equinor proudly presents YOUNG IMAGINEERS

Lesson Plan

Combine imagination with science, technology, engineering, and maths and exciting things can happen!

This lesson not only develops pupils' creative problem-solving skills, but also provides the perfect preparation for entering the Young Imagineers Competition. Inspired by **Wonderlab: The Equinor Gallery** at the Science Museum, pupils will be taken on a thrilling voyage of discovery into the past, present and future of ideas and inventions, before generating their own imaginative ideas to create something unique. Pupils that enter their ideas into the Young Imagineers competition could **win a bespoke-design experience day** at the Science Museum and their **idea will be brought to life and put on display!** Time to get creative!

Suggested timing:

60-120 minutes, plus time to work on their Young Imagineers entries at home. The activities have been designed to allow flexibility; you could choose to carry them out in one session or allow more time for in-depth exploration, splitting activities across two or three lessons.

Preparation and resources:

- Young Imagineers Presentation
- Activity Sheet 1: Solving a Problem
- Activity Sheet 2: Ideas Generation
- Competition Leaflet

Learning questions (objectives):

- To find out about inventors and inventions that have changed the world.
- To explore creative techniques that help me express ideas to solve real-world problems.

Starter (5-10 mins):

To get pupils thinking creatively, hold up a simple object, such as a skipping rope. Ask them to use their imagination to think beyond what the object is used for, discussing with a partner what it could become (a swing, a halo, a snake, reigns). Invite some pupils to come to the front and mime using it in different ways.

In their pairs, challenge pupils to think of as many 'inventions' as they can in 30 seconds, then share some of their ideas. They're likely to list mechanical or electric items. Ask whether everything they can see around them is an invention, from carpets to shoes to pencils to computers to buildings to the internet. Explain that someone will have come up with an idea, researched it, developed it, tested it and brought it to life. Ask pupils to think of inventions that they used as they got ready for school today, e.g. toothbrush, clothes, TV, bowl, glass, cereal, toaster, bag, car. Explain that all of these started with a simple idea – someone using their imagination and wondering: "Wouldn't it be better/easier if…".

Optional activity - run the 30-second challenge again, but provide 'categories', e.g. 'Inventions in the classroom/your bedroom' or 'Inventions beginning with 's''.

Optional activity - share the inspirational quotes about inventions on the **Presentation** (slides 2 and 3). Ask pupils what they think the quotes mean, and to justify their reasoning. Draw out that invention requires creativity, imagination and perseverance.

Show slide 4 of the **Presentation**. Explain that inventions are a result of creativity – thinking differently about something, combined with science, technology, engineering or maths – usually, a combination of these. These are subjects are known as STEM. Discuss some of the skills and knowledge from within these subjects that leads to new inventions, such as: Science > understanding forces to enable you to create a windscreen wiper. Share the learning objectives (slide 5).

Main activities (45-90 mins):

PAST: History of great ideas (10-15 mins):

Organise pupils into groups of three or four. Give them two minutes to decide what they think are the top three inventions and why. Explain that the world is filled with the most amazing feats of 'Imagineering' (combining science, technology, engineering and maths with creativity).

Tell pupils that they're going to travel back in time to discover some of the great inventions and inventors in history. Use the Presentation (slides 6-17) to reveal the stories behind some world-shaping ideas and inventions: wheels and axles, computer programming, telephone, electric light, windscreen wipers, aeroplane, refrigerated trucks, bagless vacuum, the internet, personal computers and devices. After each invention:

- Ask pupils what difference the invention has made.
- On each slide there is a STEM logo which highlights the disciplines involved in creating it. As a class, discuss the skills and knowledge that would've been drawn upon to create and design the invention.

Note: there are quite a few inventors included, so you may want to select those you feel are most appropriate for your class.

Optional activity - allocate each group one of the inventions from the slides (or an invention suggested by the pupils earlier) and task them with giving a 30-second presentation on how the invention has made a positive difference.

PRESENT: Today's life-improving inventions (5-10 mins):

Explain that some ideas and inventions can make a big difference to the lives of specific groups of people. Use the **Presentation** (slides 18-22) to show pupils: the Kenguru electric car (for wheelchair users), the Braille smartphone, Roomba robot vacuum cleaners and the Firefly Upsee (designed to help young children with cerebral palsy to walk with their parents).

Before revealing what each invention is, ask pupils to look at the pictures and share what they think it is, who it might be for and how it might be used. Ask if pupils can think of any other examples they'd like to share.

Why not further fuel your pupils' imaginations, with a trip to Wonderlab: The Equinor Gallery at the Science Museum? They can take part in live chemistry experiments, see lightning strikes, play with forces on giant slides or travel through space under a canopy of stars. Entrance to Wonderlab is free for school groups! Be sure to book a space on the website here: **https://www.sciencemuseum.org.uk/see-and-do/wonderlab-equinor-gallery**

Main activities cont...

FUTURE...is up to your imagination! (30-45 mins):

Use the **Presentation** (slides 23-26) to introduce the Young Imagineers Competition.

Ask pupils how they (or how inventors might) come up with creative ideas? What inspires them? Do they have any methods they use...or do ideas sometimes just pop into their heads? What problems might someone come up against when searching for a solution? What makes an invention successful?

Optional activity - Creative technique: 'What if...'

Explain that another creative technique for generating ideas is to ask the question 'What if....' Ask the groups to come up with suggestions, however ridiculous to: 'What if the world had no colour?'; 'What if everyone had the same name?'; 'What if there was no more plastic'; or ask pupils to come up with their own 'What if...' questions.

Group competition practice

Give groups five minutes to brainstorm and come up with ideas for things that they do or use as part of their hobbies and interests, such as: playing the guitar, ballet, playing football, baking etc. Explain that many inventions come about due to the inventor's personal connection with the area they're creating for.

Then ask pupils to think whether there's anything they would like to be different, better, easier or more challenging about an aspect of their interest/hobby. I.e. could a goal return the ball back to the player, or a book stand hold your book when you read in bed.

Give each pupil group copies of **Activity Sheet 1 and 2**, which contains a plan to help them focus on a specific problem to solve, and tips for generating ideas. Remind them that we're talking about the future, so they can be as creative as they want to be - the sky is the limit! This task will help them with their competition entries.

Think of an existing invention (e.g. smart phone, television). How might it change in the future? Why do you think that?

Imagine if we didn't have an object that we use every day (e.g. water bottle, fork, school bag, scooter). What could we do or use instead?

What invention have you read about in a book or seen in a film? How could that inspire you to think of an invention of your own?

Give groups a ten-minute challenge to select one problem and come up with a creative idea to help solve it.

Plenary (10-20 mins):

Ask pupil groups to share the ideas they have come up with, explaining one of the ways these would make a difference. If possible, allow time for peer evaluation. Agree a class success criteria to check against or use the criteria from the competition.

Show the examples of the previous winners (on the Presentation, slide 27-28). One winner created an idea for a hover wheelchair for wheelchair uses to get up and down stairs and public transport. The other winner invented a solar powered pollution sucking robot pigeon.

Give pupils the **Competition Leaflet** and a personal copy of **Activity Sheets 1 and 2** to take home to create an entry for the competition.

The Competition

For a third year running, energy company Equinor, in partnership with the Science Museum, hope to inspire and engage the next generation of STEM experts through challenging them to create inventions that could have a positive impact on the world we live in. The Young Imagineers 2019 Competition asks 7 to 14-year olds to consider and answer the question: What invention would you create to make tomorrow's world a better place? Full terms and conditions can be found at: **www.youngimagineers.equinor.com**

Support:

- Differentiation will be by process and outcome. Pupils could be given images representing world problems and challenges, to stimulate ideas and discussion.

Extension:

- Ask these pupils to take their idea further.
- Pupils could research the challenge they are looking to solve, even interviewing their 'target audience' to establish their needs and wants.
- Pupils could explore and test their idea further, researching the science, technology, engineering and maths required to make their idea work and creating prototypes.

England:

England > Design and technology:

KS2

- **Design -** use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups.
- **Design -** generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.
- **Evaluate -** evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.
- **Evaluate -** understand how key events and individuals in design and technology have helped shape the world.

KS3

- **Design -** use research and exploration, such as the study of different cultures, to identify and understand user needs.
- **Design -** identify and solve their own design problems and understand how to reformulate problems given to them.
- **Design -** develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations.
- **Design -** develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools.
- **Evaluate -** analyse the work of past and present professionals and others to develop and broaden their understanding.
- **Evaluate -** test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups.
- **Evaluate -** understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists.

There is also potential relevance to Science, Maths and PSHE, depending upon the direction of the pupils' inventions.

Wales:

Design and technology: Designing

KS2

- Investigate how existing products look and function as a source of ideas for their own products, e.g. examine a range of products related to their task, toys, healthy eating.
- Develop a simple specification/recipe for their products indicating their intentions and approach.
- Demonstrate their creative thinking when considering and recording solutions to problems that arise during their designing and making.
- Develop and communicate their design ideas in a variety of ways, using ICT and models where appropriate.
- Evaluate their design ideas as they develop, considering the needs of the user.

KS3

- Identify and use appropriate sources of information to help generate and develop their ideas for products.
- Be creative and innovative in their thinking when generating ideas for their products.
- Develop a specification/recipe for their product.
- Explore, develop and communicate design ideas in a range of ways, including annotation, drawings and CAD, e.g. clip art libraries, internet resources, scanners, digital cameras.
- Model and refine their design ideas in 3-D form or food prototyping where appropriate.
- Evaluate, refine and modify their design ideas as they develop in relation to aesthetics, sensory requirements, healthy lifestyle, function, safety, reliability, properties of materials, ingredients, components, sustainability and cost.
- Evaluate their final design ideas against their initial specification/recipe.

There is also potential relevance to Science, Mathematics, Sustainable Development and Global Citizenship and other aspects of Design and Technology depending upon the direction of the pupils' inventions.

Northern Ireland:

The Arts: Art and Design

KS1

- Look at and talk about resource material to simulate their own ideas.
- Enjoy and appreciate the work of artists and designers and craft workers from their own and other cultures; use what has been viewed as a starting point for their own work.
- Talk about their own and others' work and how it was made, use observations to identify difficulties and suggest modifications.

KS2

- Look at and talk about the work of artists, designers, and craft workers from their own and other cultures; appreciate methods used in the resource materials and use their appreciation to stimulate personal ideas and engage with informed art making.
- Evaluate their own and others' work and how it was made, explain and share their ideas discuss difficulties and review and modify work to find solutions.

KS3

- Developing an appreciation of the work of artists, designers and craft workers from their own and other cultures, past and present.
- Developing creative thinking skills and personal creative outcomes through investigating, realising, designing and making; drawing and graphic media, printmaking, textiles, ceramics, 3-dimensional construction or prototyping, lens based and digital media.
- Using the visual elements with understanding when engaging in Art and Design.
- Evaluating and appreciating their own and others' work.

Design and Technology

KS3

- Design - identifying problems; investigating, generating, developing, modelling and evaluating design proposals; giving consideration to form, function and safety.
- Communication – use of free-hand sketching and formal drawing techniques and ICT tools.
- Respond to a personal design challenge in relation to their own lifestyle.
- Explore technical inventions and designs that have met a social need cost-effectively.
- Explore how developments in Technology and Design have changed the way we access social media.

There is also potential relevance to local and Global Citizenship, Mathematics and Numeracy, Science and other aspects of The Arts and Technology and Design depending upon the direction of the pupils' inventions.

Scotland:

Technological Developments in Society and Business

- **First level -** I understand how technologies help provide for our needs and wants, and how they can affect the environment in which we live.
- **Third level -** I understand how scientific and technological developments have contributed to changes in everyday products.
- **Fourth level -** I can analyse products taking into consideration sustainability, scientific and technological developments.

Craft, Design, Engineering and Graphics

- **First level -** I can design and construct models and explain my solutions.
- **First level -** I can explore and experiment with sketching, manually or digitally, to represent ideas in different learning contexts.
- **Third level -** I can create solutions in 3D and 2D and can justify the construction/graphic methods and the design features.
- **Fourth level -** I can apply design thinking skills when designing and manufacturing models/products which satisfy the user or client.

There is also potential relevance to the Sciences, Mathematics, Social Studies and other aspects of Technologies depending upon the direction of the pupils' inventions.