



„Impact of air pollution on human health” - lesson plan

Duration	1 hour
Age	6 – 9
Type of classes	Didactic and educational activities
Goals	<ul style="list-style-type: none"> • Children have knowledge on the impact of air pollution on human health • Children acquire data through senses • Children communicate data and information in appropriate form To acquaint children with the general subjects related to air - the phenomenon of spreading, the phenomenon of breathing and the importance of these phenomena for a human being, • To present methods of proper behaviour during days with high concentrations of pollutants in the air and an attempt to consolidate the desired habits.
Methods	Show, talk, film screening, brainstorming,
Forms of work	Individual, Groupal
Needed material	<ul style="list-style-type: none"> • A picture of tennis court • A picture of the particulates size (comparing with a hair) • A picture of the blood vessels and heart • A picture of a vein • Human body mannequin (optional) • Video device and internet connection • Dust proof masks
Evaluation methods	<ul style="list-style-type: none"> • Survey

Attention: During the lesson, it is worth using the dedicated presentation available to download from the "Clean Air" website.

The presentation consists of slides related to topics discussed during the lesson. The teacher after completing each exercise can use a slide (or slides) summarizing the given issue, to remind the most important information and to systematize the knowledge of students. The presentation also includes slides with exercises and the answers to them.

1. Respiratory system



The teacher, after presenting the subject of the lesson (slide 1) asks the children - What's something that you do all day, every day, every minute no matter where you are? - and after a few minutes the teacher give the kids three options (slide 2):

- a. Think about cartoons
- b. Blink
- c. Breath

Most children will answer correctly and will choose c option (slide 3) after that the teacher will explain that we need breathing air to be alive. The air contains oxygen, and this is essential for our organism. The way that the oxygen is introduced in the organism is through the lungs, through the respiratory system.

It is easy to feel your lungs just put your hand on your chest and breathe deeply you will feel your chest getting bigger.

The teacher explains how the air ends in our body - the air travels from the mouth to the lungs first through the trachea, then it is divided into two forming the bronchus, which in turn are divided into thousands forming the bronchioles and at the end of them are the alveoli - the teacher will explain that we have about 30 000 bronchioles in each lung and it is about the same thickness as a hair.

Finally, the alveoli allow oxygen from the air to pass into our blood through ultra-narrow pipes, called capillaries, and the heart sends oxygen to the cells in our body.

The teacher explains to children that when we are breathing we are introducing all the things that the air contains, and when we are in a polluted area the air can contain small particles such as less than 10 micrometres or even less than 2.5 micrometres and the problem is that this particulates are so small than they can pass through the capillaries and get into your blood causing serious health problems.

Then the teacher shows children new and old machine filter and/or dust proof masks (the old ones must have been used and have some dirt on them), and lets them see how they can feel the air of a fan through these equipment. Then, the teacher asks children which equipment will work better to prevent pollution, the new unused ones or the old dirty, used ones?

The teacher can let children answer about this question and give their explanation on why they think so. They can discuss in group and understand that these equipments work worse as they get more and more pollutants.

Now, the teacher explains them that though the respiratory system can resist pollution, the constant exposure to elevated particle pollution will contribute to reduced respiratory function the same way as with filters. So even if we will see pollution in our



neighbourhoods and our body is prepared to fight against it with our “filters”, reducing exposure will reduce possible health effects.

Then, the teacher shows slide 5 from the presentation - for summarizing the knowledge they have gained.

2. Cardiovascular system

The teacher asks the children – apart from breathing, what's something that you do all day, every day, every minute no matter where you are? (slide 6).

Yes, it is pump blood all over your body thanks to a muscle which is called heart (slide 7).

The teacher explains the students that the heart is responsible for pumping blood to the cells carrying oxygen and collecting waste through the arteries and veins.

The heart is a muscle located a little to the left of the middle of your chest, and it's about the size of your fist.

Your heart is like a pump or rather two pumps in one. The right side of your heart receives blood from the body and pumps it to the lungs. The left side of the heart does the exact opposite: It receives blood from the lungs and pumps it out to the body. This can be explained with straws trying to get water from one plastic glass to the other, sucking water from one glass and leaving it in the other glass.

But air pollution can cause inflammation of the veins, and this can create problems in the distribution of the nutrients in our body and more health problems derived from this effect.

Then, the teacher shows slide 9 from the presentation - for summarizing the knowledge they have gained about cardiovascular system.

3. How small is PM?

The teacher reminds students about the most important substances which pollutes the air, because we have to know who we must defend against (for example PM, NO₂, ozone).

The teacher explains the problem is these pollutants are “the invisibles killers” you cannot see or smell it most of the times and they create the illusion that nothing is happening but our organism is suffering. But in fact sometimes you can see and/or even smell it and you only need to be conscious about it (as with smoke from chimneys). So your first two detectors are your view and your smell. Teacher could do some trials now with matches.

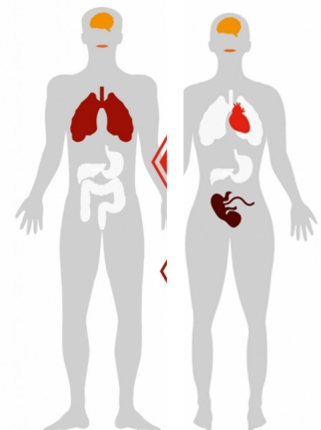
Then, teacher shows how small are PM - this is the reason why they are so dangerous - they can penetrate the body, bloodstream and organs and carry very dangerous substances (slide 10).



4. Effects of air pollution on children's health and development

The teacher can show a short video (1:18 min) from World Health Organisation "Breathe Life - How air pollution impacts your body" (<https://www.youtube.com/watch?v=GVBey1jSG9Y&feature=youtu.be>) (or: <https://www.youtube.com/watch?v=sAKyhfxr7s> 2:50-3:40 - for younger children) which is on slide 11. After that s/he starts a conversation with the children to ask them about the effects of the particles one of the main pollutant on the body.

The teacher explains that the pollution can cause cardiovascular effects because inflammation and other affections in the veins, as well as respiratory effects, including asthma attacks, reduced lung development in children, and increased respiratory symptoms such as coughing, wheezing, and shortness of breath. S/he shows slide 12 with marked organs affected by air pollution.



As is difficult to explain all effects, an experiment can be done letting them to breathe normally, and then breath through their shirt (or other available tissue), asking them which way they breath better, with or without the tissue? They will answer that better without it, and thus the teacher can work with them to understand that more pollution in our lungs mean to have less space for the air to go through, and thus can make it more difficult to breath.

As well, as another example, the teacher can work with children using small straws and big straws to suck water from a plastic glass. And ask them with which straw its easier to do it. Children will see that with the bigger straw it's easier, and thus the teacher will explain that some pollutants make our veins to inflame and thus our veins have less space to carry the blood, and it will be more difficult as with the straws example.

Teacher explains that the pollutant not only causes problems on physical health but also air pollution can cause a reduction in intelligence as it can affect neuronal connections.

5. Puzzle



The teacher places in a prominent place, for example on a blackboard, a board with drawings (along with the signatures) appearing in the puzzle and explains the meaning of individual drawings. Then s/he gives the children a page with a puzzle and/or displays it on the presentation (slides 13-18)

Variant A – Role division

The teacher randomly selects children from the class and assigns them individual roles in accordance with the pictures from the board. The teacher (or other child) plays the role of a reader and reads the text written in words. Students join the text they read by saying the name of the previously indicated picture. In this way, they read the text related to the subject of air pollution together.

Variant B – Common reading of the text

The teacher introduces students to the way the encrypted text is read. The teacher acts as a narrator, and the whole class, on the teacher's signal, tries to read the content of the encrypted message together. The teacher indicates on the board a given symbol when it appears in the content.

NOTE: For younger children (not able to read), you can reduce the number of symbols and choose the ones that are unambiguous (eg car, house, heart)

Variant C – Division into parts

The teacher divides the text into 4 sections and entrusts 4 students with reading the encrypted message. Each of them reads the fragment indicated by the teacher.

Then the pictures can be colored.

6. Protect yourself from unhealthy air

Then the teacher asks students how to defend themselves against the effects of air pollution on health. Students answer and give their ideas. Students answer and give their ideas, the teacher writes them on the board. S/he then displays slide 15 and shows 5 tips to help protect against air pollution. Luego, el maestro muestra las diapositivas 16-21, y los estudiantes deben elegir qué comportamiento del dibujo dado es malo y cuál es bueno (por ejemplo: usar máscaras anti-smog, bueno, ventilar la sala en un día de smog, incorrecto). El profesor comprueba y corrige las respuestas. Los dibujos fueron tomados del sitio web www.smog.edu.pl (sitio web preparado como parte del Proyecto "Implementación del Programa de Protección del Aire para la Pequeña Polonia - Pequeña Polonia en una atmósfera saludable" / LIFE-IP MALOPOLSKA / LIFE14 IPE PL 021).

The teacher ends the lesson by displaying slide 22.

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