Non-renewable sources of energy

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Activity No. 1

Part of the lesson:

EVOCATION

The aim of the activity: To familiarize students with a basic division of the sources of energy used by the people and society.

STEP 1.

Brief description of the activity:

Teacher makes a short brainstorming on the topic, asking students: „Which sources of energy do people use?" and writes down their answers without correcting or commenting them. All the suggestions should be written on the blackboard. The brainstorming sessions should not last longer than 5 minutes.

Instruction (what you need to tell the students):

Answer the question: „Which sources of energy do people use?"

STEP 2.

Brief description of the activity:

Make a short summary of the brainstorming results. Teacher draws attention to specification of the 2 major groups of sources of energy – renewable and non – renewable.

In cooperation with students we mark on the blackboard (e.g. with two different colours), which sources of energy are considered to be renewable and which are not. In case of doubts we can discuss a bit (e.g. wood and coal are renewable, but only wood is renewable in an acceptable time horizon). At the end of the activity it should be obvious, which sources of energy are renewable and which are not. The division and discussion should not last more than 5 minutes.

Instruction (what you need to tell the students):

What do you think - which sources of energy are considered to be renewable and which are not?

Tools for the activity (everything you need to take to the classroom): Blackboard/flipchart, coloured chalks/markers

Estimated time (max. 40 min.): Max. 10 minutes

Notes: Both steps can be done at the same time (to write down and colour-mark the suggestions) according to the group (older or advanced students).

Activity No. 2

Part of the lesson:

APPRECIATION

The aim of the activity: To familiarize students with the main differences between renewable and non-renewable sources of energy using a didactic game. Students will understand advantages and disadvantages of these energy sources.

STEP 1.

Brief description of the activity:

To play a short didactic game, which helps to realize key differences between renewable and non-renewable sources of energy.

Students are introduced the game rules and play the game (see the rules in attachment no. 1). It should last approximately 15 minutes (a group of 20 students). If the game is over too fast, we can try to play one of the described alternatives.

Instruction (what you need to tell the students):

Split into two groups with identical number of members. Your task is to run to the other side of the playground/classroom, take one cube and run back. After the first runner comes back, the next one starts running and so on. Meanwhile, others build a tower of the brought cubes/blocks.

Tools for the activity (everything you need to take to the classroom): Cubes/blocks of two sizes in adequate number

Estimated time (max. 40 min.): 15 minutes

Notes: Game rules including playing options – see attachment no.1

Activity No. 3

Part of the lesson:

REFLECTION

The aim of the activity: Point out the advantages/disadvantages/risks of using non-renewable sources of energy using the results of the didactic game-play.

STEP 1.

Brief description of the activity:

Calm down the group after the game and get a brief feedback from the students.

We gather the group in the circle around the cubes towers. We provide a short time to the students to express their feelings and emotions connected with the game. They tell each other their opinion/feeling connected with the game run. In this way, we avoid expressing these during reflection time. Activity should not last more than 5 minutes.

Instruction (what you need to tell the students):

Try to tell each other the opinion/feeling connected with the game run.

STEP 2.

Brief description of the activity:

To analyze the game run and the results according to the society type represented by each group (see attachment no.1).

Each group summarises their tasks and results in the game (which cubes were used, how many towers were built, how tall they were, when the group run out of cubes etc.). The teacher glosses and explains analogies and contexts. Teacher should try not to provide the solutions (avoid sentences „it´s bad/good....", „we should …"), but leads the students to form and formulate their own attitude and discuss it. All the information needed for reflexion is summarised in the attachment no.2. Reflexion should follow the game immediately and should take at least 10 minutes.

Instruction (what you need to tell the students):

Try to summarise: which cubes were used, how many towers were built, how tall they were, when the group run out of cubes etc.

Tools for the activity (everything you need to take to the classroom): none

Estimated time (max. 40 min.): 5 min + 10 min

Notes: Texts for the reflexion guiding – see Attachment no.2

Attachment 1

Preparation and tools for the game

It`s recommended to play the game outside (e.g. playground field). It`s also possible to use a gym, school corridor, or even the classroom (the space is limited then). Cubes of two sizes of any colour are needed for playing. We can recommend the sizes of e.g. 15x15x15 cm and 5x5x5 cm.

The game rules

Prepare two piles of cubes/bricks at one end of the playground – a smaller number of the bigger cubes and at least three times bigger number of the smaller ones. It`s recommended to use at least 20 pcs of the bigger cubes and 60 pcs of the smaller cubes for a group of 20 students.

Divide a group into two equal groups. One of the group represents a society which is using non-renewable sources of energy – the group works with big cubes. The second group is a society which uses just the renewable sources of energy – the group works with small cubes. The teacher can explain the meaning of this division (it can also be explained after the game play during the game analysis for the group of older or advanced students).

The piles of cubes represent sources of energy, which students can get (by simply running and picking up the cube from the pile and bringing it back to the start point). The opposite end of the playground where the group stays represents the seat of their society. Here the towers of the cubes are built. Students try to build as high and as stable tower/towers as possible. The tower is built simply by putting the cubes on each other (no complicated structures). If the tower seems unstable, the group starts building a new one.

The game is played like a relay - race. Students are running to pick up a cube one by one. Each can bring just one cube. The rest of the group is building the towers at the seat of their society. On purpose, we do not define the winner of the game.

When the group working with the big cubes runs out of the sources and has all the towers built, the game goes to the end. It´s good to go on for a bit longer to let the students realize, that one group is out of all its sources now while the other can still continue.

First the group with big cubes, finishing faster, supposes itself to be the winner – the students got all the cubes fast, their towers are higher. During the reflection, however, we analyse, what`s the meaning of this „victory". We point out to the possible results of fast running out of the sources and show, that in a fact the other group is a winner in many aspects.

Game Variations

We can divide the group into 4 subgroups if the number of students is too high (e.g. 4 sets of cubes of two different sizes and variable amounts is needed).

We can change the groups in the game if the number of students is too small. Each group can try to play with both big and small cubes, while changing the roles.

We can also try to divide the group into three subgroups (with the group of advanced students or if we have more time). The third group can combine big and small cubes – this group represents a society using both types of energy resources.

Attachment 2

Tool for guiding the reflection

1. Size and number of cubes – representing energy sources quality and quantity

The group working with the big cubes represents the society using just non-renewable sources of energy (oil, gas, coal, uranium) in order to meet all the needs and to develop. The cubes are big – these sources of energy are very rich (we can use the analogy with food). One cube brought enables the tower to grow fast and high. On the other hand the number of the cubes is limited as well as the amount of non-renewable sources of energy on the earth. The faster the group members bring the cubes the faster the reserves run out. It´s the same for the non-renewable sources of energy. The faster we consume the faster we are running out of our resources. Discovery of new deposits of resources provides just a temporary solution of this problem.

The group working with the small cubes represents a society using just renewable sources of energy (sun, water, wind) to meet all the needs and to develop. The cubes are small – these sources of energy are often not so rich and if they are, we have serious troubles to store it (e.g. limited capacity of batteries). These sources provide the energy continually, but they are endangered with fluctuations in production process (wind turbine in calm weather, water power-plant in drought). Similarly, the towers built with small cubes cannot reach so high. On the other hand the number of the cubes is unlimited (the teacher can also add more during the game) – it is almost impossible to run out of these renewable sources of energy. It is possible to build small towers for as long as we want (unlike the big ones).

2. Size and number of the cube towers – representing possible use of energy sources

The group working with the big cubes is able to build higher towers. Non-renewable sources of energy are and always were the „engine of progress". The technological development would never be so fast and intensive without the use of non-renewable sources of energy (e.g. metallurgy using coal, transportation development with oil). On the other hand the innovation and technological progress would certainly come without massive using of non-renewable sources of energy, too. But it would not be so fast and its result would not provide such comfort, that our western civilization got used to. The number of the towers built of big cubes is limited, which is very disquieting. Non-renewable sources of energy won´t renew in hundred-thousand years´ horizon. A new deposits discovery provides just a temporary solution of this fact. Another temporary solution, which slows down running out of these sources, is efficiency improvement of their use (power plant, engine etc.). But our civilisation cannot sustain without using renewable sources of energy (big cubes will run out fast for sure).

The group working with the small cubes is able to build smaller towers. These sources were and are also the engine of the society development, but their efficiency had never been so high in comparison with the non-renewable sources (e.g. electrical mill produces 300 times more flour then the water mill). This is a true limitation for renewable sources of energy. Man which belongs to the western civilisation would have to live modestly using just renewable sources.
The big advantage for the group working with the small cube was a big long - lasting supply of the cubes and this society could build the towers much longer than the other group. The life of this society is much more sustainable. The towers are smaller (e.g. life is modest), but sustainable.

If we choose the option with **a group working with both cube types**, we can compare also our today´s situation of the western civilisation – we are trying to increase the portion of renewable sources in our overall consumption. The students set the big cubes as a basis for the small one intuitively. This type of society can significantly delay the time of cubes (sources) ran out. They also learn to work with the small cubes and they can continue working with these only (the society sustains). Towers combining this way are higher than those made just of the small cubes (our „comfort of life“ would not decrease so much).