Investigating biodiversity

Content summary:
A whole class data collection activity that uses the BBC micro:bit as a biodiversity counter to log the number of species of animals and the number of species of plants spotted while in the school playground.

Time: Approx. 2 hours split up into 4 sessions.

Session 1: Introduction and planning (20 min)

Resources required	Prior learning	Before the lesson
• Map or image of playground (see Getting started activity). • Investigating biodiversity video on BBC Teach activity guide. • Playground survey pupil worksheet. • Playground survey glossary.	**Science** • Meaning of biodiversity. • Classification of living things into different groups/species.	• Gather all resources required.

Differentiation

Think about groupings and volume of data and group pupils in any way that works for your class. Mixed ability pairs or small groups work well. If you have an area that includes a high number of plant species, encourage a systematic approach. Some suggestions:

- Divide the area up on your map and allocate pairs or groups to very small areas.
- Allocate different types of plants to different groups. For example, one group only logs species of grasses and flowers, and others log species of trees and bushes.

Session details

1. Recap the BBC micro:bit playground survey and introduce this survey activity using the Investigating biodiversity video on BBC Teach.
2. Highlight the key question we want to answer:
   How many different species of plants and animals do we have in our playground?
3. Explain that the micro:bit is not automatically programmed to be a biodiversity counter, but we can program/code it to become one.
4. Recap class understanding of biodiversity and other key terms.
5. Explain that when we are logging different species, we need to be able to tell them apart – link to prior learning on classification if applicable.
6. Talk about how to keep the process scientific and the data robust, reminding children higher numbers are not 'better' and how to be logical in how they approach their logging.

Session 2: Optional coding (30 min)

Resources required	Prior learning	Before the lesson
• Investigating biodiversity micro:bit how to guide including coding video. • Image of biodiversity counter code available on micro:bit how to guide. • Code on MakeCode or biodiversity counter hex file. • BBC micro:bits, battery packs and batteries (one per pair or group). • To put code on your micro:bit you will need one of the following: • A computer (e.g. laptop or Chromebook) and a micro:bit USB lead • An Android tablet with the micro:bit USB lead and an adaptor (support article with more detail for Android tablets) • An Apple iPad with Bluetooth enabled and the micro:bit app (support article with more detail for Apple iPads)	**Computing/ICT/Technology** • Combining code blocks to create a program. • Understanding inputs.	• Check pupil computers allow micro:bit drive to display (more information here). • Decide the playground boundaries to log data within – include everything children can play on, every playtime, every day. • Have the Investigating biodiversity micro:bit how to guide and coding video ready to share. • Display image of biodiversity counter code. • Make sure batteries are in micro:bit battery packs.

Planning

If you want to skip to the Fieldwork session, you will need to make sure the code is transferred to the micro:bits in advance. You can download the biodiversity counter hex file from the micro:bit how to guide.

Session details

1. Open the **biodiversity counter code in MakeCode**, show the code on screen and talk through how it works.
2. Watch the micro:bit coding video in Investigating biodiversity micro:bit how to guide with your class and take note of key points.
3. Ask pairs or groups to go to **makecode.microbit.org** and create the biodiversity counter code on their device.
4. Demonstrate how to **transfer the code to the micro:bits** and ask pairs or groups to transfer code. If you are using tablets, then **please follow these instructions.**
5. Once pupils transfer the code, they should test it by pressing button A and button B on the micro:bit to see the icons and numbers appearing. Then press the reset button on the back to clear the data log.
6. Pupils do not need to keep the same micro:bits that they have programmed. They can be gathered up and powered off, and the code will stay on the micro:bits ready to use in the next session.

Session 3: Fieldwork (40 min)

Resources required	Prior learning	Before the lesson
• BBC micro:bits, battery packs and batteries (one per pair or group). • Pupil worksheets for recording when back in the classroom and pens or pencils. • Map showing surface locations (optional).	**Science** • Identification of plants and animals in local area.	• Ensure the code is on the micro:bits and the batteries in the battery packs are working. • Decide on pairs or groups that will work together and how to divide the class in half.

Differentiation

If specific children need support conducting their survey, provide additional support through who they are partnered with or through additional tools.

Session details

Getting Started activity (5 min)

1. Use the playground map from the introduction activity (or another map) to ensure pupils know where playground boundaries are, so they know what they can and cannot log.

Model how to use the biodiversity counter (10 min)

2. Share the 'Investigating biodiversity' micro:bit how to guide with the class and read through how it works.
3. Model how to reset the micro:bit by pressing the button on the back before they start.
4. Remind them not to press the reset button once they start logging data, or they will lose their data.
5. Model how to use the counter each time a different type of plant or animal is spotted.
6. Highlight how the LED screen changes to show the entry has been logged.
7. Show them how to press the micro:bit logo to get the totals so far.

Log data in your playground (30 min)

8. Split the class in half and allocate animals to one half and plants to the other half. This means that pupils only need to focus on logging one thing at a time. The groups can then swap halfway through so that both groups have the opportunity to log both plant and animal species.
9. Go outdoors and allow children to log how many different animal species and plant species they see in the whole playground.

Troubleshooting

- Ensure battery packs are clicked in fully before beginning.
- Restarting logging is possible if the reset button on the back of the micro:bit is pressed, but this will delete the data already logged.

Session 4: Data analysis and recording (30 min)

Resources required	Prior learning	Before the lesson
• Totals from each micro:bit LED display. • Pupil worksheets for the classroom data analysis session. • Calculators (optional).	**Maths** • How to calculate the average/mean (not essential as teacher-led, class activity).	• Decide if you will use calculators or other methods of support. • Distribute pupil worksheets for the classroom data analysis session.

Differentiation

Use tools and differentiation appropriate to your class. You may find calculators or a spreadsheet helpful, or task different groups with working out different things.

Session details

Calculate the class average for plant and animal species (20 min)

1. Ask pupils to fill in the pupil worksheet using the totals from their micro:bit LED display
2. Calculate the class average for the number of species logged for both plants and animals.
3. Ensure your data is as robust as possible by identifying and removing outlier results.
4. Record your results on the playground survey poster.

Discuss findings (10 min)
Questions

1. *Were you surprised by your data or not?*
2. *Can you see any patterns in the data you collected?*
3. *What does this data tell us about our playground?*

Link back to what we wanted to find out:

4. *How many different species of plants and animals do we have in our playground?*

Look ahead:

5. *What action do we want to take based on our findings?*