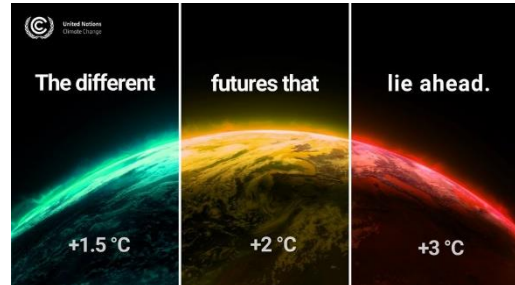


THE BIG FOUR

Teacher Notes

- Can-Do:** *Can interact collaboratively with peers*
Can manage interaction as a leader
Can interpret and explain data
- Goals:** Reducing your carbon footprint; working in groups
- Input:** Infographics; videos
- Output:** Discussion, written explanation of data
- Focus:** Interacting collaboratively and leading a group
Explaining data orally and in writing



Introduction

Explaining data refers to the transformation into a verbal or written text of information found in diagrams, charts, figures and other images. The user/learner might do this in writing or orally as part of a PowerPoint presentation, or when explaining to a friend or a colleague the key information given in graphics accompanying an article, a weather forecast, or financial information.

Explaining data in speech and in writing include the following:

- ✚ describing graphic material on familiar topics (e.g. bar/pie/flow/weather charts, etc.);
- ✚ presenting trends in graphs;
- ✚ commenting on bar charts;
- ✚ selecting and interpreting the salient relevant points of empirical data presented graphically.

Can-do statements

The lessons are designed for students at B2 level, but they can be adapted to B1 level.

- ✚ Can interpret and describe reliably detailed information contained in complex diagrams, charts and other visually organised information on topics in his/her fields of interest.
- ✚ Can interpret and present reliably in writing detailed information from diagrams and visually organised data in his/her fields of interest. (CEFR CV, 2020)

There are 3 different lessons in this topic.

1. Lesson 1
 - asks students to think about how they individually impact global warming and what actions most & least impact. They may be (very) familiar with climate change but less informed regarding what matters most.
 - The mediation objective is on how well they interact and collaborate in groups. This can be lightly done or in greater depth via the analysis and reflection.
2. Lesson 2
 - asks whether education, government and other organisations are missing opportunities to effectively teach young people to reduce their carbon footprint.
 - As regards mediation, we are using cross-team collaboration to create and bridge the “gaps”, something that may challenge class management and timing in that there is quite a bit of movement and switching groups.
3. Lesson 3
 - asks students to convert the visual to the written. It is reasonably straightforward but there is a lot of information and students need to accurately explain it in at least 200 words.

Activities



Video viewing



Cross grouping aka cross-team collaboration



Explaining data in writing

Summary of procedure

LESSON 1: 1.5°C - what it means and why it matters	45 minutes
Task 1. What do you know about carbon footprint? (Lead in)	10
Task 2. Thinking about working in teams	5
Task 3. Which actions, <u>do you think</u> , impact your carbon footprint most and least?	10
Task 4. Analysis of the infographic. Which actions <u>do</u> impact most and least?	10
Task 5. Analysis & reflections on working in teams	10
LESSON 2: The Big Four & Missed Opportunities	45 minutes
Lead in: revising most and least impactful actions	5
Task 6. Video viewing (Kimberly Nicholas): note-taking & discussion	15
Task 7. Video viewing (Seth Wynes): note-taking and summarising his concerns Explaining data (orally): How Canadian Highschool books feature Climate Change actions	15
Homework: <i>Mitigating Climate Change</i> videos	10
Lesson 3: Explaining data in writing	45 minutes
<ul style="list-style-type: none"> Teams mediate content of videos & discuss “missed opportunities” 	10
<ul style="list-style-type: none"> Preparing to explain data in writing - Q & A framework 	5
<ul style="list-style-type: none"> Explaining the infographic in writing 	25
<ul style="list-style-type: none"> Analysis & reflections 	5

Materials:

- | | |
|--|---------------------------------------|
| 1. Student worksheets [9 pages] | Appendix 5: Seth Wynes |
| 2. Teacher notes [9 pages] | Appendix 6: Infographic 2 |
| 3. Slides for classroom work [31 slides] | Appendix 7: World Economic Forum |
| 4. Appendices: | Appendix 8: Green Mountain Energy |
| Appendix 1: Personal choices cards | Appendix 9: Planet Justice |
| Appendix 2: Infographic 1 | Appendix 10: European Green Deal |
| Appendix 3: Collaborating in groups | Appendix 11: Explaining Data Frame |
| Appendix 4: Kimberly Nicholas | Appendix 12: Mitigation Gap checklist |

LESSON 1

Lead in

Start with the “What” students are going to do (PowerPoint slides 2-5).

Task 1. Pair-work. What do you know about carbon footprint? Answer the following questions.

- a) The title *1.5°C – what it means and why it matters*, the Climate Facts graph and the infographic were produced following COP 2023. Can you explain their significance?

Possible answers

- *We are creating too much greenhouse gas, and the planet is heating up.*
- *Because it is heating up, we are experiencing more extremes in weather:*
 - *heat waves and droughts or wildfires,*
 - *polar ice melting, sea levels rising, causing flooding, sea temperatures increasing – killing marine life, storms, hurricanes and typhoons, or just more wet weather*
- *Every fraction of a degree of warming matters. At the previous COP they said that we need to keep below 2° C by 2050. Now they are saying we need to keep it below 1.5° C or changes will be irreversible.*
- *GHG emissions are rapidly increasing: between 2010 and 2020 they rose from 40 tonnes to over 50 tonnes. They say that they have to peak by 2025 and then dramatically reduce.*
- *This means we need to make steep cuts in our carbon footprint.*

- b) What are Greenhouse Gases?

- *Greenhouse gases (GHGs) are gases in the earth's atmosphere that trap heat. During the day, the sun shines through the atmosphere, warming the earth's surface. At night the earth's surface cools, releasing heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere.*

- c) What is your carbon footprint?

- *Your carbon footprint is the amount of carbon dioxide (a GHG) released into the atmosphere as a result of particular actions such as driving a car.*

- d) Brainstorm ways an individual can mitigate climate change by reducing their carbon footprint. Don't at this point share the list below with students, but if they're struggling to think of any ways, suggest one or two to get them going.

- | | |
|---|---|
| <ol style="list-style-type: none">1) <i>Buy a more fuel-efficient car, a hybrid or an electric car</i>2) <i>Make sure your house is air-tight / insulated</i>3) <i>Use a programmable thermostat</i>4) <i>Eat less meat, especially beef</i>5) <i>Use power strips in your home office and home entertainment centre.</i>6) <i>Upgrade your refrigerator and air conditioner, especially if they are more than five years old.</i>7) <i>Get an electricity monitor.</i>8) <i>Change those light bulbs.</i> | <ol style="list-style-type: none">9) <i>Wash clothes in cold water.</i>10) <i>Buy less stuff.</i>11) <i>Reduce, re-use, and recycle</i>12) <i>Let policy makers know you are concerned about global warming.</i>13) <i>Spread the word.</i>14) <i>Protest:</i><ul style="list-style-type: none">• <i>Fridays for Future [school strikes, involving 150 countries in 2019];</i>• <i>Extinction Rebellion</i>• <i>Greenpeace</i> |
|---|---|

Task 2. Working in teams. Which lifestyle choices impact your carbon footprint the most & the least?

Organise students into teams of 4. If there's an odd number arrange teams of 5 (not 3).

Giving themselves a team name helps form the team and it's easier for you to manage the different groupings. Write their team names on the board.

Hopefully by asking them to think about participation beforehand, the groups will focus on the process, not just the task.

The prompts below are about encouraging participation more than they are about "how do you say ...?"

Give them 5 minutes to work through the questions and then move onto sorting the cards and the discussion in Task 3. Return to levels of participation afterwards.

Make sure everyone in the group contributes to the discussion.

1. If someone is not contributing, what could you ask?

- X, what do you think?
- X, do you have a view on this?

2. If you disagree, what could you say?

- I don't really agree with you.
- Yes, I can see your point, but I think...

3. If you agree, what could you say?

- Yes, I completely agree.
- Yes, me too.

4. If your group start talking about something different, what could you say to bring them back on track?

- Can we come back to the question?
- Let's focus on this one.

5. If you don't understand or need more information, what could you say?

- Sorry, I don't quite see what you mean. Could you say it again?
- I'm not sure I completely understand. Could you say it again?

Choose someone to be the leader, to guide the discussion:

Group leader, do you have any rules for your discussion?

Example: you ask each person in order / everyone must say something.

Task 3. Discussion in groups. Which actions do you think impact most and least?

Distribute the cards, (Appendix 1, one per group, check they understand the task and any unfamiliar vocabulary.)

Give the group leader the time limit and use a timer if you have one.

It's probably a good idea to ask them all to take a photo of the card line.

Ask the reporters to tell the class the team's top 5. Maybe you can list their top one or two on the board and elicit comments on the various teams' choices, but leave it open-ended so that they can compare with the infographic.

Task 4. Analysing and interpreting an infographic. Which actions actually impact the most and the least?

Display the infographic “*Personal Choices to reduce your contribution to climate change*” (PowerPoint Slide 11) or pin it on the wall as a poster or give your students the infographic as a handout (Appendix 2).

Tell students that it’s been created by two scientists on the basis of their research whose results are published in their article “The climate mitigation gap: education and government recommendations miss the most effective individual actions” (2017 IOP Publishing Ltd). Students will learn more about the scientists and their research in the following lesson.

Give students time

- to compare their photo with the infographic,
- to complete the table and
- to discuss the infographic’s importance

1. How similar or different were their choices compared with the infographic?
2. Complete the table (also PowerPoint Slide 13)

Eat a plant-based diet	saves 0.8 tonnes of CO ₂ equivalent a year
Switch electric car to car free	saves 1.15 tonnes of CO ₂ equivalent a year
Buy green energy	saves 1.5 tonnes of CO ₂ equivalent a year
Avoid air travel	each roundtrip transatlantic flight saves 1.6 tonnes of CO ₂
Live car-free	saves about 2.4 tonnes of CO ₂
Have smaller families	one fewer child would save 58.6 tonnes of CO ₂

3. How important is the infographic?

This is not merely a way of closing the discussion.

Is it important? Yes, very.

Without sermonising, the objective behind this question is to teach them, if they don’t already know, that moderate impact actions like recycling and even low impact actions like using LED light bulbs are “good to do”, and not just for mitigating climate change (e.g. also good for reducing pollution) but ultimately, they won’t impact enough on climate change.

Only the high impact actions will impact enough to affect global warming.

The researchers are concerned that people do not realize this.

... and in the next lesson, in missed opportunities, Seth’s research shows government and education are either missing opportunities unknowingly or “sugaring the pill” and deluding us – but don’t mention this yet.

Task 5. Analysis and reflections

Return to the process, i.e. how well they interacted in groups. Display Appendix 3 on the board (Power Point Slide 16) and ask students to answer individually and then discuss their answers as a group.

Note this is the only lesson to focus on the process of how well they collaborate, but, obviously, you can add it in other lessons if it’s helpful.

LESSON 2

This lesson focuses on the short videos the two researchers have made and is followed up by what other organisations tell us.

It starts with Kimberley's assessment of her own life choices vis-à-vis the big four and goes on to Seth's concerns about education and government missing opportunities to educate the young.

- a. Tell the class that the authors of this research talk about the “**big 4**” and elicit which they are? (you can speculate “why those 4” - but they don't actually say why they exclude switching from electric to car free or using green energy, perhaps the significance of transport or perhaps green energy is outside an individual's control)

The Big Four

Eat a plant-based diet	Live car-free
Avoid air travel	Have smaller families

Task 6. Video viewing 1

Introduce Kimberly Nicholas, check students understand the task and play the video.

You could try giving the students more control over the listening / viewing by using the worksheet (Appendix 4). The students access the video on their devices via the QR code and view the video with their ear buds / headphones replaying it as needed.

You can increase the degree of interactivity and collaboration by having students compare notes with a partner or in their team, and then the whole class.

Notes should include:

1. Kimberly is one of the researchers.
2. Their research showed which actions reduce an individual's carbon footprint the most.
3. The big 4 are: eat plant-based diet, avoid air travel, live car free, and have one fewer child.
4. The video is Kimberly comparing the big 4 with other, smaller actions, and talking about her choices.
5. Flying one round trip = 2 years of eating meat.
6. She doesn't fly in Europe, nearly eliminated flying for work.
7. Cars. One year's driving = 3 years eating meat.
8. She had 2 cars in California.
9. Now walks or cycles or takes public transport BUT she can because it's good.
10. Eating meat = 4 years of comprehensive recycling.
11. Half her food is fruit & veg, but still eats eggs and cheese (so not completely plant-based).
12. Dairy = cows = GHGs.
13. Having kids = 24 years of driving.
14. Having children is the biggest choice for the climate BUT having kids is a very personal decision.
15. She doesn't have kids. She and her fiancé are thinking about it now.
16. Opinions about Kimberly, about students own reaction to information and their choices:
E.g., She is realistic – not completely not flying, not completely plant-based diet, uses public transport, and will probably have at least one child – but maybe not 2 or 3.

If, however, warming of the planet is to be kept below 2 °C, the first 3 might be enough to keep her below the 2.1 by 2050, but having children won't.

Personalise it by asking students to individually make notes about what they do in their family and discuss in their teams and then share their conclusions (rather than what each family does) with the whole class. This may require some sensitivity. It is an important issue but it's not a naming and shaming activity.

Task 7. Video viewing 2

Continue by introducing Seth Wynes, play the video and ask students to make notes and summarise his concerns or you could make it more student controlled and use Appendix 5 (QR code + questions for students to work individually, then compare in pairs, and share with whole class.

Give out the infographic (Appendix 6) with the worksheet (or display slide 24) so that they can use it to explain Seth's concerns.

Notes should include:

1. Seth is a scientist (and a school teacher) who researched "Mitigating Climate Change".
2. He became interested because he was a science teacher whose students had many misconceptions about climate change.
3. The big 4 are
 - (a) Eat a plant-based diet,
 - (b) Avoid air travel,
 - (c) Live car free,
 - (d) Have smaller families.
4. They are important because we need to get emissions per capita down to 2 tonnes per year by 2050.
5. and for some of these actions we don't have easy technological fixes.
6. He discovered high school textbooks weren't focusing on the high impact actions.
7. Only 4% addressed high impact actions.
8. A lot of focus on low impact or moderate impact actions.
9. Things like conserving electricity that might be turning off light bulbs when you leave a room
10. or unplugging devices when you're not using them.
11. Recommendations are phrased as compromises.
12. Instead of live car free, a textbook might say make sure that your cars have properly inflated tyres to reduce gasoline use.
13. This is a missed opportunity because it doesn't show students the seriousness of climate change, or the need to focus on high impact actions they could or should be taking.
14. Government advice similar to textbooks.
15. He looked at guides from Canada, the U.S., Australia, and the E.U.
16. Only Australia mentioned living car free and
17. none mention or promote having a plant based lifestyle.
18. So they created their own resources to promote high impact actions. What is your opinion?
My view?
 - It is bad that if we follow the advice of science textbook writers and governments, we clearly cannot reach the 2.1 tonnes per capita that we need to by 2050.
 - It is a missed opportunity maybe because

- science textbook writers and governments are uninformed or misinformed or because
- politicians nearly always have short term goals, because they're elected every 4 or 5 years
- or maybe it's not just a missed opportunity.
- Maybe it is because big businesses especially in the oil industry want to distract us. They tried to deny global warming, and now they cannot deny it, so they want us to switch to compromises which don't hurt their business so much but do damage our future.

Homework: *Mitigating climate change videos*

The 4 videos encourage people to reduce their carbon footprint – but in different ways. The students' task is to determine which suggest “must-do’s” (i.e. high impact actions) and which suggest “nice to do’s” (i.e. moderate or low impact actions).

A	World Economic Forum [00:41]	B	Green Mountain Energy [01:27]
C	Planet Justice [02:02]	D	European Green Deal [01:58]

Divide students into groups of four. Assign each student a letter A, B, C, D, and ask students to give their group a name. If there are extra students, have additional As, or Bs etc. but don't make smaller groups by e.g. dropping D. The homework task is described in Appendices 7-10.

LESSON 3

Teams mediate content of videos & discuss “missed opportunities”

Remind students what groups they formed in the previous class and reorganise them into groups of A's, of B's, of Cs, and of Ds. Ask students to help each other make sure their summary is complete and accurate (informationally).

Reorganise the groups so that they are in their original groups and ask them to share the content of the videos referring to their summaries, then discuss and draw conclusions. (Optional: Before they do so, review what mediation is, i.e. dialogic, not monologic.)

Their conclusions should be along the lines of

- The European Green Deal is sadly an excellent example of what Seth is saying. It is inspiring but rather general: give space to nature.. find greener ways to move around (bikes, electric ferries), eat healthily (what can be seen may suggest plant-based diets, no cattle in the view, but...
- Only the Green Mountain video really focuses on high impact actions. The others may make us feel we are doing something to reduce our carbon footprint, but following their advice has little impact.
- it's obvious what Green Mountain's motivation is: selling green energy. The motivation of the others is less clear. The WEF has a website which has a laudable mission statement, but there is no real information about Planet Justice (it's a popular hashtag.) and the European Green Deal suggests it is a public service announcement by the EU.

Preparing to explain data in writing - Q & A framework

You could deep-end your students and simply ask them to write an explanation of the infographic or you could use the framework provided.

Explaining the infographic in writing

Once you've agreed the answers to the questions (see Appendix 11), ask them to write the explanation working alone, then ask them to work in pairs, assessing their own and their partner's explanation, using the criteria provided. The criteria are adapted from the scale used in the national exams.

You could ask them to produce an explanation in writing of the second infographic, but perhaps as "spaced repetition" in a later lesson.

For alternative activities, see Appendices 12 & 13.

Analysis & reflections

Have students discuss with a partner, and in whole class:

1. How easy was it to explain the infographic?
2. How well did you do?
3. What did you learn?
4. What could you do next time to improve?