

Net Zero VEXcode Activity

Session 2 Lesson Plan

Learning Intention

- Use an existing program to drive a rover around a virtual school (simulated to model your own), collecting current and ambition CO₂ emission data from multiple sensors.
- Compare and analyse the data using a carbon calculator spreadsheet.
- Use the data persuasively to encourage others to help save the planet.

NB Session 2 can be delivered without Session 1.
Duration: 40 – 50 minutes

Learning Outcomes

- Run a program that uses real-world data to create a simulated school modelled on your school's current environmental impact.
- Output the collected current data into a carbon calculator and review the calculated CO₂ emissions.
- Repeat with environmental ambitions for your school, and use the carbon calculator to analyse the results.
- Use this persuasive data to present your findings in a style designed to suit the audience, encourage them to reduce CO₂ emissions and help save the planet.

Resources

- Net Zero Adventure main film
- Session 2 Teaching Guide PowerPoint
- Session 2 Explainer Video
- Session 2 Student Guide (.pdf)
- Free access to VEXcode VR and the data science school 'playground'
<https://vr.vex.com/?classcode=DATASCIENCE>
- Boop! Carbon Calculator macro-enabled spreadsheet (.xslm) or if unable to use macros, try
<https://boop.freshleafdigital.com>
- Student files.zip, teaching files.zip

Keywords

- | | |
|----------|----------|
| • Design | • Data |
| • Test | • Input |
| • Debug | • Output |

Key Learning Goals*

Pupils should be taught to:

- use a programming language to solve a variety of computational problems
- undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users

*These learning goals align to the National Computing Curriculum in England - Key Stage 3 (ages 11-14)

Health and Safety

Ensure students are supervised when using computers. Monitor safe use of internet access and ensure e-safety.

Introduction

- If not already completed, watch the Net Zero Coding Adventure main film as an assembly for the year group, or as a class (as described in Session 1).
- In the setup you will need to ask the students to copy the student files into their own area, and open the student guide to aid self-led learning – see more details below.
- Ensure the VEXcode VR website is accessible for student logins and that none of the VEX websites are blocked in your setting.

Plenary

Discuss with the class what they have learnt in the assembly and the activity. How successful were they in completing the tasks? Invite students to share some of their debugging stories, coding additions and how they have used the persuasive data. What did they find the most challenging and why?

Session 2 Main Activity

Setup: As Session 1

Challenge 2: Collect current school CO₂ data using 'Grover the Rover', paste it into the Boop! carbon calculator spreadsheet and review the outcome.

Challenge 3: Collect ambition school CO₂ data using 'Grover the Rover', paste it into the Boop! carbon calculator spreadsheet and review the outcome.

Challenge 4: Use the Boop! spreadsheet to compare and analyse the CO₂ emissions and use it as persuasive data

Extension Challenges: As Session 1

Assessment Questions

- What is net zero?
- What CO₂ emission ambition settings did you put in the sliders, to represent the goals for your impact?
- How was the data easier to read once it had been analysed using the Boop! spreadsheet?
- How will you persuade others to help save the planet?

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Links to other National Curricula in England

Literacy:

- Computing: *Algorithm, Design, Write, Test, Debug, Iteration, Selection, Input, Output, Variable*
- Data: *Analysis, Export, Structured, Unstructured, Descriptive, Predictive, Prescriptive.*

Numeracy:

- Use standard units of mass, length, time, money and other measures, including with decimal quantities
- Use a calculator and other technologies to calculate results accurately and then interpret them appropriately

Resources:

- **VEXcode VR Magic Link:** <https://vr.vex.com/?classcode=DATASCIENCE> (and then go to Tools > Expand Logic Categories so your display matches the instructions)
- **Computer requirements:** Internet-enabled computer including student login access to VEXcode VR - NB please test student login access in advance.
See unblocking requirement here: <https://kb.vex.com/hc/en-us/articles/30676963229204-Domain-Access-Requirements-for-VEX-Websites-and-Software>
- **Main Film:**
GWTP Net Zero Coding Adventure Main Film (ages 11+)
(accessible via account login on www.getwiththeprogram.co.uk/login)
- **Readme file:** (this is a list in the teacher.zip file explaining what's in there)
'00 - Start here - readme.docx'
(accessible via account login on www.getwiththeprogram.co.uk/login)
- **Explainer Video:**
GWTP Net Zero VEXcode Activity Session 2 Explainer Video (ages 11+)
(accessible via account login on www.getwiththeprogram.co.uk/login)
- **Lesson Plan:** (this document - pdf for teachers)
'Net Zero VEXcode Activity Session 2 Lesson Plan (ages 11+).pdf'
- **Teaching Guide:** (PowerPoint for teachers)
'Net Zero VEXcode Activity Session 2 Teaching Guide (ages 11+).pptx'
- **Student Guide:** (student-led learning tool)
'Net Zero VEXcode Activity Session 2 Student Guide (ages 11+).pdf'
- **Teacher zip file:** (contains all the documents and files, other than videos for Sessions 1 & 2)
'Net Zero VEXcode Activity teacher files.zip'
- **Student zip file:** (contains all the student documents and files for Sessions 1 & 2)
'Net Zero VEXcode Activity student files.zip'

Timings

Set up: 5-10 minutes

Challenge 2: 10 minutes

Challenge 3: 10 minutes

Challenge 4: 10 minutes

Plenary: 5-10 minutes

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Further details for set up and testing before the Sessions:

- **Session 2 can be run without having completed Session 1**

If you have completed the set up for Session 1, you will not need to repeat this for Session 2, although some students may need to use the solution program rather than their own if it was not complete or they missed Session 1

- **Copy files (only if not completed for Session 1)**

You will need to download the 'teacher files.zip' and 'student files.zip' and put them on your school / setting servers.

These contain pdfs, PowersPoints, and .vrblock files which are simple files which hold data about the position of the VEXcode VR block programming, and which can only run within the VEXcode VR website.

The student files contain everything the students will need to run both Session 1 and Session 2, and **each computer user will need a copy of the file each, so that the program doesn't overwrite anyone else's code** (NB in some browsers there is an autosave function). There is also a solution vrblocks program for Session 1 called 'Net Zero VEXcode Solution 1.vrblocks'.

The teacher files contain a copy of the student files for demonstration purposes, as well as teaching aids such as the Teaching Guide, this Lesson Plan, the Student Guide, an empty Boop! spreadsheet and a Boop! spreadsheet pre-filled with data to demo the data analysis.

- **Test VEXcode access (only if not completed for Session 1)**

If you have not done this already for Session 1, you will need to test the VEXcode VR access for both teacher and student logins using the Magic Link (<https://vr.vex.com/?classcode=DATASCIENCE>), and then go to Tools > Expand Logic Categories so your display matches the instructions), and ensure you are able to 'Open Playground' select the 'HOC Data Science' playground, and 'Confirm & Close' the input sliders to reach Grover the Rover in the virtual school!

You may need to request for some VEX Robotics websites to be unblocked by your IT support – follow the link below for more details:

<https://kb.vex.com/hc/en-us/articles/30676963229204-Domain-Access-Requirements-for-VEX-Websites-and-Software>

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Further details for the session plan:

Demo setup, and student setup

(demo for students on smart/whiteboard using the Teaching Guide or the Session 1 Explainer Video)

20 minutes

- Find the 'Net Zero VEXcode Activity Session 2 Teaching Guide.pptx' and the 'Net Zero VEXcode Activity Session 2 Explainer Video (ages 11+)' link on your account on our platform.
- You can use either the Teaching Guide PowerPoint or the Explainer Video to demonstrate the setup stage.
(NB the Explainer Video has chapters to help you easily jump to the summaries or new sections).
- **File download and copying (this will not be needed if you have completed Session 1):**
NB each school / setting will have a different file structure, so you will need to have decided where the student files will be stored initially (they can be found in 'student files.zip' which will need to be extracted/opened), and where to ask the students to copy them.

Important: each computer must work from its own separate program template, so at the very least the .vrblock program must be copied across, one per computer (we recommend copying the whole student file structure).

Please ask your school/setting technical support if you need help with this.

The slide/video section for this point looks like this:

Teachers:

Please could you demonstrate where the students need to save / can find the student files on your school system, so each student has a copy.

Please see our Lesson Plan for more details.

- **Setup continued (this is needed for Session 2, even if it was completed for Session 1)**
– the students can complete the set up using the following steps, as per the Explainer Video, Teaching Guide, Quick Guide and Student Guide (see image below).
- **NB Step 4:** opening the HOC Data Science Playground may take a while as it will depend on your internet connection bandwidth. If it takes a long time for everyone, you may not have unblocked the VEX websites fully
(see debugging, or go to: <https://kb.vex.com/hc/en-us/articles/30676963229204-Domain-Access-Requirements-for-VEX-Websites-and-Software>)
- **NB Step 5:** this is designed to be a natural pause to discuss your school's current environmental impact, while you wait for all the student VEX Playgrounds to load.
Ideally everyone should wait at this point so they can all start together.

FROM THIS POINT, PLEASE FOLLOW THE STUDENT GUIDE FOR FURTHER INSTRUCTIONS FOR THE ACTIVITY AND EXTENSION OPTIONS.

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Plenary

Discuss with the class what they have learnt in the assembly and the activity. How successful were they in completing the tasks? Invite students to share some of their debugging stories, coding additions and how they have used the persuasive data. What did they find the most challenging and why?

Assessment questions

- What is net zero?
- What CO₂ emission input information did you enter into the sliders, as your ambition setting? (These represent the goals for your environmental impact)
- How was the data easier to read once it had been analysed using the Boop! spreadsheet?
- How will you persuade others to help save the planet?

You can use either the Teaching Guide PowerPoint, or the Explainer Video to help with the plenary, (reminder, the Explainer Video has chapters to help you easily jump to the summaries or new sections).

What have you achieved?

- 1: you've inputted your current settings to create a school modelled on your own, and ambition settings to explore your ambitions for your school.
- 2: you've run the Grover the Rover program twice to collect this data.
- 3: you've worked with this data, to create CO₂ emission, absorption and reduction calculations.
- 4: you've compared the two data sets, reviewing them using either trees or cows.
- 5: and finally, (and perhaps most importantly) you've created some persuasive data you can use in conversations, posters or presentations. These will encourage others to think seriously about the changes we can all make, to move us towards net zero ...and ultimately help us on our mission to save the planet!

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VEXcode VR debugging help

You can find the 2 tables below in the student guide as well!

Debugging help

Sometimes in coding, things don't work out quite the way we'd planned, and this happens so often we have a term for it – debugging.

If you are having issues, please try the following:

VEXCode Activity

- If you're having trouble accessing the VEX Playground it may be due to network restrictions on your school computers.
- If you haven't already, your teacher or leader might like to try using a teacher's login and computer to access the playground, (<https://vr.vex.com/?classcode=DATASCIENCE>), and then go to Tools > Expand Logic Categories so your display matches the instructions)
- If this works, it suggests the issue may be caused by restrictions on the student logins or computers.
- Please share the following link with your IT department or specialist so they can ensure students have access to all the necessary domains.

Domain Access Requirements for VEX Websites and Software: <https://kb.vex.com/hc/en-us/articles/30676963229204-Domain-Access-Requirements-for-VEX-Websites-and-Software>

If the above fails to solve the issue, please email us on getintouch@getwiththeprogram.org.uk so we can send you instructions for how to raise a technical issue with our team.

Boop! Spreadsheet debugging help

Debugging help (cont)

Boop! Spreadsheet

1. Check you have macros enabled on your Excel spreadsheet – the Boop! spreadsheet won't work properly without it. You can just close and reopen it, enabling macros, if you didn't the first time.

Some schools/locations may not allow macros, so you might need to use our Environmental Impact Analyser, at <https://boop.freshleafdigital.com>

(instructions can be found on the document 'Net Zero VEXcode Activity Session 2 alternative replacing Boop! Spreadsheet (plus persuasive data extension) v1.0.pdf'), or watch our Boop! Spreadsheet video instead.

2. Once saved as a .csv file, the data should fall under the headings: station, day, value, and unit of measure and will probably have been converted to columns by Excel. If it doesn't look like this, it may be saved in the wrong format, as a .txt file for example. If so, click on the file to select it, then right-click on it to open the options menu and select **open with**. Choose Notepad or WordPad, then file, save as, and other formats. As in Challenge 2 and Challenge 3, save document as .csv with the appropriate title.

Alternatively you could save in the data monitor again, and ensure you type .csv at the end of the file.

3. Make sure you've copied and pasted all of your data, including the headings and all the digits, into the current and ambition tabs of the Boop! spreadsheet.
4. Check the program for Grover has collected the data correctly. You may need to change your VEXcode project, and re-collect the current and ambition data, remembering to put the correct input slider settings in before each run through.

Have a wonderful time on your coding adventure!