Activity:	Associated LO:	Resources:
10:00 – 10:30	Pre-lab talk: (Any announcements). Introduce the ‘crime’ scenario and explain the format of the labs. Brief safety talk. Split students into groups and ask them to devise a ‘plan of action’. Time for student questions.	1, 2	~50 copies of releases 2, 3, blank spot test tables and analysis proformas
10:30 – 11:30	Rotation system: Groups 1, 2 and 3 – Spot tests Groups 4, 5 and 6 – IR analysis Groups 6, 7 and 8 – NMR analysis	2, 3, 4, 5	
11:30 – 12:00	Rotation system: Groups 6, 7 and 8 – Spot tests Groups 1, 2 and 3 – IR analysis Groups 4, 5 and 6 – NMR analysis	2, 3, 4, 5	
12:00 – 12:30	Rotation system: Groups 4, 5 and 6 – Spot tests Groups 6, 7 and 8 – IR analysis Groups 1, 2 and 3 – NMR analysis	2, 3, 4, 5	
12:30 – 12:45	Summary: Conclude the lab session, allowing for student questions and to remind students of how to use the information in their reports.		
12:50 – 13:00	Students to clean work stations before leaving.		
Reflections:	<p>This lab session is designed to allow the students to plan and execute their own research investigation into drug analysis. During the lectures the students are introduced to various ‘spot test’ methods which are normally used to guide further analysis – very much like the students will be required to do.</p> <p>Building on previous use of the machines in Year 1 and Year 2 (1st semester) modules, students are asked to create their own IR and NMR methods. Students may use the library search option, although they should not solely rely on this information.</p> <p>Therefore they are asked to show a detailed breakdown of their analysis and confirm this with the chemical structures of each unknown compound.</p> <p>Due to resource availability not all groups are able to start with spot test analysis - This does not disadvantage any group.</p>		



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Course:	The Earth's Changing Surface	Date & Time	
Topic:	The Rock Cycle- surface processes	No. of students:	30
Learning Outcomes:	1. Understand the relevance of the Rock Cycle to a study of geology 2. Provide a unifying theory for the study of the Earth's Changing Surface 3. Introduce terminology for a number of processes which will be reinforced in future sessions 4. Introduce the students to the Geological Society website and signpost to the many resources within the facility 5. Introduce the concept of timing of geological events		
Time:	Activity:	Associated LO:	Resources:
30 mins	Starter exercise — sorting out the processes Gives the opportunity to test knowledge of concepts that probably came across at KS3 in science or geography	3,5	Thirty copies of exercise sheets
15 mins	Go through results giving opportunity to clarify and for dispute the answers	3,5	
30 mins	Hand out information sheets with two copies of the rock cycle diagram. Briefly talk about the use of conceptual models and the split between surface and underground parts of the cycle and that they will be covered separately. Introduce the Geological Society website (link is on the handout) and the table in the handout. Talk through the parts of the cycle utilizing the pictures and animations provided on the website. Ask questions regarding the locations pictured. — recognise/visited? Tie back weathering to work on minerals.	1,2,3,4	Thirty copies of handout 4
5 mins	Wrap up- key conclusions.		
Reflections:	The Rock Cycle is one of the unifying concepts or "Big Ideas" of Earth Science, providing a useful framework for considering many other processes and concepts. It introduces the importance of the interconnectedness of the different processes, and there is room for other cycles to be fitted into the detail of it. As other topics are taught, they can be related back to the Rock Cycle, so it becomes the Story Arc for the understanding of the majority of the module, hence why it is the second topic to be taught after the basics of minerals and rocks has been presented.		