

Saving sea creatures

**Activities:** 2

**Programming languages:** MakeCode

**Target age:** 7-11 yrs

**Subjects & topics:**

* Computer systems: Input/output
* Programming: Selection
* Global Goals: 14 Life below water

# Design challenge summary

In the **Light-up fishing nets** activity, students learn about the problem of bycatch and potential solutions, before creating a prototype light-up fishing net using micro:bit.

In **Sea safe turtles** students discover about sea turtles before creating a prototype sea turtle-safe beach light using the micro:bit’s LEDs.

## Overall key learning

* to learn about the problems faced by marine creatures caused by fishing and pollution
* to identify possible solutions to the problems
* to learn how inputs (sensors) and outputs (light and sound) of the micro:bit can be used to design and make prototype solutions
* are responsible, competent, confident and creative users of information and communication technology

## Additional skills

Researching, prototyping, design thinking, creative thinking, problem-solving

## Activity 1: Light-up fishing nets

Learn about the problem of **bycatch** (unwanted fish and other marine creatures trapped by commercial fishing nets), the impact of it and potential solutions, before creating a prototype light-up fishing net using micro:bit.

**Key learning:**

* To learn about the problem of ‘bycatch’ and its impact on marine ecosystems
* To identify possible solutions to the problem
* To learn how inputs (sensors) and outputs (light and sound) of the micro:bit can be used to design and make prototype solutions

## Activity 2: Sea safe turtles

In this activity students discover all about sea turtles before creating a prototype sea turtle safe beach light using the micro:bit’s LEDs.

**Key learning:**

* To discover more about the threats faced by sea turtles
* To learn about efforts to help them
* To learn how micro:bit inputs (sensors) and outputs (LED lights) can be used to make a prototype to help protect sea turtles

# Curriculum links

## England National Curriculum

#### KS2 computing curriculum

Curriculum aims:

* are responsible, competent, confident and creative users of information and communication technology

Students should be taught to:

* design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts
* 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
* select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

[Read the full KS2 computing curriculum](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239033/PRIMARY_national_curriculum_-_Computing.pdf)

#### KS2 science curriculum

* recognise that environments can change and that this can sometimes pose dangers to living things

[Read the full KS2 science curriculum](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425618/PRIMARY_national_curriculum_-_Science.pdf)

#### KS2 DT curriculum

* apply their understanding of computing to program, monitor and control their products

[Read the full KS2 DT curriculum](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239041/PRIMARY_national_curriculum_-_Design_and_technology.pdf)

## Scotland Curriculum for Excellence

#### Technologies

* I can explore and experiment with digital technologies and can use what I learn to support and enhance my learning in different contexts (TCH 1-01a)
* I can explore and comment on processes in the world around me making use of core computational thinking concepts and can organise information in a logical way (TCH 1-13a)
* I understand how technologies help provide for our needs and wants, and how they can affect the environment in which we live (TCH 1-07a)
* I understand the instructions of a visual programming language and can predict the outcome of a program written using the language (TCH 1-14a)
* I can demonstrate a range of basic problem solving skills by building simple programs to carry out a given task, using an appropriate language (TCH 1-15a)
* I can extend and enhance my knowledge of digital technologies to collect, analyse ideas, relevant information and organise these in an appropriate way (TCH 2-01a)
* I can analyse how lifestyles can impact on the environment and Earth’s resources and can make suggestions about how to live in a more sustainable way (TCH 2-06a)
* I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment (TCH 2-07a)
* I understand the operation of a process and its outcome. I can structure related items of information (TCH 2-13a)
* I can explain core programming language concepts in appropriate technical language (TCH 2-14a)
* I can create, develop and evaluate computing solutions in response to a design challenge (TCH 2-15a)

[Read the full Curriculum for Excellence: technologies](https://education.gov.scot/Documents/Technologies-es-os.pdf)

#### Sciences

* I can distinguish between living and non living things. I can sort living things into groups and explain my decisions (SCN 1-01a)
* I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food (SCN 1-02a)
* I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction (SCN 2-01a)
* I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area (SCN 2-02a)

[Read the full Curriculum for Excellence: sciences](https://www.education.gov.scot/Documents/sciences-eo.pdf)

## Northern Ireland Curriculum - Primary

#### Using ICT across the curriculum

* explore - investigate, make predictions and solve problems through interaction with digital tools
* evaluate - talk about, review and make improvements to work, reflecting on the process and outcome

#### KS1 - suggested curriculum ideas for the world around us

* design and make simple models
* the variety of living things in the world and how we can take care of them
* how people’s actions can affect plants and animals

#### KS2 - suggested curriculum ideas for the world around us

* design and make simple models
* the consequences of change through investigating global issues, for example, rainforest destruction or light pollution

[Read the full Northern Ireland Curriculum - Primary](https://ccea.org.uk/downloads/docs/ccea-asset/Curriculum/The%20Northern%20Ireland%20Curriculum%20-%20Primary.pdf)

#### KS1 & 2 - requirements for using ICT

* explore - investigate, make predictions and solve problems through interaction with digital tools

[Read the full KS1 & 2 requirements for using ICT](https://ccea.org.uk/downloads/docs/ccea-asset/Curriculum/Curriculum%20Requirements%20for%20Using%20ICT.pdf)

#### KS2 - the world around us

* how living things rely on each other within the natural world
* the effect of people on the natural and built environment over time

[Read the full KS2 requirements for the world around us](https://ccea.org.uk/downloads/docs/ccea-asset/Curriculum/Key%20Stage%202%20Statutory%20Requirements%20for%20The%20World%20Around.pdf)

#### Primary using ICT - desirable features - computational thinking and coding

**Level 4**

Pupils should:

* create a more sophisticated coding project using a broad range of commands; and/or
* solve a given problem using commands in a programming environment.

**Programmable devices (such as Parrot Drone, micro:bit or Sphere)**

* look at and talk about examples of coding projects, including the use of motion, looks, lights or sounds, sensors, control and events such as ‘if...then’ and ‘loop until’ (or equivalent) that make the code more efficient;
* recognise that these projects are composed of different components and break the task into smaller manageable tasks (decomposition);
* in small groups, plan and storyboard their own coding project, working out what different parts of the program must do, using logical reasoning to discuss and compare the commands that are required for their algorithm;
* use a range of commands to create a project including triggering commands such as ‘if...then’ and ‘loop until’ to facilitate a more efficient method of interaction;
* test and debug at regular intervals and collaborate with others to solve problems as they arise;

**Finally**

* share their work (possibly using digital tools), respond to feedback and comment on others’ work; and
* organise files and export work in an appropriate format so that others may view it.

[Read all Primary using ICT desirable features](https://ccea.org.uk/downloads/docs/ccea-asset/Curriculum/Primary%20Using%20ICT%20Desirable%20Features%20Update%202019.pdf)

## Curriculum for Wales

#### Science and technology

Progression step 2 - design thinking and engineering offer technical and creative ways to meet society's needs and wants:

* I can safely use a range of tools, materials and equipment to construct for a variety of reasons
* I have experienced using basic prototyping techniques to improve outcomes

Progression step 3 - design thinking and engineering offer technical and creative ways to meet society's needs and wants:

* I can consider how my design proposals will solve problems and how this may affect the environment

Progression step 2 - the world around us is full of living things which depend on each other for survival:

* I can recognise that what I do, and the things I use, can have an impact on my environment and on living things
* I can explore relationships between living things, their habitats and their life cycles

Progression step 2 - computation is the foundation for our digital world:

* I can safely use a range of tools, materials and equipment to construct for a variety of reasons
* I can follow instructions to build and control a physical device

Progression step 3 - computation is the foundation for our digital world:

* I can use sensors and actuators in systems that gather and process data about the systems’ environment

[Read the full science and technology curriculum](https://hwb.gov.wales/curriculum-for-wales/science-and-technology/descriptions-of-learning/)

#### Humanities

Progression step 2 - Our natural world is diverse and dynamic, influenced by processes and human actions:

* I can describe how people and the natural world may impact on each other

Progression step 3 - Our natural world is diverse and dynamic, influenced by processes and human actions:

* I can describe and give simple explanations about the impact of human actions on the natural world in the past and present

[Read the full humanities curriculum](https://hwb.gov.wales/curriculum-for-wales/humanities/)

#### Digital competence framework

Progression step 1 - data and computational thinking - problem-solving and modelling:

* I can recognise and follow instructions in the appropriate order to perform a task.
* I can organise, select and use simple language to give instructions to others.
* I can control devices giving instructions.
* I can identify errors in simple sets of instructions (algorithm).

Progression step 2 - data and computational thinking - problem-solving and modelling:

* I can detect and correct mistakes which cause instructions (a solution) to fail (debug).
* I can create and record verbal, written and symbolic instructions to test ideas, e.g. the order of waking up through a diagram or flowchart.

Progression step 1 - producing - evaluating and improving digital content:

* I can comment on work in relation to a single success criterion.

Progression step 2 - producing - evaluating and improving digital content:

* I can give an opinion about my own work and suggest improvements based on the success criteria.

[Read the digital competence framework](https://hwb.gov.wales/curriculum-for-wales/cross-curricular-skills-frameworks/digital-competence-framework)

## USA Code.org

Courses C, D, E and F

Concepts included:

* sequencing
* loops
* events
* conditionals

[Read the full CS Fundamentals curriculum](https://code.org/educate/curriculum/csf)

## USA CSTA Standards

#### Grades 3-5

* 1B-CS-01 - Describe how internal and external parts of computing devices function to form a system.
* 1B-CS-02 - Model how computer hardware and software work together as a system to accomplish tasks
* 1B-CS-03 - Determine potential solutions to solve simple hardware and software problems using common troubleshooting strategies.
* 1B-AP-08 - Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
* 1B-AP-10 - Create programs that include sequences, events, loops, and conditionals.
* 1B-AP-11 - Decompose (break down) problems into smaller, manageable subproblems to facilitate the program development process.
* 1B-AP-12 - Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

[Read the CSTA Standards in full](https://csteachers.org/k12standards/ ).

This content is published under a [Creative Commons Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)](https://creativecommons.org/licenses/by-sa/4.0/) licence.