

Clean Air and Happy Brain

LESSON PLAN FOR PRIMARY SCHOOLS

Clean Air and Happy Brain

This lesson plan, created for primary school children, consists of two one-hour lessons. These lessons aim to introduce pupils to air pollution, its causes, and its effects on health, with a specific emphasis on brain health.

Each lesson includes five sections and lasts 1 hour. Activities are designed based on an ethnographic approach that encourages students to observe, talk with others, make comparisons, and consider their personal experiences.

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Lesson 1

Air pollution

Lesson objectives

- Pupils will learn that the human need to breathe in to live.
- They will learn what air pollution is and what sources make the air polluted.
- They will be encouraged to think about health impacts of air pollution.



Take students to a natural environment such as a park, forest, or beach.

Let them know that they will learn about air quality and its impacts on our health in this lesson.

1 Thinking (10 min)

Ask your students to breathe deeply five times.

Then ask them the following question:

What enters our lungs when we breathe?—
The answer is AIR.

Explain to students that we are surrounded by the air everywhere and always need to breathe to live.

2 Group activity: What is air pollution? (25 min)

Split students into pairs or small groups. Give each group six photos of polluted and non-polluted areas (*Appendix 1*).

Ask each group to divide photos into two categories regarding their similarities.

Then ask each group the following questions:

- What differences and similarities do you notice between the two categories of photos?
- What do you see in photos, and how do you describe these areas?

Introduce your class to the term “air pollution”

- Explain to the pupils that air pollution is the contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere.
- Pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide, and sulfur dioxide (*WHO website*).¹

¹ <https://www.who.int/health-topics/air-pollution>

3 Class discussion: Sources of air pollution (15 min)

Invite students to discuss the following questions with their partners:

- Do you think the air is clean or polluted here?
- Do you think the air is more polluted here or on the road?

Then show students each pair of photos in *Appendix 2* and ask them the following questions:

- Where do you think the air is more polluted? Why?
- Can you name some sources of air pollution?

Explain to students that the burning of fossil fuels such as coal, oil, natural gas, petrol, or diesel is the main cause of air pollution:

- Motor vehicles, industrial facilities, and forest fires are common sources of air pollution (WHO website).
- Indoor air pollutants can originate from both indoor and outdoor sources. Indoor sources of pollutants include combustion (heaters, wood burners, smoking, cooking), furniture and building materials, hobbies, and cleaning activities, as well as mold, bacteria, pets, and plants. Moreover, Infiltration of outdoor traffic pollution can be especially high in homes in cities and near busy roads. Factors such as building design and material and natural and mechanical ventilation will affect the level of indoor air pollutants from indoor and outdoor sources.

Therefore, condensed neighbourhoods, industrial areas, and heavy traffic routes are more polluted.

4

The final challenge: awareness of air pollution (10 min)

Ask pupils to discuss the following questions with their partners and write down their answers.

- Why should we learn about air pollution?
- How does air pollution affect us?

Briefly explain to learners that we need to pay attention to air pollution and learn about it because it impacts our health.

Let the pupils know that they will learn about these effects in the next session.

5

Homework

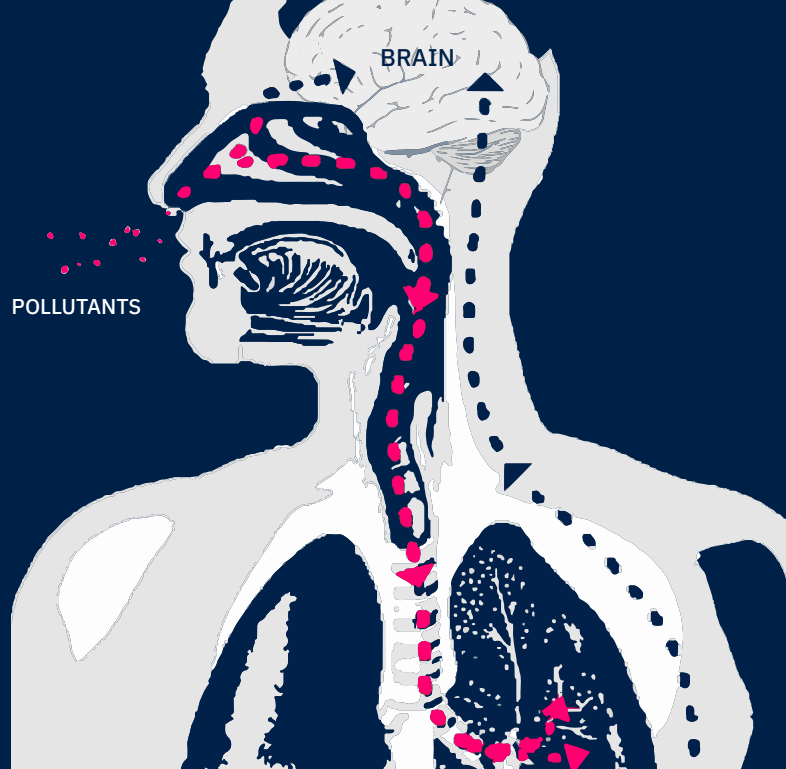
Ask students to walk around their neighbourhood with a parent during the weekend, write down their observations, draw or take photos of three resources/activities that pollute the air, and bring their writings and drawings/photos to the class.

Lesson 2

Air quality and brain health

Lesson objectives

- Pupils will learn that the quality of air is important as it affects our health.
- They will learn that air pollution impacts our brain health and thus all of our everyday activities.



1 Thinking (10 min)

Remind the class of the last session's essential points, including air pollution, its causes, and its impacts.

Then ask pupils to talk about their observations of neighbourhoods, show their drawings / photos, and explain them.

Before beginning the new lesson, ensure that the pupils are familiar with air pollution and its resources.

2 Class discussion: Health effects of air pollution (15 min)

Ask students the following questions:

- Have you ever been in a polluted area?
- How do you feel when you breathe polluted air?
- Have you ever got coughs or dry eyes when you are outdoors?

Then explain to students that all of us are affected by air pollution as we breathe it every moment. Air pollution can especially cause health problems, including respiratory, cardio-pulmonary, and whole-system impacts for the very young and old.

Then emphasise that exposure to high levels of air pollutants at critical points in our lives, particularly in early life, is detrimental to brain health across the life course and increases the risk of dementia and related disorders.

Information for teachers:

- WHO data ² shows that almost all the global population (99%) breathe air that exceeds WHO guideline limits and contains high levels of pollutants, with low- and middle-income countries suffering from the highest exposures.
- The main pathway of exposure from air pollution is through the respiratory tract. Breathing in pollutants leads to inflammation, oxidative stress, immunosuppression, and mutagenicity in cells throughout our body, impacting the lungs, heart, brain among other organs and ultimately leading to disease.
- Almost every organ in the body can be impacted by air pollution. Due to their small size, some air pollutants are able to penetrate into the bloodstream via the lungs and circulate throughout the entire body leading to systemic inflammation and carcinogenicity.
- There is suggestive evidence also linking air pollution exposure with increased risk for adverse pregnancy outcomes (i.e. low-birth weight, small for gestational age), other cancers, diabetes, brain disorders including global cognition and neurodegenerative disorders, learning in childhood and stroke-related brain damage, reduction in white matter and neuroinflammation.

² <https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-impacts>

3 Main activity: Brain functions (25 min)

Show the pupils the Brain Function Diagram (Appendix 3). Introduce students to the functions of the brain.

Explain to them that the brain is the essential organ of the body that controls thought, memory, emotion, touch, motor skills, vision, breathing, temperature, hunger, and every process that regulates our body. Therefore, brain health affects our everyday activities.

Then ask learners to discuss the following question with a partner:

- Can you name the daily activities in which you use your brain?
- What happens if our brain does not work correctly?

Write down students' answers on the board.

Introduce students to the term *dementia* and some of its common symptoms.

Explain to the learners that people living with dementia may experience memory loss, difficulty concentrating, finding it hard to carry out familiar daily tasks, such as getting confused over the correct change when shopping, struggling to follow a conversation or find the right word, being confused about time and place, mood changes and so on (NHS website).³

³ <https://www.nhs.uk/conditions/dementia/symptoms/>

5 Homework

Invite pupils to ask the following questions from an adult (parents, grandparents, etc.), record or write down their answers and bring them to the class:

- Do you remember how the air quality was when you were a child?
- Do you think the air was more or less polluted in the past? Why?

4 The final challenge

Remind the class that air pollution is a significant cause of dementia and that we can prevent dementia by reducing air pollution.

Then invite students to discuss the following question with a partner:

- Do you take part in activities that cause air pollution? (e.g., using cars, flying on a plane, heating the house, etc.)

Appendix 1

1



2



3



4



5



6



Appendix 2





InSPIRE is a UK policy and research consortium devoted to mitigating the impact that air pollution and the exposome have on brain health (including cognitive function, mental health and dementia).

Find us online: www.inspireairbrain.org

