

Introduction lesson Plastic Soup

Summary:

- ✚ This Introduction is a 30-minute lesson about the size, sources and possible solutions of the plastic soup. Also the challenges of recycling and what you can do to reduce your own plastic use is discussed.

Relevant for the subjects

- ✚ geography, biology, health care, philosophy, social studies, humanities & society, humanity & nature, mentoring, chemistry, science, healthcare & well-being

Learning goals

- ✚ The students understand that plastic is a much used material.
- ✚ The students learn about the scale of the ocean's plastic environmental problem.
- ✚ The students can identify the major sources of the plastic soup.
- ✚ The students can explain why recycling is not the real solution to the plastic soup.
- ✚ The students can explain the consequences of the plastic soup.
- ✚ The students think about ways to reduce their own plastic use.

Preparation

- ✚ This digital board lesson has an interactive option called '**student devices**'. Ask the students to bring their mobile phones or tablets to the lesson. If you would rather not use mobile phones or tablets in the lesson, it is not obligatory.
- ✚ Should you choose the '**student devices**' interactive option, it will run a quiz during the lesson.
Recommendation: only use this interactive option in classes of up to 30 students.
- ✚ Students can sign up on their mobile device to the LessonUp.app. They will be asked for a PIN code (this will appear automatically on slide 3 and will also show at the bottom of the screen). Students who sign up under a false name may be removed by the teacher.
- ✚ Students who do not have a mobile device can join the quiz with another student.
- ✚ If **student devices** is turned ON, you can opt to turn the sound and the share screen ON or OFF. Further on you can choose if you want to **show ranking after each quiz** question. Doing so will create a competitive element, but it can be distracting. Recommendation: turn the 'show ranking after each quiz' OFF.
- ✚ The abovementioned options will also show if you click on the PIN code at the bottom of the screen.

Lesson description

Slide 1: Introduction

This lesson on the plastic soup is offered to you by the Plastic Soup Foundation. The Plastic Soup Foundation, founded in 2011, is an environmental organisation that addresses the plastic soup. We want to make sure that no more plastic enters our water. We do this by tackling the sources of plastic pollution such as litter, microplastics in cosmetics and microfibres from synthetic clothing. We also run campaigns and support all sorts of research and smart solutions.



Slide 2: Introduction film

This brief film explains the objective of this lesson.

Slide JOIN

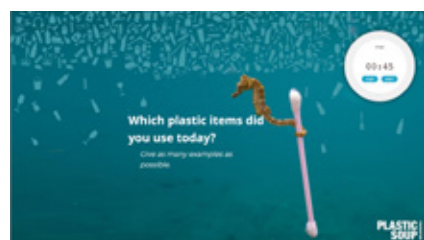
If you choose the interactive option (**student devices** are ticked), ask the students to go to www.LessonUp.app and enter the PIN code. The students fill in their names as participants. If they fill in inappropriate names, you can easily delete these by clicking on the cross next to the name.



Slide 3: Word web

Ask the students to think about the plastic items that they used today, or items to which plastic has been added or that are partly made of plastic. Ask them to fill in as many as possible in 45 seconds. Start the stopwatch on the screen by clicking on START.

You will probably collect a wide variety of answers in a short period. Discuss the most common plastics and also the less obvious forms of plastic. Then differentiate between disposable products that are made for single-use (i.e. such as sandwich bags or food packaging) and plastic items that can be used multiple times (i.e. telephones, toothbrushes, pens etc.). Group these two categories on the digital board by dragging the answers together. You don't need to go through the entire list, the point of the exercise is that the students see how much plastic is only used once before disposing.



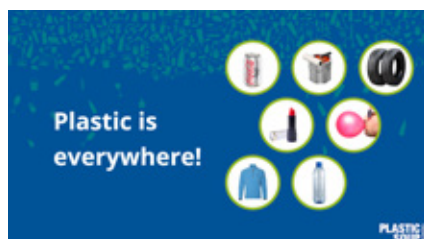
Slide 4: Plastic is everywhere!

This slide shows a few less obvious sources of the plastic soup. Discuss those that have not been included in the answers in slide 3.

Tins

You don't see it from the outside, but the inside of tins are usually lined with a thin plastic coating.

Extra information: this coating sometimes contains BPA, a substance that when used in food packaging can enter your food in small quantities. Large quantities of BPA damage the liver, kidneys and affect fertility.



Lesson description continued

Synthetic paint

Most paint these days is synthetic. Synthetic paint weathers in the wind and, in particular, in sunlight. The paint then enters the environment in microplastic form. This also happens when painted objects are sanded. The dust that is released is mostly composed of microplastics.

Car tyres

Wearing out of tyres is the largest source of microplastics in surface water. Tyres are made of synthetic rubber. Friction with the road surface causes the tyres to wear and release microplastics into the environment.

Microbeads in cosmetics

Many cosmetics contain miniscule plastic particles, the so-called microbeads. Since 2012, the Plastic Soup Foundation has run the *Beat the Microbead* campaign. The objective of the campaign is to prevent plastic particles in personal hygiene products from entering the sea by asking consumers not to use these products anymore.

Synthetic clothing

At present, about 63% of our clothing is made of synthetic materials or mixes of natural and synthetic fibres. In every 5 kilo wash, between 600,000 and 17.7 million plastic microfibrils are released into the rinsing water. The Plastic Soup Foundation's *Ocean Clean Wash* campaign works to prevent the leaching of microfibrils into the ocean by searching for solutions.

Extra: Ask what the students are wearing. Ask them to check the washing instruction labels in their clothing. Synthetic fabrics are acrylic, nylon, fleece, lycra, polyester etc.

Extra information: Fleece in particular releases a lot of fibres. Neither washing machines nor sewage purification systems are equipped to catch these fibres. The fibres are so small that they easily enter the water and then enter the food chain.

Miniscule plastic particles have been found in plankton, mussels and even in honey. Traces of plastics have even been found in the air. These nano plastics are so small that they can pass through the walls of cells. Scientists believe that nano plastics can also enter our bloodstream through our respiratory tracts. The Plastic Health Coalition, a Plastic Soup Foundation initiative, enables scientific research into the effects of plastic on our health.

👍 Slide 5: 425,000,000,000 kilos!

The worldwide production of plastic was estimated at 425,000,000,000 (425 billion) kilos in 2018. This includes the production of synthetic fibres (66.6 billion kilos). Unfortunately, the production of plastic is still growing exponentially.



Lesson description continued

- 👉 **Slide 6: In 2019 we produced more than 425 billion kilos of plastic worldwide.**

How many Eiffel Towers do you think this is?

This is a multiple choice question. The students answer their questions on their devices. The Eiffel Tower weighs 10.1 million kilos. The right answer appears on the next slide: 42,000 Eiffel Towers. Please keep in mind that the Eiffel Tower is made of steel, which is much heavier than plastic.



- 👉 **Slide 7: Film 'Plastic Oceans' (3 minutes) with interspersed questions**

The film is interspersed with questions (slides 8-13) that you can discuss with the class.



- 👉 **Slide 8: How much plastic ends up in the oceans worldwide every minute?**

This is a multiple choice question. Every year at least 8 million tons (= 8 billion kilos) of plastic ends up in the oceans. The plastic comes from litter, microplastics from cosmetics, microfibres from clothing etc.

The right answer appears on the next slide: 1 full garbage truck per minute.



- 👉 **Slide 9: Full garbage trucks every minute**

This slide shows how much plastic ends up in the water every minute. At present, this is equivalent to the contents of one garbage truck per minute. So an unimaginable amount of plastic enters the water, but as plastic production is still growing, this will amount to much more in the years to come. This is also related to the world's population growth and increasing wealth. The forecast is that in 2025 it will be the contents of two garbage trucks a minute and in 2050 six garbage trucks a minute.



- 👉 **Slide 10: Why is the plastic soup a problem?**

Either ask the students to discuss this in pairs or discuss this in the class.



Lesson description continued

👉 Slide 11: Plastic does not decompose

Plastic does not decompose, instead it breaks down into ever smaller particles. The smaller the particles, the harder it is to clean up. Furthermore, the small plastic particles easily enter the food chain as animals mistake it for food.



👉 Slide 12: Think about all the plastic that has ever been produced in the whole world. How much of it might have been recycled? Only give the percentage.

This is an open question. Since the 1950s, 8.3 billion tons of plastic has been produced in the world. Only a small percentage of this has been recycled. Ask the students to fill in their answers on their devices.

Note: only fill in the numbers without the % sign otherwise the answer will be seen as wrong by the system.

The film talks about the circular economy. This is an economic system in which everything goes round in a closed circle to avoid raw materials from being wasted. Products or components of products are used as many times as possible. The materials in items that are thrown away when barely used, such as packaging, can be used again as resources for new products (recycling). There is no such thing as waste in the circular economy!

At present the economy is often linear and not circular. This means a straight line: raw materials removed from the earth → make new products → use products → throw away products → incinerate the waste. In the linear economy, raw materials are ultimately lost.



👉 Slide 13: Why is recycling still a challenge?

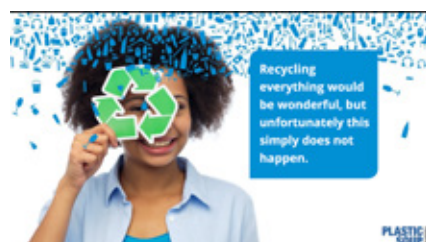
This is a drag and drop question. There is more than one right answer. The students can do this drag and drop question either on their devices (interactive option) or as a class.

While recycling seems to be a promising solution, it unfortunately has disadvantages. There are more than a thousand different types of plastic. All the additives such as plasticisers, flame retardants and colourants make this even more complicated. That a material is recyclable does not always mean that it is economically viable to do so. Sorting of plastic is such a complicated process that it is always cheaper to produce new plastic. High value recycling requires a clean waste stream (e.g. without food residues) of the same type of plastic.



👉 Slide 14: Recycling everything would be wonderful, but unfortunately this simply does not happen

It is thus very difficult to recycle plastic to create high value products. Unfortunately, to date only a small percentage of plastic waste is recycled. A good example of equivalent value recycling are the PET bottles that are collected through a bottle deposit scheme and recycled.



Lesson description continued

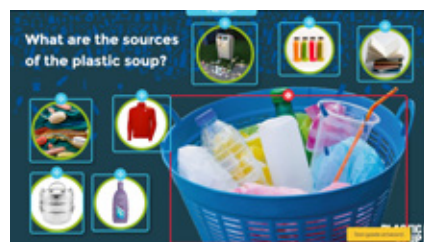
👍 Slide 15: What are the sources of the plastic soup?

This is a drag and drop question. There is more than one right answer.

Ask the students to drag the sources of the plastic soup into the plastic basket on their phones. This exercise can also be done in the classroom.

Discuss the right answers. These are:

- A: Fishing nets. Almost half the plastic soup consists of abandoned fishing nets. These disintegrate and animals get caught in them.
- B: Synthetic clothing: Fleece is one example of a synthetic material. It releases millions of synthetic microfibres whenever it is washed.
- D: Plastic bottles: Millions of PET bottles are used all over the world every day and regularly enter the plastic soup.
- E: Microbeads. Miniscule plastic particles are still contained in some cosmetic products. These are called microbeads.
- F: Litter. Litter that is not cleaned up blows or flows with rainwater into ditches, sewers, rivers and the sea, thereby becoming part of the plastic soup.



👍 Slide 16: The plastic soup starts in your own hands

Discuss the litter problem with the students. Do they have examples from their own neighbourhoods? Do they sometimes throw things on the street? If so, why?

Litter blows into rivers that flow into the oceans. Litter is thus a source of the plastic soup.



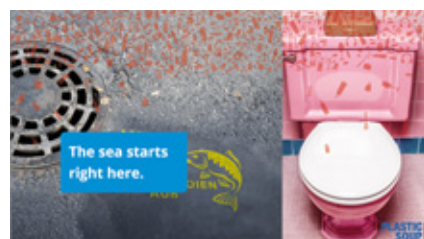
👍 Slide 17: ... or chilling at a festival

A huge amount of rubbish is left behind at festivals. Bottles, food packaging, tins, cigarette butts, tents ...



👍 Slide 18: The sea starts right here

Litter that enters a drain flows to rivers and ultimately to the sea. Even everything that is thrown down toilets can end up in the environment.



Lesson description continued

👍 Slide 19: Rivers wash it into the ocean

This is a photo of the Meuse River (in the Netherlands!) during a period of low water.



👍 Slide 20: The oceans are getting polluted

This surfer in Bali (Indonesia) is surfing a wave of plastic litter.



👍 Slide 21: Animals get entangled

Thousands of animals are threatened by plastic pollution. Animals often do not see and smell the difference between food and plastic rubbish. This duck cannot open its beak anymore because of a piece of plastic that someone threw away.



👍 Slide 22: Animals eat it

Thousands of animals are threatened by plastic pollution. Animals often do not see and smell the difference between food and plastic rubbish. Plastic can completely block the gastrointestinal tract.



👍 Slide 23: We eat it

Plastic enters our bodies. People eat fish and shellfish and this is how plastic can enter our bodies. The consequences of this are currently being examined by the Plastic Health Coalition, an initiative of the Plastic Soup Foundation. This coalition **enables scientific research into the effects of plastic on our health.**

Read more on: www.plastichealthcoalition.org



👍 Slide 24: What can you do to reduce your plastic consumption?

Ask students to discuss solutions in pairs for a few minutes. They can add their solutions on their devices. Discuss their solutions in the class. This is about what the students can do **THEMSELVES** and not high-tech solutions.



Lesson description continued

👍 Slide 25: Refuse, reduce, re-use, recycle

The Plastic Soup Foundation's solutions in order of importance are:

1. Refuse = Just say no
2. Reduce = Use less. Do you really need it?
3. Re-use = Use again and again
4. Recycle = Separate your rubbish so that the materials can be used again as a raw materials

For every category, ask the students for an example.



👍 Slide 26: Ideas for a plastic diet

You can do something too!



👍 Slide 27: Ideas for a plastic diet

- Bring your own reusable bottle, instead of buying (small) single-use plastic water bottles.
- Buy takeaway only if it is packed in paper or cardboard, or bring your own container.
- Use shampoo bars instead of shampoo from a plastic bottle.
- Bring your own reusable (cotton) shopping bags.



👍 Slide 28: Ideas for a plastic diet

- Use reusable bamboo straws instead of plastic straws.
- Refuse plastic single-use cups and use glass instead.
- Use cotton buds made of wood, instead of plastic.
- Choose snacks wisely! Avoid plastic wraps.



👍 Slide 29



Lesson description continued

👍 We would be pleased to hear your thoughts about this lesson and the challenges. Please fill in the evaluation form, preferably after doing the challenge. This only takes 5 minutes.

Please go to: bit.ly/PSFEvaluation

