Kai's Clan Lesson Plan – Ocean Rescue

Suitable Years 4 to 6. This lesson has been adapted from Kai's Clan Projects.

Background to mission

Across the world's oceans microplastic particles are becoming an extreme danger to the life of marine animals. If ingested, these microplastics can cause life threatening problems and upset the balance for aquatic life. This lesson provides opportunities for students to use robots and develop solutions to clean the ocean floor to protect marine life and waterways to protect birdlife. The lesson can be extended to find ways to keep water ways clean and limit the impact of microplastics in the world's oceans.

SDG 14: Life Below Water

and sustainably use the oceans, seas and marine for sustainable development. Explore and understand the plastic waste to our oceans. Generate and explore ideas better control discarded trash from entering our oceans.

Conserve resources threats of of how to

Image from https://sdgs.un.org/goals/goal14

Australian Curriculum:

Digital Technologies (in this lesson plan)

- (AC9TDI4P01) define problems with given design criteria and by co-creating user stories
- (AC9TDI6P01) define problems with given or co-developed design criteria and by creating user stories
- (AC9TDI4P04) implement simple algorithms as visual programs involving control structures and input
- (AC9TDI6P05) implement algorithms as visual programs involving control structures, variables and input

Science (extension of concept)

- (AC9S4H02) consider how people use scientific explanations to meet a need or solve a problem
- (AC9S5H02) investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions
- (AC9S6H02) investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions

HASS (extension of concept)

- (AC9HS4S06), (AC9HS5S06), (AC9HS6S06) propose actions or responses to an issue or challenge that consider possible effects of actions

Sustainability - World views

World views are formed by experiences at personal, local, national and global levels, and are linked to individual, community, business and political actions for sustainability.

Learning Intentions:

- Identify how humans are affecting aquatic life in the oceans and in waterways.

- Explain why turtles need a clean ocean and birds need clean waterways.
- Investigate ways of cleaning the ocean and waterways.
- Examine human habits and apply the three R's to prevent plastics pollution.

Lesson Overview:

Life Below the Sea – What does aquatic life need to survive?
Introduce the problem and show images of how plastics get to the ocean. Discuss how pollution is due to human activity on land and at sea. Research microplastics at:

- What are microplastics? (noaa.gov)
- Microplastics (nationalgeographic.org)
- Plastic pollution in the ocean: data, facts, consequences (unesco.org)


Bottlecaps gathered from the oceans (Source: NOAA)


Tangle of floating plastic netting and other plastic debris (coastalcare.org)


Polluted beach (Source unknown)

Explore the problem – How does plastic effect marine life eg. turtles?
Microplastic pollutants cause harm to sea turtles that are in danger of eating plastic bottles that they mistake for jellyfish. Research:

- Plastic pollution is killing sea turtles: Here's how – WWF-Australia | Plastic pollution is killing sea turtles: Here's how | WWF Australia
- How much plastic does it take to kill a turtle? - CSIRO

Note: some images may be too graphic for some students.

Discover solutions – What is happening now to fix the problem?

Explore ways we can contribute to removing plastics from the oceans and reducing the use of plastics. Show how one students drive to get rid of plastic straws has led to a new wave of biodegradable paper straws. What other human habits can we influence and change?

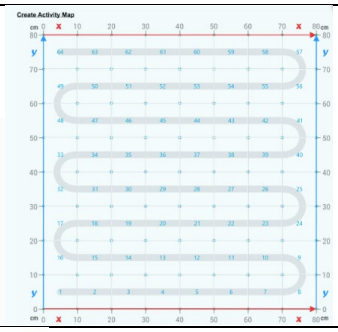
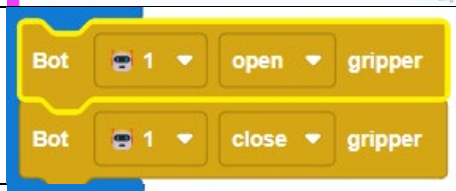
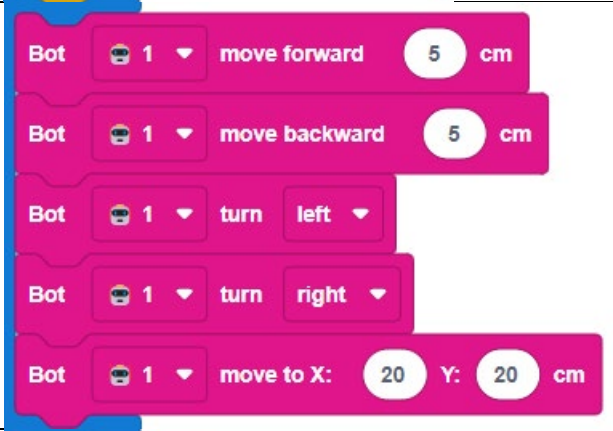
- War on Waste: Why go straw-free? - ABC Education
- Straw No More

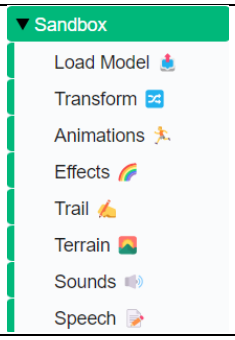
Resources:

- SDG Resources for Educators - Life Below Water (unesco.org)
- Microsoft Word - Marine Debris Lesson Plan September.docx (globalgoals.org)
- War on Waste - ABC Education

Coding Challenge

Investigate ways to clear litter from the ocean floor. Move your Kai's robot in a free space or using a mat to remove plastic rubbish simulating the ocean floor. Place litter objects randomly on the floor or Lego bricks to represent plastic litter on the ocean floor. Encourage students to think about where the collected plastic rubbish will go such as a recycling zone?

Steps	Possible code available
Break the challenge up into steps and develop a plan. Which code blocks will you use to move the robot to the objects?	
Which code blocks are needed to grab the objects?	
Which blocks are needed to move to any position?	
Move plastics to a recycling zone using to robot. What does this replicate?	
Considerations	• What are some ways to prevent plastic pollution? • What are some methods of cleaning the ocean? • How can we prevent polluted oceans in the first place? • What does our coding challenge replicate in the real world?

Extension Using the Sandbox section, students can create a VR ocean environment using Minecraft, TinkerCad or Google Poly. Load AR models such as litter and turtles and use animations to bring them to life. Have your robot clean the ocean in VR mode using Kai's Virtual Viewer app.	

Assessment

Assessment will depend on your classroom needs and goals. We have some tips and resources to support assessment below.

- 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 can help support observations.
- Teachers observe students using the Kai's Clan robots, creating their algorithms and debugging.
- Use questioning to elicit student understanding of the functions of the robot and their algorithmic thinking.

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

For more information

Please visit our webpage https://csermoocs.adelaide.edu.au/lending-library
Email cser@adelaide.edu.au

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