



INNOVATION CHALLENGE



TEACHER TOOLKIT.

Enhance your students' understanding and knowledge of enterprise, entrepreneurship and employability skills.



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INTRODUCTION.

Welcome to this Innovation Challenge toolkit! We hope you find it useful! Innovation is all around us; every day businesses are set up and new products or services created. Companies House states that around 500,000 new businesses are registered every year in the UK, with an average of 30,000 new products launched.

BACKGROUND TO THE PROJECT.

This challenge is designed to engage your students with the process of innovation by identifying problems in their local community and creating innovative products or services to solve them.

The challenge will introduce them to the world of innovation, taking them through the various stages from coming up with an idea to commercialisation.

The students will set up a small team (perhaps as part of an after-school Innovation Club) to work on the problem, while taking part in a number of related activities

throughout the challenge. Their product or service must outline how it addresses and aims to solve the problem they have identified in their local community.

The students will work through modules including business planning, marketing, employability skills, pitching and finance.

The challenge is designed to enhance their understanding and knowledge of enterprise as well as improving their confidence and motivation.

OUTCOMES FOR STUDENTS

- Students feel empowered and informed to make confident choices about their future career options, especially in relation to STEM careers where there is a severe recruitment shortfall
- Students have a greater awareness of 'innovation to commercialisation' which brings societal benefits and stimulates the economy, which they can play a part in
- Students have enhanced insights and abilities in transferable employability skills
- Students have a better understanding of innovation, enterprise and entrepreneurship

OUTCOMES FOR TEACHERS AND SCHOOLS

- Teachers will have confidence and access to high quality resources for applying real world context, innovation processes and knowledge to enhance their lessons
- The innovation challenge is embedded within the schools STEM Agenda and improvement plan, allowing young people to develop valuable skills such as teamwork, creativity and innovation
- Schools have greater links with local industry, supporting the sustainability of the programme

THE CHALLENGE

THE CHALLENGE:

We are inviting students to come up with an innovative solution to a problem in their local community. Using the guidance in this toolkit and working through the suggested activities, the students will set up their own business in school and pitch their product or service to a judging panel at a regional final.

FORMAT:

The challenge will take approximately 12 hours to complete and can be delivered either as an after-school club, during curriculum time or as part of an Enterprise Week. Each team will be provided with an 'Innovation Ambassador' from a local company who will support the team throughout the challenge.

PRIZES:

Winners from each region will receive an investment of £250 to allow their business idea to grow. Second and third place prizes will also be awarded. All participating team members will receive a certificate.

WHEN:

The competition will be launched to schools after Easter. Business ideas have to be pitched to a judging panel at two regional finals (one in the North East and one in the West of England).

WHAT TO SUBMIT:

Teams should present their business journey using videos, drawings, photographs, posters and any other information that they have collected (including any prototypes or samples) while working on the challenge. They will also need to submit their business model canvas and profit and loss account.

TIME:

We recommend that your students spend around 12 hours on this project.

NOTE

There are lots of activities included in the toolkit that the students can participate in. The activities that are directly related to the challenge (and need to be completed) are highlighted with a thick coloured border at the end of each session and entitled "Challenge Activity."



USING THE TOOLKIT.

This toolkit has been split into ten separate sessions:

- 1.** What is Innovation? – this session takes a closer look at the innovation process and the typical characteristics of innovators.
- 2.** Research – this session will encourage your students to research a problem or challenge in their local community. The students may choose to do online research or may investigate with family members, teachers or fellow students.
- 3.** The Big Idea – a creative session where the students come up with possible solutions to the challenges highlighted by their research.
- 4.** Employability Skills – a closer look at the eight essential employability skills identified by employers.
- 5.** Project Management – students are tasked with coming up with a project plan to implement their idea using tried and tested business tools. This session will look closely at the skills within the team and, as a result of this, allocate roles and responsibilities.
- 6.** The Business Model Canvas – A robust plan is essential to the success of any business. Using a Business Model Canvas template, students will be asked to complete a one-page overview of their business.
- 7.** Show me the money – This activity will centre around the finances of the company where students will look more closely at the income and expenditure of their business. They will complete a cash flow forecast and a profit and loss account using standard business templates.
- 8.** End Product – A creative session where the students look closer at the design elements of a product and create either a model/prototype of their product or a poster detailing their service.
- 9.** Who do you think you are? – In this session students will understand the importance of a company or product name, what a target audience is and the use of promotional tools.
- 10.** The pitch – This session focuses on how to deliver a successful pitch. It has handy hints and tips on what to say (and more importantly what not to say!) to win an investment

It is recommended that the sessions are completed in order, although this is not essential.

ACCOMPANYING VIDEOS .

There are a series of short videos accompanying this toolkit which will help you through the challenge. The videos focus on Marketing and Branding, The Innovation Process, Pitching and Employability Skills. All videos are available to download from the resources section of the STEM Learning website which can be found by clicking on this link

<https://www.stem.org.uk/cxhspm>

SESSION 1

WHAT IS INNOVATION?

LEARNING OUTCOMES

Students will...

- Have a greater understanding of innovation and the innovation process
- Identify key characteristics of innovators

THE INNOVATION PROCESS.

According to the Oxford English Dictionary, the definition of Innovation is “a new method, idea, product etc.”

The innovation process is the journey a business takes from identifying an opportunity and coming up with the initial idea, through development and then onto commercialisation. It can be broken down into 3 phases

- 1. Conception** - Idea generation and evaluation
- 2. Implementation** - Product or service development and testing
- 3. Marketing** - Launching it in the market place

The innovation process usually starts with a problem or challenge requiring a solution. The final product or service is the result of solving the problem. Companies need to continually innovate to adapt to an ever-changing marketplace. Without innovation companies can become static and lose their competitive edge.

WHY INNOVATE?

- 1. To solve a problem**
- 2. Respond to changing marketplace**
- 3. To harness new opportunities**
- 4. To remain competitive**
- 5. To survive**



10 CHARACTERISTICS OF INNOVATORS

Not everyone is an innovator - someone may identify a problem but not have a solution or may have had a good idea but lack the confidence to take it any further. Innovators tend to have the following characteristics:

- Creativity
- Good at solving problems
- Seize an opportunity
- Risk takers
- Resilient
- Hard-working
- Welcome change
- Curious
- Persuasive
- Leadership

THE INNOVATION PROCESS VIDEO 1.

There is a short supporting video which accompanies this section, highlighting the key steps in the Innovation Process. You can access this video by clicking on this link <https://www.stem.org.uk/cxhspm>



Failure is an option here. If things are not failing, you are not innovating enough.

Elon Musk



SESSION 2

RESEARCH.

LEARNING OUTCOMES

Students will...

- Research their local community and identify any challenges
- Turn those challenges into potential opportunities

THE IMPORTANCE OF DOING YOUR RESEARCH.

All of us encounter problems every day of our lives. Most of the products we use today are the result of someone identifying a problem and solving it.

This challenge encourages your students to investigate their local community and identify current issues and/or problems that affect

people on a daily basis. If everyone in the class came up with just one problem, they would have around 30 potential business opportunities! It is always good to have more ideas at this point. The fun begins when the students work through each one and decide which idea(s) they are going to take forward.



If your dreams do not scare you, they are not big enough

Ellen Johnson Sirleaf

CHALLENGE ACTIVITY 1

To understand what challenges their local community is facing, your students will need to implement some form of research. This research will help them

to find out further information on any local challenges, when it happens, why it happens and who is affected by it.

They could do this in the following ways:

1. Speaking to family and friends
2. Asking fellow students, teachers and governors of their school
3. Using the internet to find articles that have been published recently about their community
4. Listening to and reading local news reports
5. Finding out if there is a neighbourhood group set up where they could ask for help
6. Speaking to the local council to ask what issues they are aware of in their community

Ask your students to undertake some form of research. You may like to split the students up into smaller groups and task each group with one of the 6 research methods listed above.

Ask them to consider the following questions:

- **What is the problem?**
- **Where does the problem happen? Is it a local problem or could it affect a wider geographical area?**
- **Who does it affect? Is it a specific group of people?**
- **Why is it a problem and why does it need a solution?**
- **How are you going to solve it?**

STUCK FOR AN IDEA?

The National Citizen Service Changemakers programme is a way that your students can help with challenges in their local community. Further information can be found at:

<https://wearencs.com/changemakers>

SESSION 3

THE BIG IDEA

LEARNING OUTCOMES

Students will be able to...

- Convert challenges into solutions
- Discuss and fine tune their ideas
- Use traditional business tools to generate ideas

For any business to succeed the company must identify a product or a service that is needed (although your customer might not know that they want or need it yet!) and that people are prepared to pay for. If your students have completed their market research in the previous section, they may already have a few ideas to work on.

When coming up with an idea, ask your students to consider the following:

- **Is their idea a product or a service?**
- **What is it?**
- **Who is it for?**
- **How are they going to make it?**
- **How much are they going to sell it for?**
- **How are they going to let people know about it?**

ARE YOUR STUDENTS STUCK FOR IDEAS?

This might help them:

1

What are the current trends?

Ask them to look at recent developments or trends and ask them to predict what they think the next one might be.

2

Look for problems

Ask your students to write down problems that they encounter on a daily or weekly basis, or products that they have struggled with that perhaps could benefit from some minor changes. What about a product that they have tried to buy, but haven't been able to find? Suggest that they might like to ask their wider networks such as their family or friends to do the same. Hopefully, they will have a long list of problems that need a solution!

3

Don't reinvent the wheel

There are lots of great ideas already out there but could they make some slight changes that might help solve a different problem? Is there something available in another country that they have seen that is not currently available in the UK?

4

Play to their strengths

Ask your students to think about their skills and those of their teammates. Is there anyone who is good at fixing things? Someone who is a good baker? An artist? Can you use these talents in your business? What about any hobbies that the team might have?

5

Bring something up to date

Ask your students to look for something that could do with updating. Perhaps something that hasn't changed for a very long time that would benefit from being modernised.

6

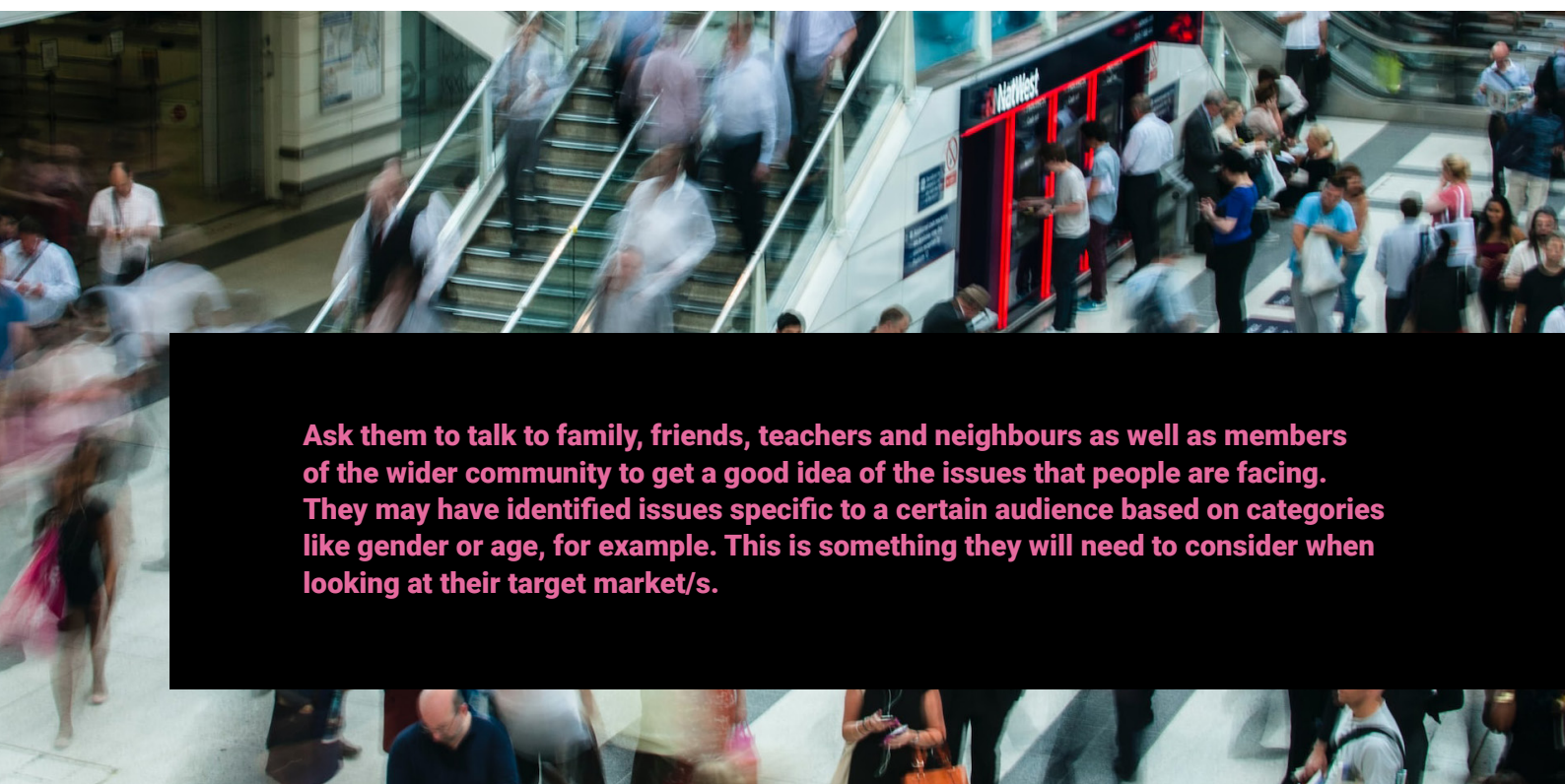
Make something cheaper

Is there a product that your students could make and sell cheaper just by using different materials, making it smaller or by changing it slightly?

7

Talk to people

Remind your students that their product or service needs to have customers! They may have come up with a fantastic idea but if no-one wants to buy it, then they are destined to lose money!



Ask them to talk to family, friends, teachers and neighbours as well as members of the wider community to get a good idea of the issues that people are facing. They may have identified issues specific to a certain audience based on categories like gender or age, for example. This is something they will need to consider when looking at their target market/s.

CHALLENGE ACTIVITY 2

Your students probably have lots of ideas and although many of them may work, it is important to fine-tune them down to a manageable number. Ask them to think about the following questions for each idea:

- 1. What is the product or service?**
- 2. Why is it needed?**
- 3. Who is it for?**
- 4. What are you going to need to make it happen?**
- 5. How much are you going to charge for it?**
- 6. Why will people buy it?**



SESSION 4

EMPLOYABILITY SKILLS

LEARNING OUTCOMES

Students will be able to...

- Understand the eight essential employability skills as defined by the Skills Builder framework
- Familiarise themselves with the 13 skills required for Enterprise
- Assess the skills and competencies within the team and allocate suitable roles

SKILLS BUILDER

Throughout this Innovation Challenge, your students will be using several essential skills. It is important that they recognise when they are using these skills and therefore have a better understanding of what they got out of the experience. This is where the Skills Builder framework can help.

Skills Builder is a universal framework of eight essential skills that has been developed by educators, employers and youth organisations to ensure that everyone is speaking the same language in relation to skills.

These skills focus on the outcomes of making each pupil an effective learner, a successful employee, and ultimately a happy and well-rounded adult in the future. They are: Listening, Speaking, Problem Solving, Creativity, Staying Positive, Aiming High, Leadership and Teamwork.

Further information on each skill is listed below:



LISTENING

The ability to listen and understand information



SPEAKING

The oral transmission of information or ideas



CREATIVITY

The use of imagination and the generation of new ideas



PROBLEM SOLVING

The ability to find a solution to a complex situation or challenge



AIMING HIGH

The ability to set clear, tangible goals and devise a robust route to achieving them



STAYING POSITIVE

The ability to use tactics to overcome setbacks and achieve goals



TEAMWORK

Working cooperatively with others towards achieving a shared goal



LEADERSHIP

Supporting, encouraging and motivating Others to achieve a shared goal

Transferable skills like those listed above are not only important in school and college, but also in the workplace. Every year employers say these skills are as important as any qualification.

Further information on Skills Builder can be found on their website

(<https://www.skillsbuilder.org/>)

You may also be interested in downloading a copy of the Skills Builder Journal that your students can use to record their experiences throughout the Innovation Challenge and when they have applied the eight essential skills.



Teamwork makes the dream work, but the vision becomes a nightmare when the leader has a big dream and a bad team.”

John C Maxwell

THE ‘BIG 13’ ENTERPRISE SKILLS

In addition to the eight Employability Skills, there are also skills which are essential when thinking specifically about enterprise. Enterprise Skills are those that help an individual identify an opportunity and make the most out of it. They tend to be creative people, coming up with new and beneficial ideas, processes, or methods. The skills are:

POSITIVE ATTITUDE

**CREATIVITY AND
INNOVATION**

**PRODUCT AND SERVICE
DESIGN**

TEAMWORK

PROBLEM SOLVING

**ORGANISING AND
PLANNING**

EFFECTIVE COMMUNICATION

INITIATIVE

FINANCIAL LITERACY

ETHICAL DECISION MAKING

**NEGOTIATING AND
INFLUENCING**

RISK MANAGEMENT

LEADERSHIP

You can see that six of the key Employability Skills are duplicated in the above list.

CHALLENGE ACTIVITY 3

How enterprising are your students?

In this activity your students will assess themselves and the wider team in relation to some of the key enterprise skills listed above. We will be using a scale of 1 – 4:

- 1** Never **2** Some of the time **3** Most of the time **4** All of the time

Positive attitude	Score 1-4
I always finish a task	
I can turn a negative situation into a positive one	
I never give up	
I look for opportunities in difficult situations	

Leadership	Score 1-4
I am comfortable leading a team	
I recognise the strengths and weaknesses of other team members	
I am good at making decisions	
I am often asked for advice	

Problem solving	Score 1-4
I like solving problems	
I can find several solutions to problems	
I enjoy being challenged	

Teamwork	Score 1-4
I am a good listener	
I have good communication skills	
I am very trustworthy	
I understand and respect other peoples opinions	

Now ask your students to add up their marks; the maximum score is 64.

Ask them who in the team scored the highest overall? What about per section? Ask them if this came as a surprise or did it make sense that those individuals would score highly?

Your students can now use this information (and other information gathered as part of this process) to look at the various roles required to complete the Innovation Challenge and to start allocating specific responsibilities to individuals within the team.

EMPLOYABILITY SKILLS VIDEO 2.

There is a short supporting video which accompanies this section, highlighting the eight essential employability skills needed to work in the fire service.

<https://www.stem.org.uk/cxhspm>

ADDITIONAL RESOURCES.

There are lots of skills-based information and resources available online which you may be interested in investigating.

MY SKILLS, MY LIFE – WISE CAMPAIGN

In 2014 WISE (Women in Science and Engineering) published a report called “Not for People Like Me” sponsored by Network Rail which summarised evidence explaining why girls and people from black and Asian backgrounds assume that science, technology and engineering are not for them. As a result of this the author of the report, Professor Averil Macdonald CBE, went on to develop a quiz for girls to understand their personality traits and to match them with different types of roles. In response to feedback and an independent review, WISE replaced the quiz with an online game called My Skills, My Life.

My Skills, My Life is a tried and tested outreach resource created by WISE to inspire girls aged 11-19 to consider a career in STEM. It allows girls to find out about their preferred personality types and matches them with role models who have rewarding and successful careers in STEM. Further information on the My Skills, My Life campaign can be found here

<https://www.wisecampaign.org.uk/how-to-get-involved/my-skills-my-life/>

SKILLS BUILDER HUB

This is a free online hub full of Skills Builder resources, designed to specifically teach the framework. You will need to set up an account with your email address.

<https://hub.skillsbuilder.org/start/>

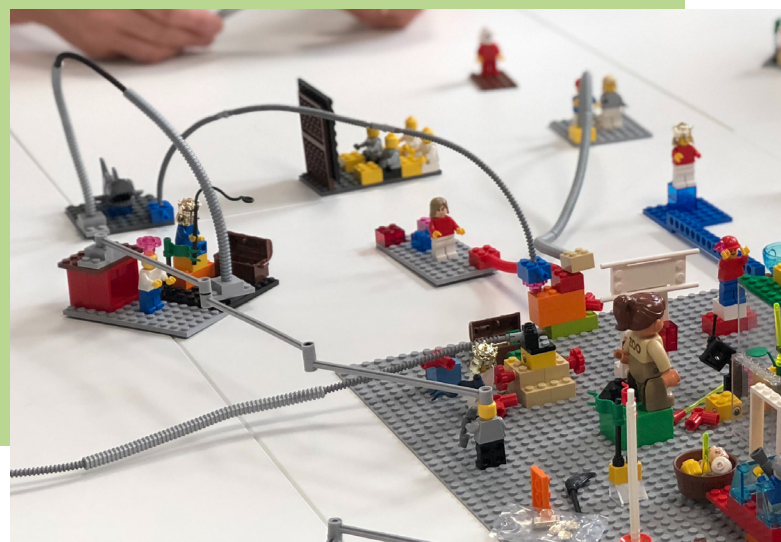
LEGO SERIOUS PLAY (LSP)

The LEGO® SERIOUS PLAY® Method (LSP) was formally launched in January 2002. It originated from a development process in the mid '90s when the owner of the LEGO® Company was dissatisfied with the results of the company's strategy-building sessions. Since 2002 the LSP method has further developed into a thinking, communication and problem-solving technique that supports individuals, groups and organisations.

Although originally aiming for adults to develop new insights into challenging organisational issues, another department of the LEGO Company, namely LEGO Education, started developing a variant (next to LEGO SERIOUS PLAY) for children called: “Build to Express”.

Participants are encouraged to ‘think with their hands’, intuitively constructing metaphorical models in response to a series of questions. The models they create are then used for knowledge and perspective sharing, helping the individual and the group to move towards new ways of working. LEGO® SERIOUS PLAY® can be incorporated as part of the Innovation Challenge by using it to assess the various skills of team members in a fun and creative way.

<https://thinkbrickseducation.co.uk/>



SESSION 5

PROJECT MANAGEMENT

LEARNING OUTCOMES

Students will...

- Complete a Gantt chart
- Understand the various roles needed within a team
- Allocate team members to the most appropriate role

GANTT CHART

When working on any project that has many elements to it and a strict timescale, having a plan is essential to the project achieving what it needs to in the time available. Gantt charts are used by many businesses and Project Managers (irrespective of the size

of the project) all over the world. They are a useful tool to keep the project and all those involved with it on track and can highlight immediately when a task has fallen behind.

EXAMPLE GANTT CHART

Below is an example of a two-month Gantt chart split into eight weeks. Along the top of the chart is when the activity needs to take place and down the side

of the chart is a list of the activities that need to happen. The example below illustrates the use of a simple Gantt chart when organising a birthday party.

BIRTHDAY PARTY GANTT CHART

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Agree date & book venue	■							
Invite guests		■						
Collect RSVPs				■				
Book entertainment			■					
Book catering					■			
Order Cake					■			
Buy decorations							■	
Buy present							■	
Decorate venue								■
Pick up cake								■
Have party								■
Write thank you cards								■

ALLOCATING ROLES

Now your students know what jobs need to be done and by when. They now need to allocate the right individuals (or groups) to the most appropriate role for them, depending on the different skills within the

team. They can use some of the information they found out about themselves and other team members when they completed the challenge activity in section four of this toolkit.

The following roles are likely to be needed when working through this challenge (there may be more your students would like to add.)

PROJECT MANAGER

Is responsible for planning, organising and directing the project, ensuring that it is delivered on time and on budget. They oversee all the other members of the team, keeping a close eye on timescales and budget.

FINANCIAL CONTROLLER

The finance team will monitor the finances. They will fully understand all the business income and expenditure to ensure that the company makes a profit. They may also be responsible for sourcing additional funds such as sponsorship or applying for grants.

PRODUCT DESIGNER & MANUFACTURE

This team is responsible for the overall design and manufacture of a product (or improvement of an existing product) from start to finish. They will often produce drawings, investigate different materials, create a prototype, and make any design amendments needed as a result of market research.

MARKETING & BRANDING

This team will come up with a business and/or product name. They should also consider imagery, colours and a logo. They may create marketing materials such as flyers, posters, presentations, and write press releases.

SALES

Members of this team have responsibility for selling the product or service. They are often seen as 'the face' of the product. It is their responsibility to sell the product or service directly to the target audience, which may mean organising a launch, delivering a pitch, or setting up taste tests in the case of edible products. They usually work very closely with the Marketing and Branding teams.



CHALLENGE ACTIVITY 5

Play to your strengths

1. Ask your students to think about and write down the different roles that they will need to fill within the team to work on the challenge
2. Put them in a table format as shown below (suggested roles have been included but your students may wish to add others) so that all your students can see (using either a whiteboard or a large piece of paper)
3. Now go through the Post-it notes from the previous activity and ask the students to place an activity Post-it note under the role that they think it should be allocated to.
4. Once you have finished, read out the activities underneath each role and ask the students who within the team they think would be best suited to each role.

PROJECT MANAGER	FINANCIAL CONTROLLER	PRODUCT DESIGNER & MANUFACTURE	MARKETING & BRANDING	SALES

SESSION 6

THE BUSINESS MODEL CANVAS

LEARNING OUTCOMES

Students will...

- Understand the principles behind the business model canvas
- Create their own business model canvas
- Further develop their understanding of the different parts of the business model canvas



Fail to plan, plan to fail

Benjamin Franklin



THE BUSINESS MODEL CANVAS.

A business can have lots of elements to it including identifying the people involved, developing and producing the product or service, marketing, finance and selling! With so much going on, it can often be difficult to remember everything!

It is important when starting a business that there is a long-term plan. It is very easy for business owners to get lost in the day to day running of a business.

Swiss consultant Alexander Osterwalder developed the Business Model Canvas, a one-page strategic document which looks closely at nine key areas required to run a successful business.

The Business Model Canvas can also be the first piece of information that a business advisor or prospective investor might ask for when talking to a business owner. It is a very useful tool for them to see quickly what a business is all about.

THE NINE KEY AREAS ARE:



CUSTOMER SEGMENTS.

This is where a business considers who is going to buy the product and how, by buying their product or service, it will benefit them. Without customers, the business will fail.



VALUE PROPOSITION.

This section provides further information on the product or service that the business offers and why a customer should buy it. What added value is your business offering to the customer? Why should your customers buy from you and not your competitors?



CHANNELS.

This section looks at how customers find out about a particular product or service, where they might buy it from, how they buy it, how it is delivered to the customer and any after-sales contact that the customer has with the business. A channel is all the contact that a business has with the customer throughout their purchase.



CUSTOMER RELATIONSHIP.

This section is all about the experience that the customer has when engaging with a business. This can be different depending on the customer. It may be a business wanting to attract new customers by introducing a special offer, or keep their current customers by introducing a reward scheme. More time is likely to be spent with a repeat customer as opposed to someone who is likely not to return.



REVENUE STREAMS.

This section looks at how much customers are prepared to pay for a product and how they choose to pay for it, which will differ depending on the type of customer.



KEY ACTIVITIES:

This section looks at all the activity that needs to take place to get the product or service to the customer. This will include:

1. Research, design, development and manufacture
2. Marketing of the product or service
3. Selling of that product or service
4. Ongoing customer relationships



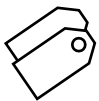
KEY RESOURCES.

This section looks at who and what a company needs to deliver its product or service. This will include any people needed, equipment, raw materials and any promotional materials that need to be designed and printed.



KEY PARTNERS.

This section looks at the role of any partners that might be involved in delivering the product or service and what they are responsible for. This would include external suppliers, manufacturers and designers.



COST STRUCTURE.

This section should be completed last as it looks at all the costs associated with a particular product or service so needs to take into consideration all the other eight blocks of the canvas. Businesses often fail as they have not accurately calculated the cost of the product or service or have not considered the cash flow (cash coming in and out of a business).



CHALLENGE ACTIVITY 6

CREATE YOUR OWN BUSINESS MODEL CANVAS

Gather your students into 3 groups and, using the template below, ask them to complete each block with information on their business. The nine blocks can be combined into 3 groups as follows:



GROUP 1

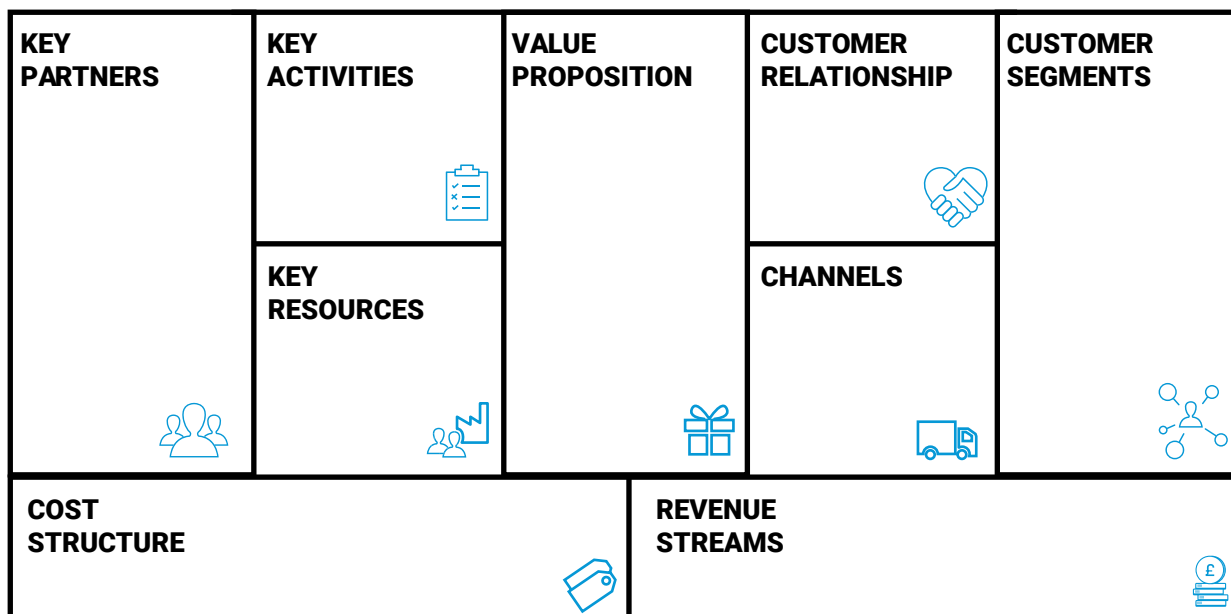
Customer Segments, Value Proposition, Channels, Customer Relationships

GROUP 2

Key Resources, Key Activities, Key Partners

GROUP 3

Revenue Streams and Cost Structure



FURTHER INFORMATION.

Further information on the Business Model Canvas and other business tools can be found at

www.strategyzer.com

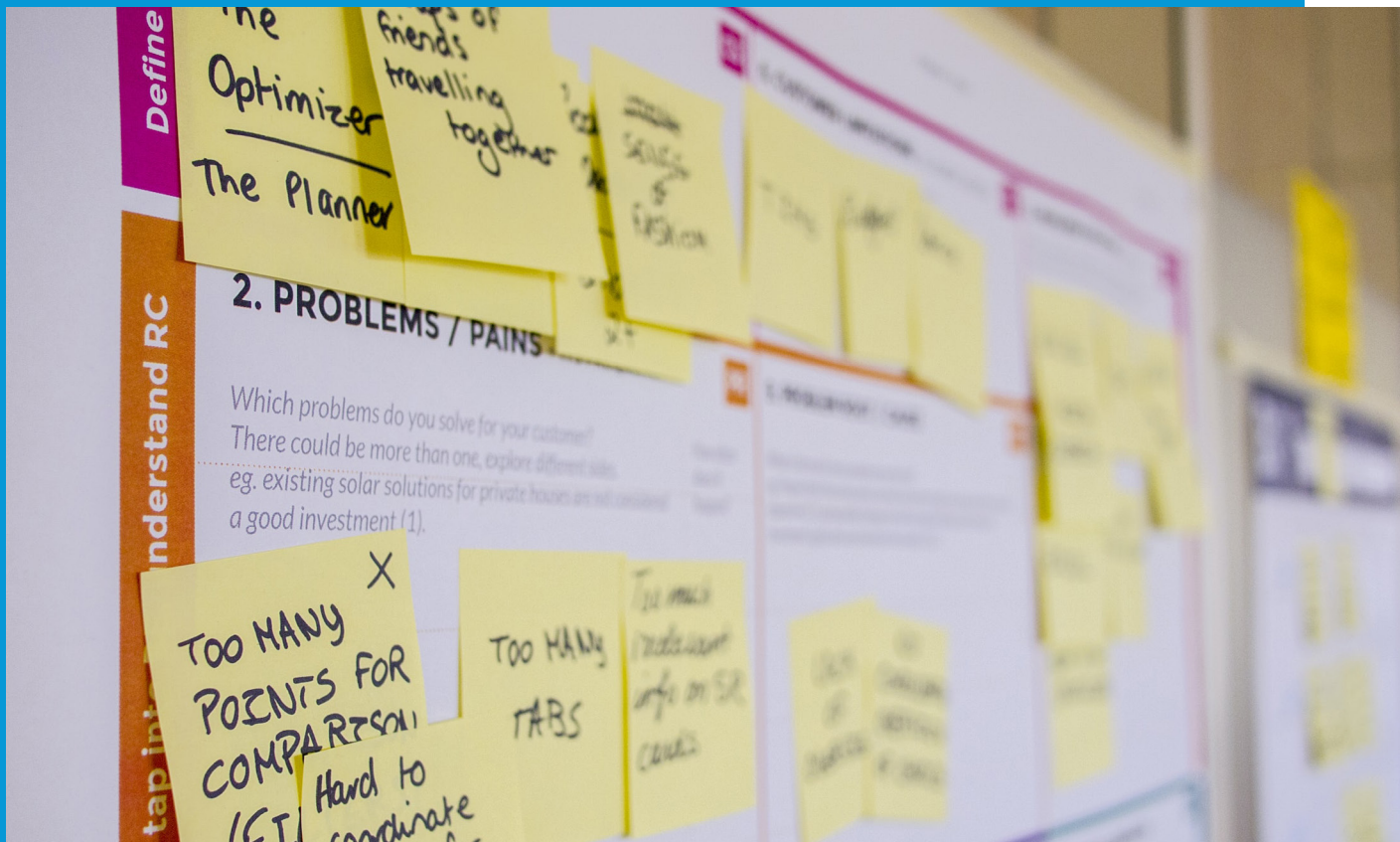
There are also simple videos available online which contain information on the Business Model Canvas. This YouTube video explains the Business Model Canvas using the example of LEGO

<https://www.youtube.com/watch?v=g4E3fhybhGM>

Information on Business Planning can be found on the BBC website or by using this link to BBC Bitesize

<https://www.bbc.co.uk/bitesize/guides/z7t3f4j/revision/1>

The above information has been adapted from www.strategyzer.com and replicated in this document under a creative commons licence.



SESSION 7

SHOW ME THE MONEY

LEARNING OUTCOMES

Students will...

- Understand basic business finance terminology
- Create a profit and loss account for their business
- Interpret a cash flow spreadsheet

BUSINESS FINANCE

It is critical to the success of any business that the money coming into the business at least covers the money going out. A business owner needs to also understand

when money is coming in and out of their business so they can plan for either a busy or less profitable period.

TURNOVER

The total amount of sales generated by a business in a certain period.

CASH OUT

This is the money going out of the business. This includes wages, advertising costs, manufacturing costs, overheads (such as heating and lighting), stationery and many others.

PROFIT

The difference between the business income (Cash in) and expenditure (Cash out)

CASH FLOW

This is the money coming in and out of the business. It is often represented by a monthly or weekly spreadsheet.

LOSS

The amount of money lost by a business, so when the total amount of expenditure is more than the total amount of income. This is often represented in a spreadsheet in brackets.

NET CASH FLOW

This is the financial difference between the money received by the business (income) and the money spent by the business (expenditure), that is, cash in minus cash out.

CASH IN

This is the money coming into the business. The money coming in will include money from sales but may also include any grants or loans that the business has managed to secure.



**Turnover is vanity,
profit is sanity**

Alan Miltz

GETTING STARTED

A business is likely to need some form of money at the very beginning to buy tools, equipment or raw materials to be able to make a particular product or deliver a service. Where might your students get this money from? Could they ask their family or friends to invest? Could they put in their own money? Would they get this money returned and when might this happen?

It is worth discussing if and when this money will be paid back at the point of borrowing to prevent any uncomfortable discussions in the future. They could also approach a local business to ask for sponsorship in return for some free advertising.



**take care of
the pennies
and the pounds
will take care
of themselves**

Benjamin Franklin



FURTHER INFORMATION.

The following BBC website has further information on business finance.

BBC Bitesize – Revenue, cost and profit

<https://www.bbc.co.uk/bitesize/guides/zxq2hyc/video>

SESSION 8

THE END PRODUCT

LEARNING OUTCOMES

Students will...

- Become familiar with the product design process
- Understand the process of bringing a product to market
- Define what customer service is
- Understand the difference between a product and a service

THE DESIGN PROCESS.

Every man-made product undergoes a journey before it reaches the marketplace. This process starts with the original idea, through the design, development and then manufacture until it is ready to be sold. Decisions are made on size, colour, shape, raw materials, packaging and price.

Some final products often end up being very different to the original idea! Often innovators may also find themselves coming up with new ideas as they work on their original one!

THE DESIGN PROCESS CAN BE SPLIT INTO 4 KEY AREAS

THE INITIAL IDEA.

What is the problem that has been identified and why does it need a solution?

THE RESEARCH.

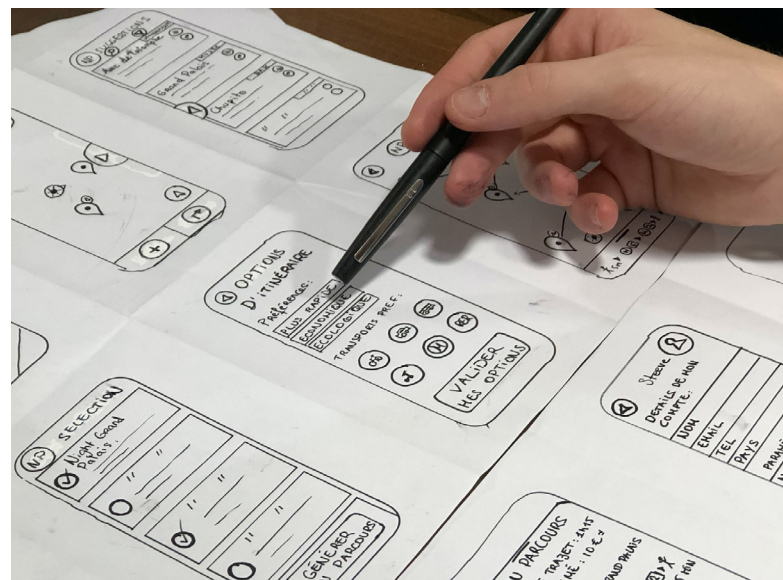
Is the idea (or something similar) already on the market? If so, is the new product/service a better or cheaper version? Some businesses may set up a 'user group' to test out their ideas and provide feedback.

PLANNING AND EXECUTION.

What materials and equipment does the business need and who needs to be involved to make it happen?

LAUNCH.

Often companies will have a product launch, where they show off their goods to potential customers and drum up business. Demonstrations often work well at this stage as this makes it easier for the audience to see the product in action. If the product is edible, free samples are a good idea.



PRODUCT DESIGN ELEMENTS.

When your students are designing their product, it is worth them thinking about the following:

APPEARANCE.

What is it going to look like? Does it need to look attractive or is that not important?

FUNCTIONALITY.

The product needs to do the job it was designed to do. Ask your students to consider the ideal size, shape and materials that they are going to use to make their product.

QUALITY.

Is it important that their product looks good quality? This is likely to increase the manufacturing costs.

COST.

Customers often have a maximum amount that they are willing to spend on a particular product which makes it very difficult to sell it at a higher price.

Your students may consider a 'price cap' (the maximum amount that a customer is prepared to pay for a product or service). This can be included as one of the questions they ask as part of their market research. It is also useful for them to find out the price of similar products currently on the market.

PICTURE THIS.

Ask your students to visualise what their product might look like in terms of size, shape, colour etc. This can make it easier for them to explain by showing a picture of it. They could start with a simple hand drawing to get across the concept.

Product designers now use computers and various software packages to bring their ideas to life, making it easier to change the shape, colour and size of a product instantly.

CHALLENGE ACTIVITY 8

DRAWING YOUR IDEA

1. Split the students up into smaller groups if necessary.
2. Provide them with a piece of paper and a set of pens/pencils.
3. Ask them to draw their product and indicate the materials that they are going to use and also the colour and size.
4. If you have access to a computer and design software, the students could use this to convert their pencil drawing into a 3D image.



CREATING A PROTOTYPE.

It can be useful if your students are making a product, that they have something physical to demonstrate. A prototype is a basic model of the product showing its size, colour, material/s used and how it works. At the prototype stage, problems can be identified and resolved before going into full production. It also provides the opportunity to see potential customers using the product and identify any issues early on.



PRODUCT ANALYSIS.

Product analysis is the process of looking at the specific features of a product including cost, quality and appearance. We do this all the time when buying things, particularly an expensive item.

A lot of this is done subconsciously, without realising that we are doing it! There are people who source products, or who perform reviews of products on behalf of the customer, for a living.

“

I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel

Maya Angelou

PRODUCT OR SERVICE?

The students may decide that their business is going to provide a service to their customers instead of making and selling a product. Examples of a service industry are businesses like running a carwash, an event management company, hairdresser, wedding arranger, physiotherapist, or a dog groomer. All of these companies provide some kind of service to their customers. Some may also sell related product/s such as a hairdresser selling shampoo or a physiotherapist selling exercise equipment that a customer can use at home.

In this sector you rely heavily on building up good relationships with your customers as you want them to return on a regular basis and recommend you to their family, friends and work colleagues. With lots of reviews now easily found online, it is even more important that a customer has a positive experience. Good customer service is key in this industry.

“THE CUSTOMER IS ALWAYS RIGHT”

Although the above slogan is perhaps not entirely true, the message is important for the following reasons:

1. Every business needs customers
 2. Negative comments can be damaging to a business
 3. Happy customers will talk to others about their experience
 4. The experience your customer receives will either keep them or lose them
 5. Listening to customer feedback may identify other business opportunities
-

CHALLENGE ACTIVITY 9

It is useful to test a product or service before launching a business. Setting up a 'user group' will help your students to fine-tune their idea and maybe make some changes before it's too late.

Ask your students to compile a customer questionnaire for their target market - there are suggestions of questions that they might like to include below.

INTRODUCTION

- Explain who you are and what your company does
- Tell them about the product or service that you are selling (show them if you have a prototype)

SUGGESTED QUESTIONS TO ASK THE CUSTOMER

- Where do they live?
- What age group are they in? 16 or under, 17-20, 21-30, 31-40, 41-50, 51+
- How often do they buy or use a similar product or service that you are offering?
- Where do they buy it from?
- How much do they pay for it?
- What is the maximum you would pay for the product or service?
- Could it be improved?
- How did they hear about that product or service?

SUGGESTED QUESTIONS FOR YOUR STUDENTS TO THINK ABOUT IN RELATION TO ANY COMPETITORS

- How many competitors do you have?
- Who are they?
- Where are they based?
- What price do they sell their product or service at?
- What special features (if any) does their product or service have?
- How do they promote their product or service?
- What type of customers do they attract?
- What problems or improvements do you think their product or service would benefit from?

SESSION 9

WHO DO YOU THINK YOU ARE?

LEARNING OUTCOMES

Students will...

- Create a business name
- Understand the basics of marketing and promotion
- Use business tools to sell their product

“

You never get a second chance to make a first impression

Oscar Wilde/ Will Rogers

THE IMPORTANCE OF A NAME.

Choosing a recognisable name is a very important part of any business. The name needs to be memorable as well as representing who the company is and what they are selling.

BRAND.

Branding can often be confused with just a business name. A brand is how the company wants their customers to feel about their products. As an example, the company Red Bull uses an image of a red bull with text written using strong colours. By doing this, the company would like the customer to associate their product with feelings of strength, energy, confidence and power.



CHALLENGE ACTIVITY 10

COMING UP WITH A BUSINESS NAME.

Once your students have an idea as to what product or service they are going to sell, then it is time to come up with a name. The name of the product can be different to the business e.g. the Apple iPhone, the Ford Ka,

or Nike Air Force 1 trainers. Your students may want to come up with a different name for their business to the product or service that they are selling, or they may decide to give them the same name.

1. Split your class up into smaller groups
2. Give each group a large piece of flip-chart paper and each person a pen
3. Ask them to decide if they are going to have a different name for their business to the product or service that they are selling
4. With either the business or product or service in mind (they can even write this in the centre of the piece of paper) ask each member to write down as many names as they can think of
5. They now need to choose which one they are going to use. They might like to vote for their favourite one if they can't decide!

NOTE: It might be helpful to ask them to write down words that link to their product/ service e.g. if they were compiling a student recipe book they might write down words such as healthy, quick, cheap, food, nutrition etc.



MARKETING AND PROMOTION.

Now they have their business name and have decided on the product or service that they are selling, they need to tell people about it! Experts estimate that we see around 3,000 marketing materials a day and this figure

is growing, mainly due to social media. Your students need to identify who their customers are and how they are going to tell them about their business and the product or service that they are selling.

THE 4 P'S

Place, Price, Product and Promotion are often referred to as the marketing mix. But what do they mean? In the table below you will see what each 'P' means

Product

This is what a business is selling. It could be a product like a recipe book or it could be a service like a car wash.

Price

How much does it cost? Keep in mind who the customer is and, if there are competitors selling similar products, how much they are charging.

Place

Where are they going to sell their product or service? Will they have a stall at a local craft fair or a parents evening, or will they sell the product online?

Promotion

How do customers find out about the product or service that you are offering? Social media? Posters? Flyers? A physical presence somewhere?

THE 4 W'S

Your students will also need to consider the following:

Who

Who are their customers? Depending on the product, they may want to attract a certain market. This could be defined by age, gender, geographical location, and other factors. So, for example, a recipe book may decide to focus exclusively on the student market but what about parents who might want to buy it as a gift for their student son or daughter? There can be a big difference between the customers who will pay for the product and the people who use the product. Also, their product or service may be of more interest in certain months of the year, such as on Mother's Day, Christmas or Easter for example.

Why

Why should people buy from them? Why is their product/service any better than what is already available? Is it better quality/cheaper/made more sustainably? What is unique about their product or service (this is referred to as the Unique Selling Point or USP)? What makes their product stand out from the crowd? Is it cheaper? More user friendly? Made with recycled materials? Not currently available?

Where

Where will they be selling their product or service? How easy is it for their customers to buy it? Will they sell it online or face to face?

What

What promotional methods are they going to use to sell their product? Will they have a website? Will they produce posters/flyers? Will they write a press release? Will they use social media channels? Will they advertise anywhere and if so, where?



CHALLENGE ACTIVITY 11

Marketing a product

With their product or service in mind, ask your students to complete the following tables

Product

Price

Place

Promotion

Who are your customers?

Why should they buy your product?

Where will they buy your product?

What promotion methods are you going to use?

MARKETING AND BRANDING VIDEO 3.

There is a short supporting video which accompanies this section, highlighting the importance of a business name and containing further information on the 4 P's

<https://www.stem.org.uk/cxhspm>



SESSION 10

THE PITCH

LEARNING OUTCOMES

Students will be able to...

- Understand what pitching means
- Put into action their knowledge of pitching
- Develop their presentation and communication skills

THE PITCH.

A successful business relies on people buying their products or service. However, some companies require investment to start their business or to support further development as they grow. To do this, a company may need to 'pitch' their business to a prospective investor. The investor will want to know a lot of important information in a very short space of time! So, the content of this pitch is crucial as it needs to convince the investor to part with their hard-earned cash!

A good example of pitching is the BBC programme 'Dragons' Den' where budding entrepreneurs get three minutes to pitch their business ideas to a panel of multi-millionaires.

Think of the pitch as being a bit like a trailer for a film. It needs to include enough interesting and exciting content to encourage people to pay to see the full version, but not too much or they won't need to!

WHO SHOULD DELIVER THE PITCH?

Pitching (or any kind of presenting) can terrify some people. However, some people seem to enjoy being in front of an audience.

If the students have completed the skills audit of your team found in section 5 of this toolkit, they will have a good idea of the various skills each member of the team possesses and who would be most comfortable in delivering the pitch.

Alternatively, your students may like to identify several people in the team with complementary strengths who will each play a part in delivering the pitch. For example, they may have individuals who can talk confidently about the finances, someone else about the idea behind the brand name and a different individual who can talk about the product design.

WHAT TO INCLUDE.

There are several important elements that are usually covered in a pitch. These are:

- 1. What is it that you are wanting**
- 2. The business name and what it does**
- 3. The roles of the people in the business**
- 4. The costs associated and income generated**
- 5. The target market and how the business is going to reach them**
- 6. The benefits to customers from buying the service or product**

1

What is it that you are after?

If you are pitching to any group of people, it has to be for a reason, the reason isn't always for investment. Whatever it is you want, make sure you ask for it. If you are asking for money, it also helps to tell the panel how much you are looking for and what you are going to use that money for.

2

The business name and what it does

A pitch usually starts with an introduction to the business and what it does. It is really important that it grabs the attention of the audience straight away so that they want to find out more. An easy way of doing this could be:

I HELP A ACHIEVE B BY DOING C

For example, a printer who uses only recycled materials to manufacture exhibition stands may use the above template in the following way:
"I help businesses (A) achieve more sales (B) with less harm to the environment by creating exhibition stands made exclusively out of recycled materials (C)."
The next part of the pitch usually focuses on the product or service that is being sold. It is important to keep this as short as possible and to focus on its unique selling point (USP). An explanation of the key features of the product and how it solves the problem is a good place to start.

“

People buy from people they trust, and they trust people they like

Garrison Wynn

3

Roles and responsibilities of the people in the team

In session 5 of this toolkit your students will have identified the different skills that each team member possesses and allocated specific roles. The next part of the pitch will include a brief introduction to all the members of the team and their main responsibilities.

4

The costs associated and income generated

This is fundamental to the success of any business - the numbers simply need to add up! Your students need to fully understand the financials of their business. This includes considering all the costs related to the design and manufacture of their product or service and therefore how much they need to sell it for to make a profit.

In session 7 of this toolkit, your students created a profit and loss account. This includes information on exactly how much it costs to make their product, how much they are going to sell it for and therefore how much profit will be made. When delivering a pitch, your students need to be prepared to answer questions specifically about their business financials.

5

Target market/s and how they are going to reach them

In session 9 of this toolkit your students looked more closely at their target audience. This is the audience who are most likely to buy their product or service.

The next part of the pitch is to explain who their target market is and the reasons behind this as well as explaining how they are going to promote their product or service to this particular audience. Ask your students to look back at this earlier session and slim down this information to include in their pitch.

6

Benefits to customers

As part of this challenge your students were asked to identify an issue or problem in their local community and to find a solution. Their customers now need to understand what the benefit is of buying this particular product or service. A lot of consumers end up buying products that they had never thought of just because they have been convinced that they needed one. Ask them to consider: why should someone buy their product? If there are similar items on the market which are being sold by their competitors, why would a customer choose to buy yours?

QUESTIONS.

Prepare your students to invite and answer questions at the end of the pitch. It is useful when they are rehearsing to invite questions from their 'test' audience. If they can't answer them at this stage, then they need to find an answer before they do the real thing! They may also be asked for a demonstration or, if the product is edible, the audience might like to have a taste.

Again, make sure that your students have tested the product before the pitch to ensure everything is working correctly or run some taste tests with a trial group, prior to the pitch. If they have already done this, it is useful to include some of the comments that they received from their willing volunteers. If there was some negative feedback and they have addressed the issue, it is worth mentioning this.

CHALLENGE ACTIVITY 12

THE PRACTICE PITCH

1. Split your students into smaller groups.
2. Hand out the pitching template below and a pen to each group.
3. Ask each group to now create a pitch for their own product or service.
4. Give the students around 15 minutes to complete the task. They also need to decide if all of the team are going to participate in the pitch or if they are going to nominate one or two individuals.
5. The students then have five minutes to pitch their product or service to the other groups.
6. At the end of each pitch allow a few minutes for questions.
7. Ask the other students to provide feedback.

PITCHING TEMPLATE – THE PITCH

Topic area	Content	Time (max 5 minutes)
Your company name and what you do		
The team and their roles		
What challenge or problem in your community are you trying to solve?		
How does your service or product address the problem?		
Who is your product for and how are you going to promote it?		
How much does your product cost and how much are you going to sell it for?		
Final Summary and Questions		

PITCHING VIDEO 4.

There is a short supporting video which accompanies this section which highlights the key elements of a pitch. You can access the video by clicking on this link

<https://www.stem.org.uk/cxhspm>

FURTHER INFORMATION.

Further information on what makes a successful pitch can be found here:

1. Innovate UK video on “How to pitch your business idea”
<https://www.youtube.com/watch?v=uZdVuQlpqvM>
2. Elevator Pitches
<https://www.youtube.com/watch?v=r-iETptU7JY>

CASE STUDIES

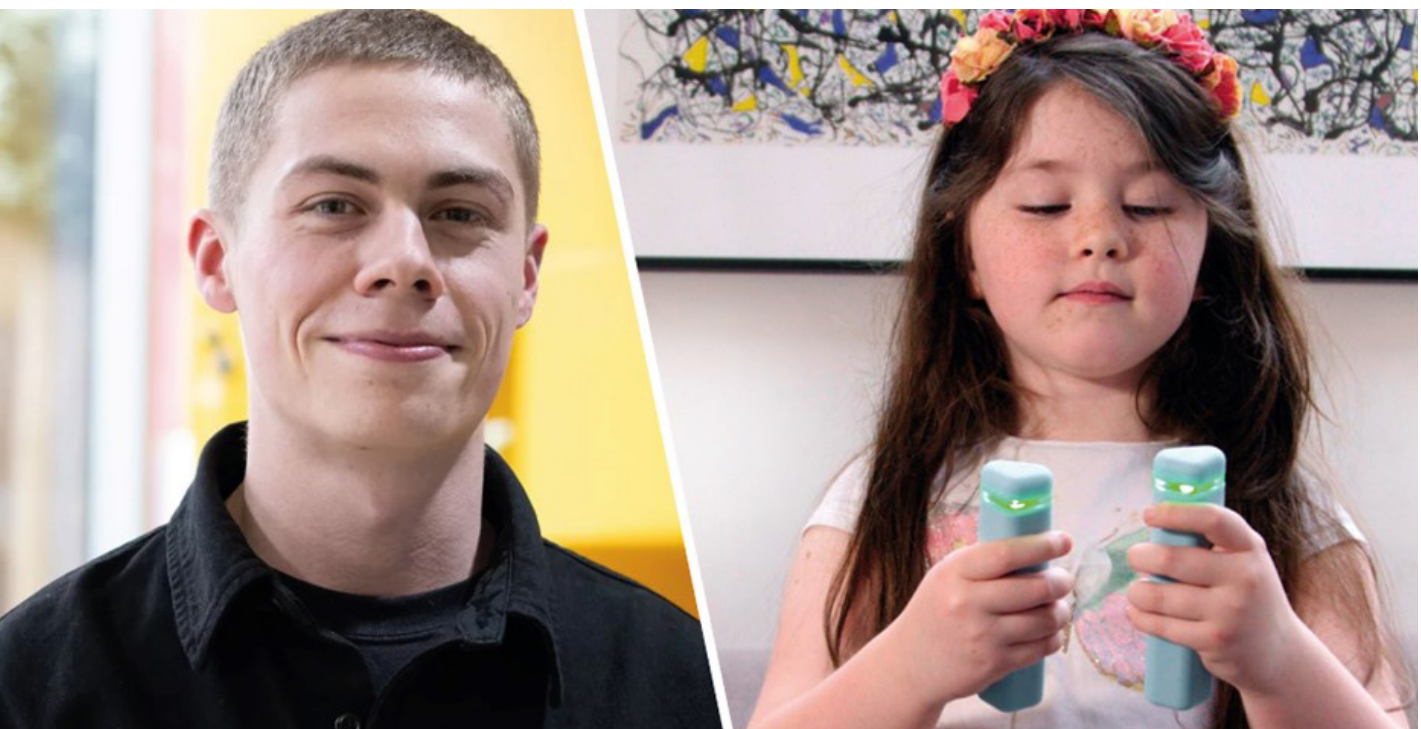
STIX MENTAL HEALTH

LIAM MURPHY UKRI YOUNG INNOVATOR

While studying product design in Brighton, Liam Murphy practised mindfulness every day. He felt the benefits and realised the practice would have been invaluable to him when he was younger. That was the trigger for a concept to make mindfulness fun for kids. Liam's product, Stix, is designed to enable children to take control of their mental wellbeing. They are hand-held remotes that provide visual, vibration, and auditory feedback, and monitor movement during fun mindful activities that have been designed by psychologists. The remotes connect to an app to provide progress and rewards, illustrated by an interactive cute 'monster' character.

Liam has been user testing many prototypes with over 50 families. Their feedback is providing useful data about how children interact with the product and what features might improve the experience.

Further information on Stix can be found here www.stixmindfulness.co.uk



Credit: Stix Mindfulness Ltd

UNCOMMON ALCHEMY

ANNA WATKINS UKRI YOUNG INNOVATOR

Anna is using seaweed slime to create sustainable, vegan and 100% bio-based alternatives to leather and plastic – turning it into everything from handbags and notebooks to lampshades.

Since winning her first award, Anna has transformed Uncommon Alchemy from a craft business into an industrially scalable production process. She is now working towards being able to create sheet material at scale for fashion brands and designers.

Anna commented:

“I started out using my seaweed leather to hand make some products for personal use. Winning the Young Innovators award showed

me that my idea had potential at an industrial scale, so now I am pursuing this ambition. Due to my chronic pain condition, being a self-employed entrepreneur is perfect, as I can manage my time and energy.

In the next few years, I am hoping to take my business to the next level, alongside developing a portfolio of radically sustainable materials for the fashion industry.”

Further information on Uncommon Alchemy can be found here

<https://www.uncommon-alchemy.co.uk/>



Credit: Anna Watkins

SAVORA

MATTHEW WALKER UKRI YOUNG INNOVATOR

From bartering at the local car boot sale to teaching himself A-level business studies, Matthew Walker was always destined to be an entrepreneur. Throughout university he pestered friends with his latest business ideas. When he raised the concept of developing mixers to pair with tequila, they were finally impressed. “For too long now, tequila has been written off as just a shot,” says Matthew. His company, Savora, created its first product, a zesty lime and sweet agave mixer, in April 2021. In the first bar to stock it, Teuchters Landing in Edinburgh, it became the best-selling speciality summer cocktail. It went on to win a Great Taste Award. A second mixer, vibrant orange and fiery ginger, has just

been launched. Matthew’s main priority now is networking – to get his products in front of distributors and buyers for larger chains and supermarkets.

Further information on Savora can be found here <https://savoradrinks.com/>



Credit: Matthew Walker

EARTHLY BIOCHAR

LOTTIE HAWKINS UKRI YOUNG INNOVATOR

Lottie has developed the first domestic biochar kiln for eco-conscious gardeners. Biochar improves soil health, increases crop yields, and is a form of carbon capture and storage. Tackling the climate emergency is at the heart of Earthly Biochar and Lottie aims to set up a network of carbon-negative production facilities to turn waste biomass into biochar.

Since winning her first award, the company has developed and launched two new products, hired three new team members, and tripled sales revenue.

Commenting on her award and project, Lottie said:

“I’m really proud of my team; it’s been a tricky couple of years with the pandemic creating unexpected hurdles. To launch two new products was an incredible feat – and winning a Young Innovators award definitely helped.

As a result, our sales revenue increased by 300%! I’m driven by a vision of every gardener in the UK adding biochar to their soil. It paints a beautiful picture of mass carbon sequestration which doesn’t cost the earth or take huge amounts of effort.”

Further information on Earthly Biochar can be found here

<https://www.earthlybiochar.com/>



Credit: Lottie Hawkins

EXPHAND PROSTHETICS

KATE WALKER UKRI YOUNG INNOVATOR

Kate designed a prosthetic that can actually grow with children, unlike anything currently available.

ExpHand Prosthetics provides affordable, life-changing upper limb prosthetics that give children a fuller, more independent life. Since winning an Innovate UK award, Kate has had positive academic and clinical product reviews, connected with NHS clinicians, submitted two patent applications, hired four people and is currently securing ExpHand Prosthetics' first investment round.

Kate commented:

"It feels amazing to be leading a business that will have such a positive impact on the lives

of children. Receiving an award is a great vote of confidence, acknowledging the work we've done so far and where we're aiming to be in the future. I am thrilled to have also been selected for the Next Steps Award.

Additional funding received as a result of the award has already allowed us to purchase a key piece of design software to adapt our product following user feedback."

Further information on ExpHand Prosthetics can be found here

<https://www.exphandprosthetics.com/>



Credit: Kate Walker

UNIFIQ GAMES

SEYED NASROLLAHI UKRI YOUNG INNOVATOR

Seyed Nasrollahi has three passions. One of them is physics, which he studied at Imperial College and the University of Cambridge. The others are games and machine learning. He has combined all three in the company he founded, Unifiq Games, which is developing a video game with a social purpose. Unifiq's game aims to enhance STEM (science, technology, engineering, and mathematics) learning for young people, and female players in particular. The UK is facing a STEM skills crisis due to under-representation, poor perceptions, lack of interest, and low school attainment. Seyed believes his product can help address the issue. Seyed's ambition for Unifiq is "to become one of the most innovative game studios in the UK, creating a digital playground based on the laws of physics down to the atom."

Further information on Unifiq Games can be found here:

<https://www.unifiq.com/>



Credit: Seyed Nasrollahi

END NOTES

- Additional Resources
- References
- Acknowledgements

ADDITIONAL RESOURCES

STEM LEARNING

STEM Learning has several free resources that can support you in your wider teaching.

Further information on what is available can be found here:

<https://www.stem.org.uk/resources>

CREST AWARDS

The CREST awards scheme is an accredited programme ran by the British Science Association. By completing this challenge your students could apply for a Bronze Award.

Further information on the CREST Awards scheme can be found here

<https://crestawards.org>

REFERENCES

INTRODUCTION

<https://www.gov.uk/government/organisations/companies-house>

SESSION 4 – EMPLOYABILITY SKILLS

<https://www.skillsbuilder.org/>

<http://www.mc4c.co.uk/the-big-13>

<https://www.wisecampaign.org.uk/how-to-get-involved/my-skills-my-life/>

SESSION 6 – THE BUSINESS MODEL CANVAS

www.strategyzer.com

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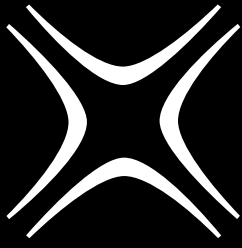
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