Learning Module

PLASTIC TOWN

Can you fight plastics?

Target group: Learners aged 9–12

Learning outcome & Acquisition of skills: The students will learn about the ecological and health-related consequences of plastic pollution. They are informed about the background to plastic production and harmfulness and find out about ways to reduce their own plastic consumption.

Global Goal: With this learning module, we are contributing to the implementation of the UN Sustainable Development Goal 4.7. "Education for sustainable development and global citizenship". The game specifically addresses **Goal 12:** "Responsible Consumption and Production" – by promoting the reduction of plastic waste. By addressing the diverse effects of the plastic crisis, other goals such as Goal 3: "Good health and well-being" or Goal 14: "Life under water" are also being pursued.

Timeframe: ~ 70 minutes

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Education for Sustainable Development
2025

Introduction

“Plastic Town“ is a board game that intends to raise awareness and knowledge of the plastic crisis and to allow the students to generate opportunities for action to reduce plastic pollution. In the fictitious “Plastic Town”, they go through various institutions that are familiar to them from everyday life and answer a variety of questions. The students *describe* where plastic is used in everyday life, *explain* how plastic is produced, used and disposed of, *describe* the causes and consequences of the plastic crisis and *model* possible courses of action to avoid plastic.

Lesson plan

Preparation for the teachers:

Materials used for one group (3–6 students):

- Game boards (x2): 1. "Plastic Town" (**A**), 2. game board for the card deck (**B**) (available as PDF for printing: **A** and **B**)
- Cards: Quiz questions (15 per institution) and action cards (15) (available as PDF for printing: **C**)
- Rules and instructions of the game (available as PDF for printing: **D**)
- Game pieces for each player
- Dices (preferably wooden or borrowed)
- A communal container & (e.g. empty yoghurt containers) and individual containers for each player
- Plastic pieces (e.g. pieces of an old packaging)

Instructions:

Optional but recommended: Some prior knowledge makes the game easier for the students and potentially contributes to better knowledge acquisition. It is therefore helpful to thematise the topic in advance.

Before and during the lesson:

a) The teachers prepare the room: Group tables are required. A game is set up on each table (see Figure 1).
b) Optional, but recommended: Teachers give a short, interactive presentation that introduces the topic. They introduce the story of the game as well.
c) The learners start reading the rules (**D**). Potential questions are answered.
d) The learners then play the game on their own in groups of 3–6.
e) Should difficulties arise, the teachers are there to provide support.

Once all groups have finished the game, the teachers initiate a reflection session (in plenum). Possible questions include how the students can reduce their plastic consumption in everyday life, what dangers plastic poses to humans and animals or why there are so many obstacles to recycling.

Story:

Welcome to Plastic Town!

You are a resident of “Plastic Town”, where a lot of plastic is produced and used. This plastic is bad for the environment. As a resident, your aim is to reduce plastic consumption and fight against the abundance of plastic in this town. However, as plastic is omnipresent, you will accumulate plastic in your bin during the game. You want to prevent this from happening, as too much plastic in your bin may get punished and few plastic may get rewarded during the game. The best way to prevent plastic from accumulating in your bin is to answer the game questions correctly.

What is the goal of the game? You win if your game piece is first at “FINISH.”

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Annex A

Figure 1*. Setup of the game "Plastic Town": Illustration of the core components, including the game boards (1, 2), card decks (3), playing pieces (4), plastic bins (5) and plastic pieces (6).*

This learning module was developed by the educators Tim Hartelt, Kaezuko Kamakuere and Annika Hoffmann. The learning module was implemented in Germany and Namibia in 2025. All data are without guarantee.

This publication was produced within the framework of the German-Namibian Exchange of Educators by Suni e.V. and the Light for the Children Foundation with the support of Sparkasse Trier, the Entwicklungspolitisches Landesnetzwerk Rheinland-Pfalz, the Catholic Fund, the Deutsch-Namibische Gesellschaft e.V. and the African-German Youth Office at Engagement Global gGmbH.
Supported by the German-African Youth Office at Engagement Global gGmbH with funds from the German Federal Ministry for Economic Cooperation and Development.
The editors are solely responsible for the content of this publication; the positions presented here do not reflect the views of Engagement Global gGmbH or the German Federal Ministry for Economic Cooperation and Development.

For further information::

Hoffmann, A., Kamakuere, K., & Hartelt, T. (2025). Learning about plastic pollution and reduction using a serious game. *Primary Science*, *185*, 25–28.

A

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THE SUPERMARKET

Open

Closed

THE BEACH

HOME

THE SCHOOL

SCHOOL

Abc
1+3

THE FACTORY

START

FINISH

B

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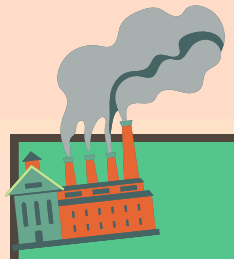

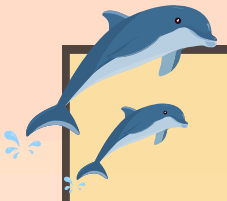

PLASTIC

TOWN

C

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You are in the supermarket buying fruit. You are offered a plastic bag. What do you do? Name a specific action.

Example answer: I refuse the plastic bag and use a reusable cloth bag.

An alternative to the traditional supermarket is a zero waste store. What is the concept of the store?

A Customers are informed in-store about the environmental dangers of plastic waste and learn how they can avoid plastic packaging in their daily lives.

B Customers must bring their own jars or boxes, as the food is sold loose. ✓

C Customers have to wrap their products in gift wrap themselves if they want to give them as gifts.

In a supermarket, a lot of things are packaged in plastic. Where else can you buy food without packaging? Give one example.

Example answer: I can go shopping in a Zero Waste Shop. I bring my own containers that I can fill on site.

What packaging-free alternatives are there to conventional shampoos? Give one example.

Example answer: There are solid shampoos. These do not require plastic packaging.

You buy a drink in a plastic bottle at the supermarket. Under typical conditions, how long does it take for a plastic bottle to break down into microplastics (very small pieces of plastic)?

A About 4.5 years.

B About 45 years.

C About 450 years. ✓

When buying fruit, many people put it in small plastic bags that are offered free of charge in the supermarket. Under typical conditions, how long does it take for them to break down into microplastics (very small pieces of plastic)?

A About 2 months.

B About 2 years.

C About 20 years. ✓

How can you reduce plastic consumption in the supermarket?

A You only buy small products with plastic packaging.

B You buy loose fruit and vegetables and do not put them into a plastic bag. ✓

C There is nothing you can do. The supermarket must sell more goods without plastic packaging.

What percentage of all plastic waste is attributed to plastic for packaging, which is often thrown away after just a few seconds?

A About 25 %.

B About 50 %. ✓

C About 75 %.

What should supermarkets NOT do to combat plastic waste?

A Fighting measures such as deposit return systems. ✓

B Introduction of a plastic-free aisle.

C Increase transparency about their plastic footprint.

What can you take with you to the supermarket to reduce your plastic consumption? Give one example.

Example answer: I bring my own reusable bags or nets for fruit and vegetables.

Under typical conditions, it takes more than 200 years for a plastic straw to decompose into microplastics (very small pieces of plastic). An alternative – paper straws – take...

A 2–6 weeks. ✓

B 2–6 months.

C 2–6 years.

Plastic straws take a long time to decompose and can have a negative impact on the environment. What is an alternative to plastic straws? Give one example.

Example answer: Straws made of stainless steel or glass.

Plastic cutlery takes a very long time to decompose. What is the best alternative to avoid disposable plastic cutlery?

A Plastic cutlery made from bioplastics.

B Reusable metal cutlery. ✓

C Cardboard cutlery.

Why are bioplastics (i.e. plastics made from plant material) not automatically an environmentally friendly alternative to conventional plastics?

A They require special conditions for decomposition. ✓

B They are always more expensive than conventional plastics.

C They can only be used in certain products.

Packaging made of composite materials poses a major problem for recycling. What is composite packaging?

A Packaging that consists of several materials bonded together, such as plastic and aluminum. ✓

B Packaging that is completely biodegradable.

C Packaging that consists only of paper.

How can you reduce plastic consumption at home? Give one example.

Example answer: Instead of plastic bags, I can use reusable lunch boxes.

What are the consequences of environmental pollution caused by plastic waste? Give one example.

Example answer: Litter can endanger animals. They eat plastic waste.

Name one reusable alternative to plastic wrap / cling film for storing food.

Example answer: I can use beeswax cloths.

Most plastic waste in households comes from which type of packaging?

A Cleaning agents.

B Food packaging. ✓

C Furniture.

What household items can be used to replace plastic bags for food storage?

A Glass jars. ✓

B Paper towels.

C Wooden boxes.

What impact does the use of plastic tableware at home have on the environment?

A Minimal, as not much plastic is usually used at home.

B Significant, as plastic decomposes slowly. ✓

C Neutral, it does not matter.

How can you reduce your plastic consumption?

A Do not buy everything in large packages, but buy lots of smaller packages.

B It is best to buy in large packs. ✓

C Use disposable plastic bags for fruit.

What is the most common way we ingest microplastics?

A Via affected foods such as fish, salt, or water. ✓

B Via the skin, as microplastics are often contained in cosmetics.

C We inhale in the microplastics.

Which way of preparing food reduces plastic waste the most?

A Cooking at home with home-grown vegetables. ✓

B Cooking at home with food bought at supermarket.

C Eating takeaway food.

How can you encourage your family to reduce plastic consumption at home? Give one example.

Example answer: I can encourage my family to always use reusable containers for shopping.

Name a method for responsibly disposing of broken plastic items in your household.

Example answer: I can bring broken plastic items to a recycling centre.

What can you do with old plastic toys instead of throwing them away? Give one example.

Example answer: I can donate old plastic toys or give them to a recycling company.

How can you reduce plastic consumption in your bathroom? Give one example.

Example answer: Instead of shampoo in plastic bottles, I can use solid shampoo in paper packaging.

How should you dispose of plastic waste at home?

A Burn it.

B Throw it in the designated waste garbage cans. ✓

C Throw it on the street.

There is usually a lot of plastic in your bathroom, e.g. plastic toothbrushes. Under normal conditions, how long does it take for a plastic toothbrush to break down into microplastics (very small plastic pieces)?

A About 100 years.

B About 200 years. ✓

C About 500 years.

What is one of the most common uses of plastic in factories?

A Packaging. ✓

B Building materials.

C Textile production.

What is a practical solution to reduce plastic pollution from factories?

A Reduction in production volume.

B Switch to bioplastics or alternative materials. ✓

C Immediate abolition of the use of plastic.

What is one of the challenges that factories face when replacing plastic components with environmentally friendly alternatives?

A The alternatives are not sufficiently efficient.

B No alternatives are available.

C The initial costs are higher and adjustments are necessary. ✓

Why is composite packaging an obstacle to recycling?

Example answer: Composite packaging consists of different materials. These are bonded together. This makes it difficult to separate and recycle the individual components.

Name one health problem that can arise from exposure to microplastics or chemicals during the production and processing of plastic in factories.

Example answer: Additives can disrupt the hormone system when inhaled. This can lead to infertility or developmental disorders.

Describe the plastic production process in a maximum of 3 sentences.

Example answer: In the production of plastics, raw materials such as crude oil or natural gas are converted into simple building blocks. These are linked together to form long chains. Various additives allow the finished products to take on a variety of shapes.

Why do people who live near plastic factories have higher risks of developing health problems?

Example answer: They are often exposed to harmful substances such as toxic chemicals and air pollution. This increases the risk of developing respiratory diseases and other health problems.

What is one of the biggest health problems for workers in plastic factories?

A. Impairment of eyesight.
B. Exposure to toxic fumes. ✓
C. High noise levels.

What is an effective strategy for recycling plastic waste generated during the production process?

A. Establishment of an internal recycling plant. ✓
B. Disposal of all waste directly to landfill.
C. Concentration on production output.

What is the most commonly produced plastic?

A. Polyethylene. ✓
B. Biopolyethylene.
C. Polystyrene.

If plastic production increases by 20%, plastic pollution increases by...

A. 10 %.
B. 20 %. ✓
C. 40 %.

What is one of the environmental impacts of plastic production in factories?

A. Increased deforestation.
B. High energy consumption and carbon emissions. ✓
C. Lower water consumption.

Why is it difficult to recycle mixed plastics?

A. They have no value.
B. They are biodegradable.
C. They cannot be easily separated. ✓

Why is the quality of recycled plastic sometimes worse than that of new plastic?

A. Recycled plastic is more difficult to mold.
B. Recycled plastic often deteriorates in quality quality through repeated processing. ✓
C. Recycled plastic has no color.

Name one environmental problem associated with the burning of plastic waste.

Example answer: Burning plastic waste releases carbon dioxide. This contributes to global warming.

Name two plastic items that are frequently used in your school and could end up as waste in the environment.

Example answer: Disposable plastic bottles and disposable packaging for snacks or pens.

You have a science lesson. Your teacher asks you the following question: Which chemical element is the main component of plastic?

A Iron.

B Carbon. ✓

C Oxygen.

You have a science lesson. Your teacher asks you the following question: What is meant by "plastic"?

A A naturally occurring material consisting mainly of wood.

B A man-made material produced by joining small building blocks together. ✓

C A material produced by biological decomposition processes.

You have a science lesson. Your classmate asks you the following question: What are endocrine disruptors?

A Substances in plastics that kill bacteria.

B Chemicals in plastics that act like hormones in the body and can disrupt the endocrine system. ✓

C Substances that are produced exclusively in the human body.

You have a science lesson. Your teacher asks you to finish the following sentence: Plastic particles that are smaller than 5 mm are called...

A Macroplastic.

B Miniplastics.

C Microplastics. ✓

You have a lesson in science. Which statement is correct?

A Plastic particles in water contain dangerous chemicals that can enter the body if ingested by animals. ✓

B Plastic in the sea dissolves completely. Then it is no longer harmful.

C Animals ingest plastic, but the plastic does not contain any dangerous chemicals.

How can your school raise awareness among students and teachers about the impact of plastic waste on the environment? Describe your idea in about two sentences.

Example answer: The school could offer workshops and information events on the effects of plastic waste on the environment. Creative ideas for the reuse of plastic waste could also be given here.

You have a science lesson. Your teacher wants you to briefly describe how plastic can find its way back to humans via the food chain.

Example answer: Plastic waste ends up in the oceans. There it is ingested by fish. Fish are then eaten by humans. As a result, the plastic finds its way back to humans.

Describe what your breakfast at school could look like if you did not want to use plastic items.

Example answer: My breakfast could be packed in a reusable lunch box made of metal or glass. I could use a glass bottle for my drink.

You have a science lesson. You have to answer the following question in roughly one sentence: What role do rivers play in the global distribution of plastic waste?

Example answer: Rivers transport plastic waste from the land into the oceans. This contributes to the global spread of plastic waste.

You have a social studies lesson. Your teacher asks the following question: What political measures could be useful to reduce plastic consumption?

A. A complete ban on all plastics.

B. A ban on single-use plastic. ✓

C. Permission to produce more plastic.

Your school canteen only uses plastic cutlery. What would be the most environmentally friendly alternative?

A. Disposable cutlery made from bamboo.

B. Reusable metal cutlery. ✓

C. Disposable cutlery made from organic plastic.

What role do schools play in reducing plastic waste?

A. Schools can inform students about the consequences of plastic consumption. ✓

B. Schools have no influence on their students' plastic consumption.

C. Schools have no influence on the use of plastic in the school itself.

You are in the school cafeteria. Which of these packaging materials is the most environmentally friendly choice?

A. Plastic packaging.

B. Paper packaging. ✓

C. Styrofoam packaging.

Why is plastic used so often at school?

A. Plastic is biodegradable and environmentally friendly.

B. Plastic has no impact on human health.

C. Plastic is light, flexible and inexpensive to produce. ✓

The plastic waste in the sea, such as bottles and bags, also comes from activities on land. What ideas do you have to avoid plastic in your everyday life?

Example answer: Reusable containers or cloth bags could be used.

Name two plastic objects that are often found as litter on beaches.

Example answer: Plastic bottles and plastic bags.

What is the danger when animals eat plastic?

Example answer: Animals can choke on the pieces of plastic or starve to death on a full stomach.

You go for a walk on the beach and see plastic waste. What would be a good action to take at this moment?

Example answer: I could pick up the rubbish and dispose of it correctly.

How does plastic in the sea reach the most remote regions such as the Arctic?

A. Through ocean currents. ✓
B. By fishing vessels.
C. By cruise ships.

How does plastic most often end up in the oceans?

A. Through waste that is disposed of directly on the beach.
B. Through rivers. ✓
C. Garbage thrown from ships.

According to studies, what percentage of seabirds have plastic in their stomachs?

A. 10 %.
B. 50 %.
C. 90 % .✓

Is plastic pollution in the oceans having an impact on biodiversity?

A. Yes, plastic waste can be a colonization area for alien species that reach new areas and threaten native species. ✓
B. Yes, plastic waste attracts marine life and helps them to reproduce better.
C. No, plastic waste has no impact on biodiversity as it only floats on the surface of the water and does not affect living organisms.

Where do the largest concentrations of plastic accumulate in the sea?

A. Near the coast, as the currents carry the plastic there.
B. In the depths of the seabed, where it is deposited.
C. In the large ocean eddies (e.g. the Great Pacific Garbage Patch), where the currents accumulate the plastic in certain areas. ✓

Which of the following items account for the majority of plastic pollution in the ocean?

A. Single-use plastic such as packaging and plastic bags. ✓
B. Fishing gear such as nets and ropes.
C. Plastic toys that are washed away from the beaches.

How can small plastic particles be transported?

A. Plastic particles usually stay close to their source and are only transported slowly through water.
B. Water is the main transport route for plastic particles, while wind has only a minor influence.
C. Wind can transport small plastic particles faster and further than water, so they can reach even the most remote places on earth within days. ✓

How can you compare the amount of plastic waste that ends up in the oceans?

A. One truckload per minute. ✓
B. One truckload per hour.
C. One truckload per day.

Approximately how long does it take for a fishing line to degrade into microplastics (very small pieces of plastic) in the sea?

A About 50 years.

B About 350 years.

C About 600 years. ✓

What proportion of plastic waste in the sea comes from activities on land?

A About 20 %.

B About 80 %. ✓

C About 98 %.

What do many sea turtles think are jellyfish and eat?

A Algae.

B Plastic bags. ✓

C Fishing nets.

You take a cab and can move your game piece two spaces further. However, cabs have tires, and tire abrasion produces microplastics, which are bad for the environment. You therefore receive three plastic pieces.

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Did you know that plastic can be recycled? This means that plastic waste is processed into other products. Three of the plastic items in your plastic bin get recycled. Put them back in the communal container.

Did you know that plastic can be recycled? This means that plastic waste is processed into other products. Three of the plastic items in your plastic bin get recycled. Put them back in the communal container.

Do you have three or more plastic pieces in your plastic bin? Your game piece must move back three spaces.

If you have two or fewer than two plastic pieces in your plastic bin, you may move your game piece one space further. If you have more than two plastic pieces in your plastic bin, your game piece must move back one space.

All players who have two or fewer than two plastic pieces in their plactic bin may move their game piece one space further. If they have more than two plastic pieces in their plastic bin, they must move their game piece back one space.

Do you have three or more plastic pieces in your plastic bib? Your game piece must move back three spaces.

All players who have two or fewer than two plastic pieces in their plastic bin may move their game piece one space further. If you have more than two plastic pieces in your plastic bin, you must move your game piece back one space.

If you have no plastic pieces in your plastic bin, nothing happens. If you do have plastic pieces in your plastic bin, you must move your game piece back one space.

If you have no plastic pieces in your plastic bin, nothing happens. If you do have plastic pieces in your plastic bin, you must move your game piece back one space on the game field.

Do you have three or more plastic pieces in your plastic bin? Your game piece must move back three spaces.

Did you know that plastic can be recycled? This means that plastic waste is processed into other products. Three of the plastic items in your plastic bin get recycled. Put them back in the communal container.

D

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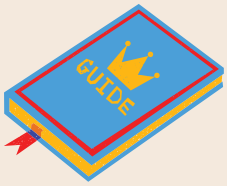
Rules for "Plastic Town"



Preparation of the game:

1. Place the two game boards in the center of the table.

2. Place the cards upside down on the matching colored spaces on one of the game boards.

3. Place all plastic pieces in a communal container (e.g., a large yogurt cup).

4. Give each player their own container (e.g., a small yogurt cup). This is each player's plastic bin.

5. Each player selects a game piece and places it on the "START"-field.

Let's get started:

Welcome to "Plastic Town"! You are a resident of this town, where plastic is produced and used in abundance. Unfortunately, plastic is bad for the environment. Your goal is to reduce plastic consumption and fight against all the plastic in the town. However, plastic is everywhere, and you will accumulate it in your bin during the game. Be careful! Too much plastic in your bin may result in penalties. Fewer plastic pieces can earn you rewards. The best way to keep your bin clean is by answering the game questions correctly.

Goal of the game:

You win if your game piece is the first to reach "FINISH."

How to play “Plastic Town”

1. The game is played **in turns**. Each player may roll the dice once and, if necessary, complete the turn.

2. The **youngest** player starts first. The other players follow in clockwise order.

3. Everyone begins from the **"START"** field. The players **roll the dice** once. They move their game piece forward the number of spaces shown on the dice. The turn ends and the next player continues.

4. If the game piece lands on an **institution**, the player to the right of the current player draws a **question card** from the corresponding color stack (matching the color of the institution). The player to the right reads the question aloud. The current player must answer the question. If the question is **answered incorrectly**, you need to transfer a **plastic piece** from the communal container into your personal plastic bin. If the question is **answered correctly**, nothing happens. For open questions, there will be sample solutions on the cards. These may help to evaluate whether the answer given by the player is correct.

5. If the game piece lands on a **red field**, the player must draw an **action card** from the red card stack. Follow the instructions on the action card.

Good luck, and may you reduce the plastic in "Plastic Town"!