

## Waste-Bot Clean-Up

Australians generate more than 7.6 million tonnes of food waste each year which is enough to fill a cricket stadium! Food waste is food intended for human consumption which is discarded from many parts of our food supply chain, including farms, processing and transport, hospitality and restaurants, supermarkets and households. While many schools, workplaces and homes have recycling and organics bins available, not enough people are using them or using them correctly. This lesson allows students to demonstrate their understanding of different types of waste while programming an algorithm to collect waste.

### Required resources

- Robot (e.g. Bee-Bot, Dash and Dot, Sphero)
- Blank Bee-Bot or similar map or masking tape to create a grid on the floor
- Cards with 'recycle', 'general waste' and 'organics' (see printable) – print about 10 of each type
- Images of different waste materials (pre-prepared by teacher or collected during lesson by students)
- iPad or camera optional (depending if students are taking their own photos of waste)

### Recommended reading/viewing

Students can learn about how much waste Australians make each year. This could be undertaken as a class inquiry, shared by the teacher or the class could watch a related video about waste.

### Required learning

As a starting point, students can learn about the magnitude and impact of waste on our environment and the different types of waste.

The World Wildlife Fund has a series of lessons and activities to raise awareness of the impact of what is eaten and thrown away. Students could learn about 'food kilometres', the distance food travels from the source to the consumer. They can calculate the food kilometres for common foods, discuss the environmental implications of long-distance food transport and explore alternative options for buying locally grown food (Mathematics & Design and Technologies).

<https://www.worldwildlife.org/teaching-resources/toolkits/be-a-food-waste-warrior>

This BeeBot activity can be used as part of an assessment task to check if students can identify different types of waste – organics, recyclables, and general waste. This lesson could be further extended to include eWaste.

## Suggested steps

After learning about the scale of the waste we create in Australia and different types of waste, students take photos of different types of waste they find in their school or home. Alternatively, students could source example images from the Internet or draw their own waste images. They categorise these into: organics, recycling, and general waste.

Some of these photos can be printed as used as the basis for the images on the BeeBot mat. Lay out a set of mixed waste images randomly on the mat. Keep the rest of the images to the side to replace.

In this BeeBot activity, students draw a random waste card from a pile of printed cards. Students then navigate the robot to collect that type of rubbish from the mat. If the student has used the correct algorithm it should arrive at the rubbish. The student takes the image and replaces it with a new waste image that had been put to the side. Students take turns collecting their waste – and checking that the waste correctly matches the card. At the end of the lesson, students can sort and count their waste collected. This could be done as a game with points for each waste item correctly collected.

## Waste clean-up Bot!



## Why is this relevant?

Computer science is helping fight food waste with sustainable solutions. Smart fridges and apps help us keep track of food so we don't waste it, AI-driven technology is helping to sort out recyclables from trash and people are using technology to map and connect those who have food or organic waste with those who need it. Today autonomous cleaning robots are commonly found in shopping centres and sometimes in homes. Students can learn about different types of waste while programming a robot at the same time. At the end of the lesson students could even design their own future waste fighting machine!

## Assessment

Observation can be used to check students' ability to carry out tasks aligned to the Australian Curriculum.

Allow students time to practice with the robot so that they feel comfortable using the functionality and in navigating around a mat. A checklist like the one below can help support observations.

- Teachers observe students using the Bee-Bots, creating their algorithms and debugging.
- Use questioning to elicit student understanding of the functions of the Bee-Bot and their algorithmic thinking.
- The teacher moves around the room and asks students as they are using the Bee-Bot to explain what the Bee-Bot is and how they are using it.

Students	Yes / No / Partial	Comments
Student can explain the steps needed to solve their algorithm (how to get BeeBot from one area to another)		
Student can correctly navigate BeeBot from one area of the mat to another		
Student can explain and justify their algorithm choice		
Student can identify where a 'bug' has occurred		
Student can fix their programming bug (debug)		
Students correctly identify types of waste		

For more assessment resources we recommend the Digital Technologies Hub:  
<https://www.digitaltechnologieshub.edu.au/teach-and-assess/>

## Australian Curriculum

### Years 1 and 2 Digital Technologies

Students learn to:

- follow and describe algorithms involving a sequence of steps, branching (decisions) and iteration (repetition) (AC9TDI2P02)

### Cross-curriculum priorities

These content descriptions connect to the following Sustainability cross-curriculum organising ideas:

- Systems: Sustainably designed products, environments and services aim to minimise the impact on or restore the quality and diversity of environmental, social and economic systems. (SD1)
- Systems: Sustainable patterns of living require the responsible use of resources, maintenance of clean air, water and soils, and preservation or restoration of healthy environments (SS2).
- Design: Creative and innovative design is integral to the identification of new ways of sustainable living. (SD2).
- Futures: Sustainable futures require individuals to seek information, identify solutions, reflect on and evaluate past actions, and collaborate with and influence others as they work towards a desired change. (SF2)

## Teacher professional learning resources

- CSER Digital Technologies + X MOOC Sustainability module
- Nutrition Australia: Ways to reduce food waste: <https://nutritionaustralia.org/fact-sheets/reduce-food-waste/>
- Oz Harvest: Education. <https://nutritionaustralia.org/fact-sheets/reduce-food-waste/>
- Sustainably schools: Waste resources <https://sustainableschoolsnsw.org.au/curriculum/teaching-resources/waste/>
- Data Education in Schools: From your plate to the planet. <https://dataschools.education/resource/plate-to-planet/>

## For more information

Please visit our webpage <https://csermooocs.adelaide.edu.au/lending-library>  
Email [cser@adelaide.edu.au](mailto:cser@adelaide.edu.au)



Recycling



General Waste



Organics



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