LESSON 8

Designing our smart city pt. 2

Age 7-11
(Key Stage 2)

60 minutes

Curriculum links

Computing
- Design, write and debug programs that accomplish specific goals
- Use sequence, selection, and repetition in programs; work with variables and various forms of input and output
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Design & Technology
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- Generate, develop, model and communicate ideas through discussion and prototypes
- Apply their understanding of computing to program, monitor and control their products

Resources

Slideshow 8:
Designing our smart city pt. 2

Student Sheet 8a:
Ideas funnel

Video:
Prototyping

Kit (per group)

- mBot with remote
- Laptop or tablet with mBlock
- Prototyping materials, such as clay, coloured paper and tape

Lesson overview

Part two of the workshop sees your class use an ideas funnel to select and refine ideas from the brainstorming activity in part one. Each group will then prototype one of the ideas using the hardware and software skills they have learned with the mBot in lessons 1-6.

Lesson steps

1. **Video opener (5 mins)**
   Introduction to prototyping, including examples of different ways people prototype and why it is useful.

2. **Classroom discussion (10 mins)**
   The class will discuss the video and think about how they can use prototyping to take some of their ideas forward.

3. **Design thinking: prototype (35 mins)**
   Groups will use an ideas funnel to choose one idea from the brainstorming session and use the mBot and crafting skills to create a working demonstration that they will be able to present to the class in the next part of the workshop.

4. **Reflect (10 mins)**
   Students will reflect on the prototyping activity and share their learning.

Learning outcomes

- Understand what prototyping is and why it is used

- Describe a number of prototyping methods

- Evaluate and refine own ideas and the ideas of others
- Combine hardware, software and crafting skills to make a prototype
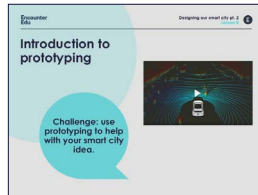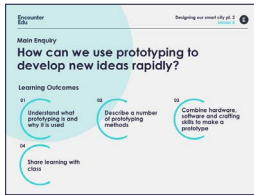
- Share learning with the class

Step

1
5 mins

If you use formal learning outcomes with your class every lesson, the list on **slide 2** has been formulated to structure learning for this lesson. All learning outcomes are composed using the SWBAT (Students Will Be Able To) format.
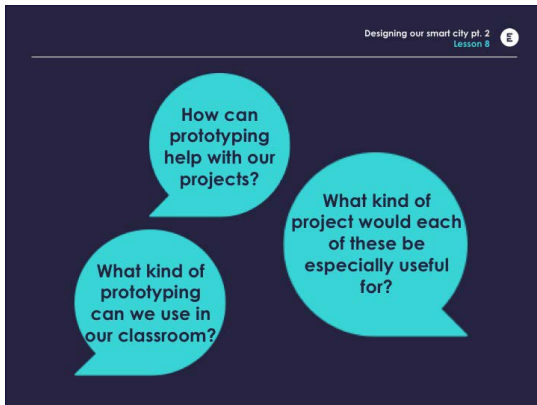
Using **slide 3** introduce students to the lesson where they are going to embark on their design challenge and use what they have learned to address societal needs.

Show your class the video **Prototyping** with examples of different types of prototype and why it is a useful process.

2
10 mins

Consider using a think-pair-share structure for these three questions as well, with students listing possible answers on their own for four minutes before sharing in pairs for two minutes. The whole class discussion element would then take a further four minutes.

How can prototyping help us with our projects? It can give a quick, cheap way to see if something works. Prototypes are very useful for getting feedback from people before you spend a lot of time and money making something, especially with unusual or new products.

Manage a whole class discussion using the questions on **slide 4**.

What kinds of prototyping can we use in our classroom?
- Prototyping in a professional setting can use technologies we probably don't have in the classroom such 3D printing or special model making tools.
- However, we can use paper prototyping, role-playing, cardboard, crafting and our mBot robot to prototype products or services in the real world.
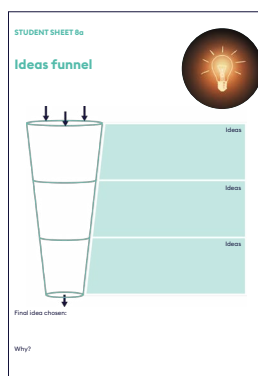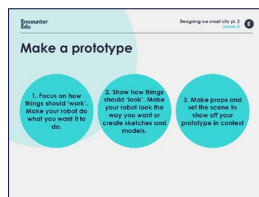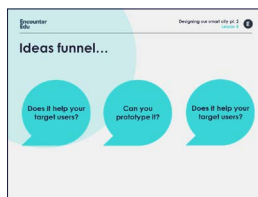
3
35 mins
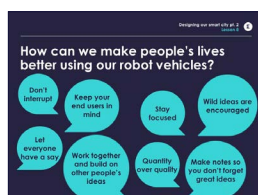
Get the students to bring out their notes from the brainstorm session. Hand out **Student Sheet 8a** Ideas funnel.

Step

Remind students that they have brainstormed many different solutions. (**Slides 5-6** can optionally be used as a refresher). Then explain that they must evaluate their ideas using an ideas funnel (**Student Sheet 8a**) to determine the final idea they want to prototype and present. The funnel is a visual representation of "good, better, best" and should also record the chosen project and the reasons for the choice.

As a guideline, the top part of the funnel should have 8-10 ideas, the middle part 4-6 and the bottom 2 or 3.

In their groups, students should narrow down the ideas they had during the brainstorm by using the ideas funnel and the three questions on **slide 7**.

Once students have chosen their final idea, they should move on to starting their prototypes. Remind them that the point of prototyping is to make something quickly that tests their idea, so they shouldn't worry too much about details. Given the limited amount of time in this session, groups may wish to divide up tasks, choosing either how things should 'work' or how things should 'look' **(Slide 8)**. If there is time, they can make props and set the scene for their demonstration.

You could also choose to get the class to vote for their single favourite idea and work on different aspects of the prototype as a single big design team with different responsibilities: code, testing, body, scenery, props, role play scripts and so on.

4

10 mins
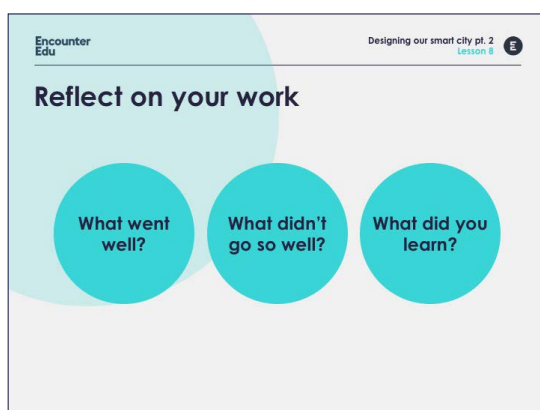
Using **slide 9**, ask your class to reflect on what went well, what didn't go so well and what they learned.