LESSON 4

Should we repair?

Age 11-14

60 minutes

Curriculum links

- Investigate the benefits and drawbacks of repair
- Apply modular design as a solution to sending devices to landfill
- Design and review a modular mobile phone

Resources

Slideshow 4:
Should we repair?

Student Sheet 4a:
Modular phone information

Student Sheet 4b:
Design a modular phone

Extension or home learning

List all the different materials found in a mobile phone.

In 150 words describe how they can harm our oceans.

Lesson overview

In this design and technology Key Stage 3 (KS3) lesson, students learn how many products are designed to become obsolete and the impact this has on the environment. This lesson is focussed on students finding solutions to make it easier to repair products. Included are teacher resources that allow students to design a modular phone that can be updated and repaired easily.

Lesson steps	Learning outcomes
1. What have you thrown away? (10 mins) Students list items which they have thrown away and consider which could have been repaired.	• Describe what products can be easily repaired
2. How have phones changed? (10 mins) Students order phones from oldest to newest and compare how designs have changed over time.	• Describe what products can be easily repaired
3. Why are things not repaired? (10 mins) Students investigate how planned obsolescence is used in industry.	• Describe what products can be easily repaired
4. Design a modular phone (20 mins) Students are introduced to a modular design. They are tasked with building their own modular phones.	• Create a modular design for easy repair • Explain the environmental implications of products that can be easily repaired
5. Would you buy a repairable phone? (5 mins) Students discuss the question, "Would you rather buy a repairable phone or the latest Apple phone?" This encourages students to explain how environmental implications do or do not impact their attitudes.	• Explain the environmental implications of products that can be easily repaired
6. Defining todays keyword (5 mins) Students use a definition grid to help them define the word repair.	• Define repair

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Step	Guidance	Resources
1 10 mins	In step 1, students recall what they have thrown away in the past. · Using slide 1, students begin to list items they have thrown away in the past as a settler activity. · Review student responses, listing some examples on the board. Pose the question to students: "Which can be repaired easily?" · Using slides 2-4, introduce the lesson and learning objectives.	**Slideshow 4:** Slides 1-4
2 10 mins	In step 2, students are asked to compare how mobile phones have changed over time. This will require them to distinguish differences they can see from images given. · Direct students to slide 5. · Ask students to work in pairs or a group to reorder the phones displayed, numbered 1-9, in order of oldest to newest. · Students write down a list of numbers in their workbook. · Ask one or two groups to feedback their order of numbers. Write these predictions on the class board. · Using slide 6, reveal the actual order of the phones from oldest to newest. · Begin a discussion by asking students, "What can you see has changed over time?" Students ought to list lots of physical characteristics they can observe. · Develop the discussion by asking, "What do you think mobiles can do today that they couldn't do before?"	**Slideshow 4:** Slides 5-6

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Step	Guidance	Resources
3 10 mins	In step 3, students gain an awareness of how manufacturers have designed phones to become obsolete quickly and how this contributes to the e-waste dumped on landfill. · Using slide 7, introduce the statement "The average Briton throws away 25-50kg of e-waste a year". Then ask students, "Why are things not repaired?" Remember to allow a 5 second think time before accepting students' answers. · If students are struggling, follow up with the questions shown on the board: "Why might we not want to repair something?", and "Why might a mobile company not want us to repair?" · Once you have elicited the idea that manufacturers have different motivations to the consumer, introduce planned obsolescence on slide 8. · Using slide 8, first outline that planned obsolescence is where manufacturers design a product with the intention that it will become obsolete. Therefore, the consumer purchases more goods. · Outline the 4 main types of obsolescence shown on slide 8. Further details provided below in information section. · Using slide 9, explain to students that phones are made of both useful and harmful metals and chemicals. When sent to landfill these react in the air and rainwater. Toxic metals and chemicals dissolve in water and enter water sources through the ground. Eventually, these can reach the ocean and harm marine organisms.	**Slideshow 4:** Slides 7-9

There are four main types of obsolescence students will be introduced to.

1. Contrived durability: Explain that most phones now have a touch screen which, although improves user experience, is easily broken and often requires specialists to fix.

2. Prevention of repairs: Explain that many phones now have in built batteries therefore cannot be easily replaced by the consumer. Furthermore, some tech brands have used specialised screws so most people cannot open and repair their phones.

3. Perceived obsolescence: Explain that most things from phones to cars come in models that are released yearly. This means that consumes perceive – think- that their phone has less value because it is an older model. This increases tech being discarded and the number of new purchases.

4. Systemic obsolescence: Explain that old tech often becomes outdated because it can not receive new updates. This means that it cannot create or receive information sent from newer devices, even though the machine's hardware still functions.

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Step	Guidance	Resources
4 20 mins	 Students now recognise how manufacturers can purposefully design products with planned obsolescence to drive profits. Students also understand the negative impact this can have on the environment. In step 4, students are introduced to modular design which they apply to create their own modular mobile. · Using slide 10, explain to students that there is a solution to the design issue. Introduce modular design by referencing the examples shown pictorially on the slide. Explain that modular design is used in houses, cars, and furniture. This type of design allows for easy assembly, repairing, and recycling. · Print Student Sheet 4a and place the different sheets around the room for the design a modular phone activity. · Hand out Student Sheet 4b. · Using slide 11, ask students to go to each station and choose the specification they would like to include on their phone, the cost for each component, and explain why they chose it. · Instruct students to sit down once finished. · Students then draw a labelled diagram of their product and complete summary questions. · Once most students are finished review the summary questions.  To ensure that designs are varied you may want to give students different budgets to build their phones. Split the class in three groups. Group one has up to £300, group two has up to £400, and group three has up to £600.	**Slideshow 4:** Slides 10-11 **Student Sheet 4a:** Modular phone information **Student Sheet 4b:** Design a modular phone
5 5 mins	 Students now understand what modular design is and how it may be able to reduce ocean plastics by making products more repairable. Now students think critically how environmental implications do/do not impact their attitudes. · Showing slide 12 pose the question, “Would you rather buy a repairable phone or the latest Apple phone?” · Facilitate a discussion among students, prompting them to explain the economic, environmental, and social reasons. · A good discussion format is ABC (agree, build, challenge). Using this model, students first respond to another person’s point by either stating they agree, would like to build on that point, or that they would like to challenge the previous point made.	**Slideshow 4:** Slide 12

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Step	Guidance	Resources
6 5 mins	In step 6, students have opportunity to think critically about what it means to repair. · Using slide 13 introduce the definition grid. Explain that the main word goes in the centre. Show students the 4 boxes surrounding the centre titled: 'definitions', 'characteristics', 'examples', and 'non-examples'. Then instruct students to draw the grid into their own books, put the word 'repair' in the centre, and populate. The definition grid is very good at making students think more deeply about concepts. However, it can be particularly challenging when defining a verb as opposed to a noun. If students are struggling, perhaps break the task into two segments, asking them to complete two boxes first. Review these as a whole class. Then ask them to complete the next two boxes.	**Slideshow 4:** Slide 13
+ 20 mins	The lesson has mostly been focused on the solution to the ocean plastic problem. This homework is designed to remind students of the problem that modular design fixes. Ask students to go home and research the different materials which make up a mobile phone. Students list the materials then, using approximately 150 words, describe how they can harm our oceans.	**Subject Update:** How to: Improve students' online research skills