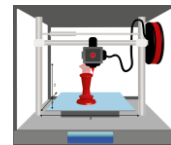


3D printing and new and emerging technologies



Teacher notes

Resources:

- Student activity sheet for Activity 3D printing in the classroom
- 3D printer and filament
- Post it notes
- Youtube
- Example files printed click the links below;

<https://www.thingiverse.com/thing:53451>

<https://www.thingiverse.com/thing:520238>

<https://www.thingiverse.com/thing:255493>

<https://www.thingiverse.com/thing:230802>

<https://www.thingiverse.com/thing:2015332>

<https://www.thingiverse.com/thing:1744950>

<https://www.thingiverse.com/thing:596966>

Pre-preparation

- Print out the files from Thingiverse to use as classroom props
- Print out the activity sheet
- 3dprinter set up and a file already prepared ready to print on the machine

Learning Objectives

- To investigate new and emerging technologies
- To understand how a 3D printer works

Starter task 15 minutes

- With the 3D printed resources from thingiverse printed off, place them on separate tables and give each student a handful of post it notes. Allow students to look at and handle the objects. Ask them to write down any questions they have on the post it note and stick it to the table e.g.
- What are they used for?
- How are they made?
- Are they useful for society?

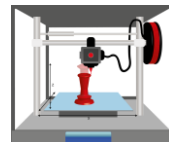


After letting the students analyse the products and write questions for 10 minutes – spend 5 minutes reviewing the questions and discussing the answers.

Objective 1 – To investigate new and emerging technologies (20 minutes)

Task 1 – 10 minutes

- Pose the question ‘What is a new and emerging technology’ can you give any examples. Using the worksheet ask the students to discuss in pairs any examples of new technology they can think of over the past few years and ones that are constantly changing.
- Give students 5 minutes to discuss in pairs and then get some feedback from students.



Students typical response could be a technology that wasn't here a few years ago, iphones, thumb print and facial recognition, contactless technology, VR, Artificial Intelligence, driverless cars etc.

Task 2 – 10 minutes

To embed the concept of new and emerging technologies and lead onto 3D printing, play the class the youtube video on the 'Top Ten emerging technologies that will change your life'

<https://www.youtube.com/watch?v=msPKD999I7Q>

Objective 2 – To understand how a 3D printer works (20 minutes)

Preparation – whilst the youtube video is playing pre heat the 3D printer

Task 3 – 3D printer demonstration (10 minutes)

- Explain to students with 3D printing being one of the top ten technologies that will change your life we are going to learn how they work. Show the students this time-lapse clip of how a 3D printer prints an object.
<https://www.youtube.com/watch?v=-gaC5BpXlIU>
- Take the students to the 3D printer and set a print of running (this could be the gear model)
- Explain to the students how the 3D printer works, show them the filament and how it's sits on the back of a machine and is fed through a tube into the 'extruder'.
 1. Explain how a file is loaded to the printer that is generated on a CAD package.
 2. The printer heats up the plastic filament until molten
 3. The filament is pushed into a nozzle and is extruded through nozzle
 4. The printer moves in x and y directions depositing a layer of molten plastic onto the print bed.
 5. The print bed then moves in the Z direction allowing for an extra layer to be printed on top of the first layer.
 6. This is then repeated until the design is fully printed, printing the model 'layer by layer'.

Refer to the pre-printed models during the demonstration to explain the concept of layers.

Ask students if they have any questions.

Task 4 – 10 minutes (Students task) – Using the worksheet students are to use the key words on the worksheet and write a description of how a 3D printer works and what they can be used for.

5 minute Plenary

- Recap the initial objectives with the class.
- Students are to complete the lesson reflection sheet on the worksheet.
- If time allows ask students to feedback their learning.