

rAn

**Raising awareness about natural disasters
through the development of best practices
and serious games**

2019-1-UK01-KA201-062018



LEARNING SHEETS AND ACTIVITIES



INDEX

| | |
|--|----|
| Introduction..... | 3 |
| Learning sheet: EATHQUAKE PROOF BUILDINGS..... | 5 |
| Learning sheet: EARTHQUAKES AND TSUNAMIS | 11 |
| Learning sheet: STORMS | 16 |
| Learning sheet: STORMS | 20 |
| Learning sheet: FLOODS | 25 |
| Learning sheet: FLOODS - BE PREPARED | 38 |
| Learning sheet: WILDFIRE PREVENTION..... | 41 |
| Learning sheet: WILDFIRE..... | 49 |



During two years of work, the rAn project consortium has created a video game and guides to teach young students how to act in the event of natural disasters. These guides, which include different activities, have been created on the basis of the best methodology and knowledge of all the project partners.

Thanks to the disaster awareness kit and the learning game, pupils can better cope with, prevent or predict dangerous situations. Furthermore, by increasing the capacity of teachers to integrate ICT into their learning methodologies, great positive effects on teaching can be achieved. Furthermore, the project promotes hands-on learning and critical thinking based on problem solving.

Both the project and its objectives have been tested and demonstrated in front of numerous schools, experts and stakeholders who have made it possible for the results to be of a higher quality.



Introduction

rAn's learning sheets present in a concise manner, information about the different natural disasters that are described in rAn's serious game: storms, floods, fires, and earthquakes. They aim to integrate the proposed digital tools and experiential learning methodologies into teaching practices. They will include end-to-end blended learning activities that deploy the rAn serious game, presented in the form of agile learning approaches.

These learning sheets are designed to provide the necessary how-to good practice instructions to integrate the proposed learning methodologies and tools into already established instructional practices. They facilitate the adoption of project outcomes, provide information about linking education to the development of basic skills and natural disasters, and use serious games as a complementary learning tool. They are planned to have a duration of one learning session, and they can be complemented with the minigames of rAn's serious game.

Learning sheet: EATHQUAKE PROOF BUILDINGS



Concepts covered by the learning activity:

- Earthquake Awareness
- Understanding of what happens to a building during an earthquake
- Elements, features and technology for buildings that help in the case of earthquake

Overall educational objective:

The aim of this learning activity is to help students to understand how earthquake proof a building can be and the specific condition that will make a difference in the case of an earthquake. This is a hands-on activity that will assist students to learn in an engaging manner.

Expected learning outcomes:

In this activity, students will learn how to create an earthquake-proof building and they will be familiarised with the significant elements when structuring a safe building.

The expected learning outcomes are:

- Students can identify the elements that will make a difference in case of an earthquake.



- The students can describe what is significant when developing a building
- Students can present their structures and discuss in the classroom how they have worked and the choices they had to make.

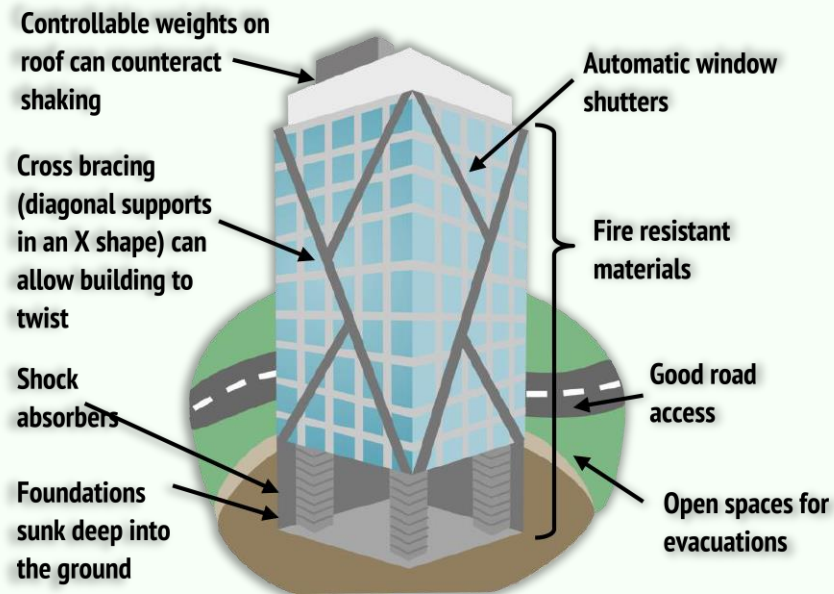
Step-by-step use of the rAn serious game in the context of the learning activity:

1. The teacher should provide for each students group:
 - Paper straws/lollipop sticks
 - Card
 - Masking tape
 - Tray
 - 3x 50g weights (small stones can be a good example)
2. The teacher gives a theoretical explanation in class about the earthquake proof buildings

Engineering buildings to withstand earthquakes is extremely important in earthquake-prone areas. New buildings can be designed from scratch to be earthquake resistant and older buildings can be retrofitted with new technologies to prevent them from collapsing in an earthquake.

3. The teacher shows the picture below and explains:

This picture shows some of the ways buildings can be designed in order to help save lives during an earthquake.



4. Now, the teacher divides the class in groups (3-4 ideally) and asks from each group to design an earthquake proof structure handing over the material

Use a piece of paper to design your own earthquake resistant structure. Your structure must be at least 30cm tall, have 3 floors and each floor must be able to support a 50g weight. Make sure to label your structure clearly and to work out how much of each material you will need.



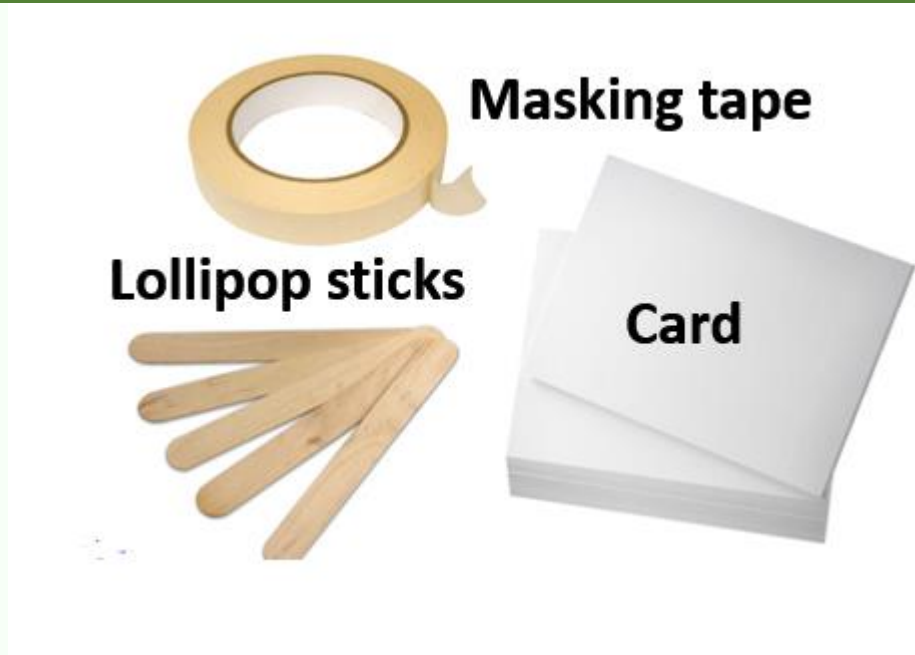
5. Now, the teacher asks the groups to build an earthquake proof structure:

Using your materials build your earthquake proof structure.

Remember that your structure must be at least 30cm tall, have 3 floors and each floor must be able to support a 50g weight!

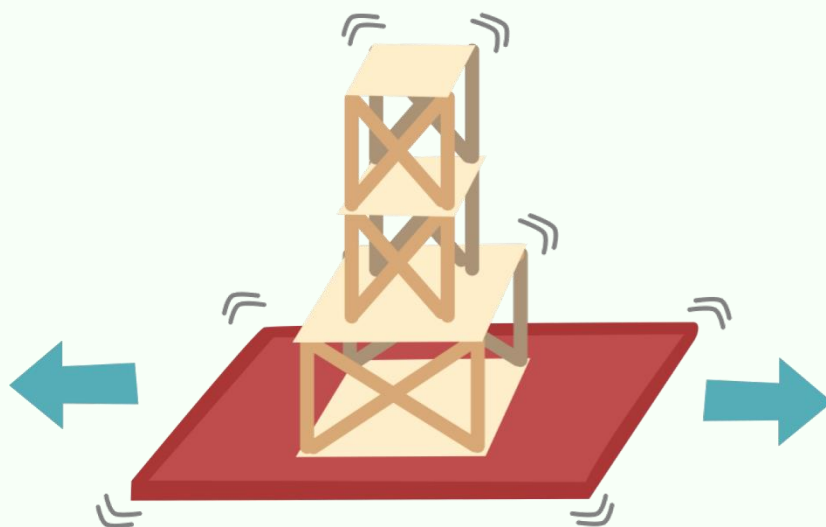
Tips to make your structure more earthquake proof:

- *Wide base*
- *Solid foundation*
- *Symmetrical design*
- *Think about additional supports*
- *Think about where you might put additional weight*



6. Once all groups have completed their structures the teacher will ask them to test them.

Place your structure and your weights on a tray and slide the tray backwards and forwards on a table. To survive the earthquake your weights must not fall off and the structure must not collapse for 10 seconds!





7. A discussion is highly encouraged with high interaction among the groups based on the performance of each structure.

- Did all structures survive the earthquake?
- What did work and what did not?
- If you were to make it again, what would you change?
- How would you improve your structure?

Assessment methods:

- Qualitative method: The teacher analyses the performance of structures created by the groups of students
- Qualitative method: The presentation of the structures and the discussion that will follow will help the teacher to have a clear image if the educational objectives have been addressed

Theoretical explanation about what makes a building earthquake proof.

- The shaking from an earthquake can turn loose soil into a liquid during an earthquake. Liquefaction can undermine the foundations and supports of buildings, bridges, pipelines, and roads, causing them to sink into the ground, collapse or dissolve.
- To withstand collapse, buildings need to redistribute the forces that travel through them during a seismic event. Shear walls, cross braces, diaphragms, and moment-resisting frames are central to reinforcing a building.
- An earthquake proof building means that the building is designed to withstand the shattering effect of an earthquake.
- Earthquake-resistant designs typically incorporate ductility (the ability of a building to bend, sway, and deform without collapsing) within the structure and its structural members. A ductile building is able to bend and flex when exposed to the horizontal or vertical shear forces of an earthquake.

Learning sheet: EARTHQUAKES AND TSUNAMIS



Concepts covered by the learning activity:

- The formation of earthquakes and tsunamis
- The strength of a simulated earthquake
- The effectiveness of different engineering designs to get people protected from earthquakes

Overall educational objective:

Understand what causes earthquakes and tsunamis and the effect they may have on people in order to evaluate the different engineering designs used to protect people from potential harm.

Expected learning outcomes:

This learning sheet has been designed to achieve general and specific learning outcomes. Learning outcomes are descriptions of the specific knowledge, skills, or expertise that the learner will get from the training activity.

In this activity, students will be familiarised with the formation of two natural disasters, earthquakes and tsunamis and with engineering methods that can keep people protected.



- Students can describe how earthquakes and tsunamis are formed
- Students can identify the effect of these natural disasters
- Students can distinguish how earthquakes are caused and how tsunamis.

Step-by-step use of the rAn serious game in the context of the learning activity:

Materials needed

- Paper
- Pencils
- A small cardboard box
- A metal box

For earthquake simulation

- Wooden blocks
- Lego blocks
- Baking paper

For tsunami simulation

- Tray that can hold water
- Water
- Sand
- Plastic objects (small dolls, small houses)
- Large ball
- Small ball

1. The teacher shows to the students the small cardboard box and the metal box and asks students to describe what they see.
2. Then the teacher challenges the students to identify which box would most likely withstand an earthquake and ask them to explain why.

3. The teacher, then, encourages a class discussion, asking students to state the different types of natural disasters they are aware of.

It will help to explain that scientists study natural disasters to help keep people safe simply because they cannot be eliminated. Also, it is noteworthy to mention that engineers construct buildings and design solutions to protect people during natural disasters.

4. Moving to the hands- on part of the activity the teacher explains to students that they will explore different types of natural disasters – earthquakes, and tsunamis.

They will learn about the cause of each natural disaster and how humans are working to reduce the impact from these disasters. Specifically, students will discover how to test the effectiveness of different engineering designs created to protect people from natural disasters.

5. The teacher divides the class into two groups and helps them to set up the two simulations. It will be useful to allow the students to rotate through each simulation:

Simulation 1: SHAKY GROUND

They build a small tower using wooden blocks and place it on a cookie sheet. Then, they build another tower, similar in size, using Lego blocks. They place it on the same cookie sheet. Students shake the cookie sheet and observe what happens.

Simulation 2: THE TSUNAMI EFFECT

They fill a long tray with water and add sand, which will function as the land near the water. Then, they add in objects, such as dolls or



houses, to the area of land. Students drop a small ball in the water and observe what happens to the water and the objects. Then students drop a much larger ball in the water and observe what happens.

6. Then, the teacher asks the students to follow their instructions:

Simulation 1

Shake the cookie sheet with the wooden blocks and observe what happens. Then shake the cookie sheet with the Lego blocks and observe what you see. Write your observations in your notebook and explain why things happened the way they did.

what happened when you shook the cookie sheet?

Simulation 2

Use this model of tsunamis to think about the damage these natural disasters can cause when they make their way on land. After dropping both balls in the water, write down your observations in the notebook. Include why you think the end result happened the way it did.

what happens to the land and objects when a small ball is used instead of the large ball?

7. After all groups have completed both simulations, the teacher gathers the class to discuss about natural disasters and the dangers they pose to animals, humans, and the environment. The teacher discusses that simulation 1 illustrated how engineering is used to solve the problem of protecting people when earthquakes happen. Then he/she discusses Simulation 2 which presented a model to show just how dangerous the waves of tsunamis are. The teacher also asks students to present their written observations.



Assessment methods:

- Qualitative method: The teacher analyses the performance of the students by the discussion encouraged at the end of the activity
- Quantitative method: Through both simulations and the discussion at the end, students should have learned a lot about natural disasters, specifically, earthquakes, and tsunamis. They should also be familiar with the different engineering technologies used to reduce the impact from these natural disasters. Teachers will evaluate the written observations for both simulations in the notebooks of the students. Their main criteria will be: (i) understanding of the cause and effect of the problem, (ii) accuracy and quality of their descriptions.

Learning sheet: STORMS



Concepts covered by the learning activity:

- Storm formation: its process.
- Different elements during a thunderstorm: Warm air, cool air, clouds, winds, lightning. How they intervene during storm formation.
- Scientific concepts: air temperature, atmosphere, cumulonimbus clouds.

Overall educational objective:

The aim of this learning activity is to, through a theoretical explanation, a game played in class with all of the students, and one of the minigames of rAn's serious game, understand and be able to explain in a simple way, how storms are formed, and the natural-scientific processes during their formation.

Expected learning outcomes:

This learning sheet has been designed to achieve general and specific learning outcomes. Learning outcomes are descriptions of the specific knowledge, skills, or expertise that the learner will get from the training activity.

In this activity, the storm formation process is described in detail. The expected learning outcomes are:

- The students can describe the process in order.



- Students can identify thunderstorms.
- Students can distinguish thunderstorms from other natural disasters.
- Students can discuss and ask questions in the classroom (verbal information and attitude).

Step-by-step use of the rAn serious game in the context of the learning activity:

8. The teacher gives a theoretical explanation in class about the process by which storms are formed.
9. Interactive learning activity based on the learning sheet: Division of the classroom in groups and game played in class.
10. Complement the learning sheet with rAn serious game.
 - a. In the game: city affected by the natural disaster → Thunder Island.
 - b. In the game: minigame associated with this learning sheet → Press the lightning rod, interactive object in Thunder Island.
 - c. Play this minigame after using this learning sheet.

Assessment methods:

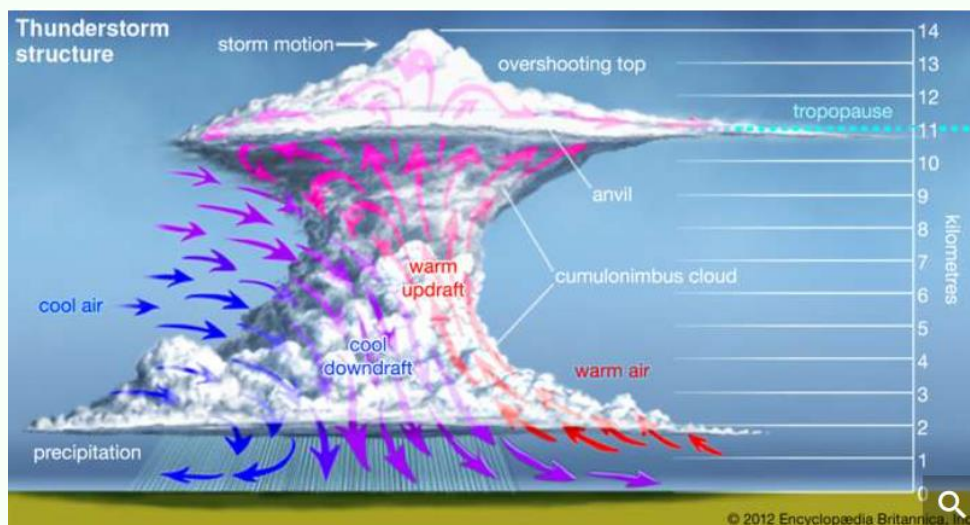
- Qualitative method: The teacher analyses the performance of the exercise conducted in class.
- Qualitative method: Debate with students → questions and oral interaction in the class during the learning activity. The teacher fosters debate and interventions from students.
- Quantitative method: Measured through rAn's serious game. In this case, the minigame associated with the learning sheet is the one that appears in Thunder Island when pressing the lightning rod.

Theoretical explanation about the formation of thunderstorms:

Thunderstorms are associated with lightning, thunder, clouds, heavy rain, hail, a lot of wind and sometimes tornadoes. They are formed like this:

- Layers of warm and moist air rises (which are light) to parts of the atmosphere that are cooler.
- The air is moist, therefore, with lower temperatures, it condenses forming a type of cloud called cumulonimbus.
- Moist air can also condense and form rain.
- Those clouds are denser, and push cool air to the earth, causing winds and rain.
- Electrical charges accumulate on cloud particles.
- If the electric charge is big, lightnings appear.

The teacher can use the blackboard to draw something like the picture below.



Interactive learning activity to do in class:

The class is the atmosphere. The teacher is the Earth. Divide the class in four teams. Each team represents a part of the process by which thunderstorms are formed. The teacher reads the process out loud and students have to move through the classroom to represent the process. The teacher can guide students and help them understand the process and the game. Students are encouraged to ask and debate about the process, interchange ideas, ask the teacher and experiment with the game!



- Team number 1: warm and moist air.
- Team number 2: Clouds.
- Team number 3: Rain
- Team number 4: Lightning

Activity process with students, by teams:

All students are divided by teams in the middle of the class. The teacher is at the desk and has explained that the desk represents the earth and that the end of the classroom represents the atmosphere.

1. Layers of warm and moist air rise (which are light) to parts of the atmosphere that are cooler → Team number 1 has to move to the end of the classroom, away from the teacher.
2. The air is moist therefore with lower temperatures, it condenses forming a type of cloud called cumulonimbus → Team number 2 (the clouds) appear and join team number 1.
3. Moist air can also condense and form rain. Those clouds are denser and push cool air to the earth causing winds and rain → Team number 3 (the rain) move from the rest of the teams that have already appeared to the teacher.
4. Electrical charges accumulate on cloud particles, if the electrical charge is big, lightning appears → Team number 4 (the lightning) moves from the rest of the teams to the teacher.

After this exercise, students can complement it with rAn serious game. They can play the minigame associated to the lightning rod (the object) where they have information about the different types of storms.

Learning sheet: STORMS



Concepts covered by the learning activity:

- Storm prevention: how to be ready for storms
- What to do before a storm/hurricane at home.
- What to do after a storm/hurricane at home.

Overall educational objective:

The aim of this learning activity is to learn what to do before and after a storm/hurricane at home. This learning sheet adds additional tips to ran's game about risk prevention and safety measures. In the game, the students will also find tips and recommendations to react when a storm surprises them outside in the open. In this learning sheet, however, we have focused on recommendations at home.

Expected learning outcomes:

This learning sheet has been designed to achieve general and specific learning outcomes. Learning outcomes are descriptions of specific knowledge, skills, or expertise that the learner is expected to get after finishing the activity.

In this activity, an infographic with different empty scenarios is presented. Students have to guess what steps they should follow before and after a storm if they are at home. The expected learning outcomes are:

- Students can describe the different steps to secure a house before a storm.
- Students understand the consequences of a storm and how it can affect their home.
- Students know what to do if their home has been damaged.
- Students are able to follow these steps and recommendations when a storm is approaching to their house.

Step-by-step use of the rAn serious game in the context of the learning activity:

This learning sheet complements rAn's serious game adding more tips related to safety measures especially at home. In this case, the minigame associated with the learning sheet is Learning how to react during a storm.

The minigame can be played either before or after the learning sheet. We are going to explain the activity as if the learning sheet is used before the game, but again, it can be also used after playing the minigame.

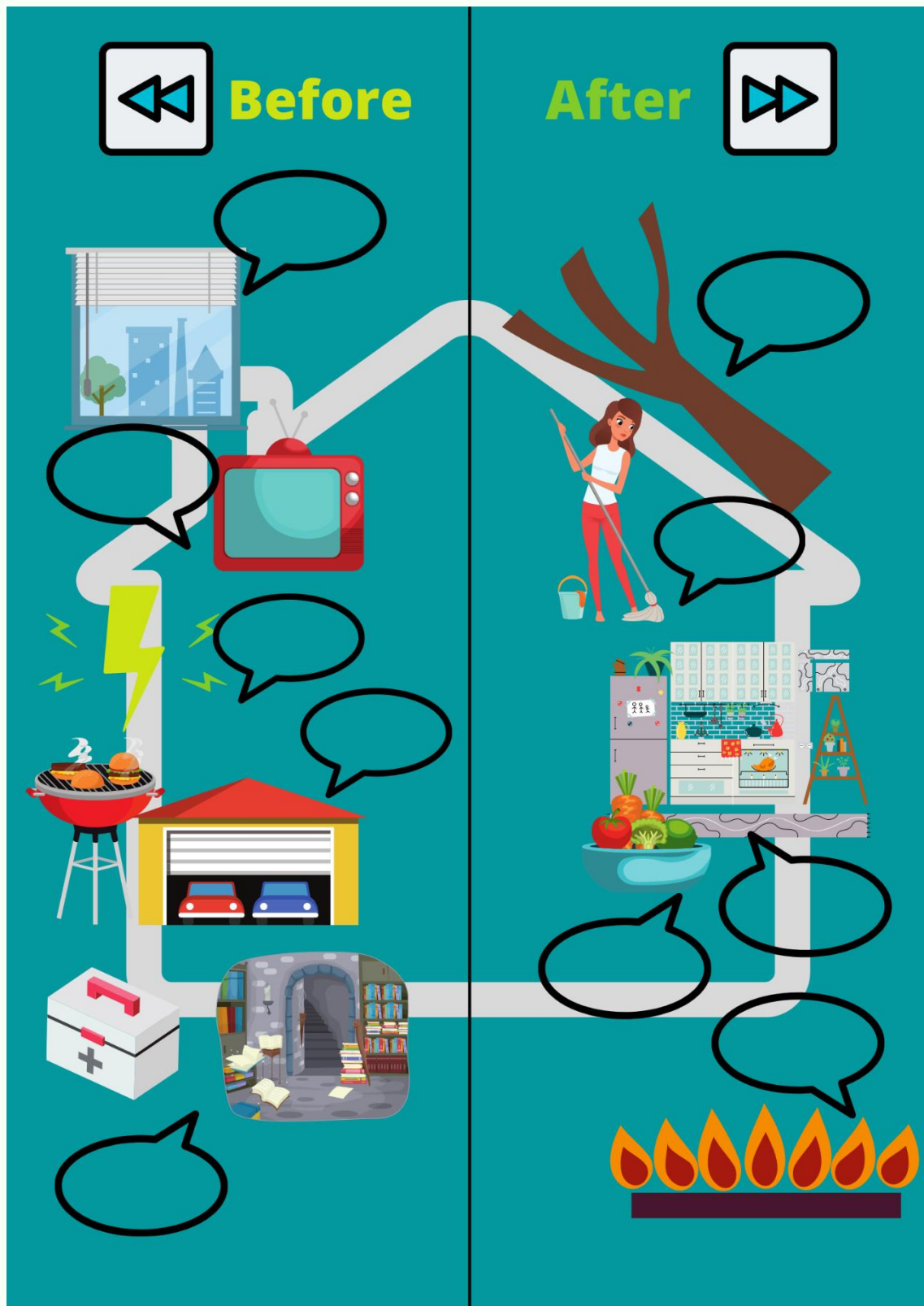
11. The teacher hands the learning sheet with the empty infographic.
12. Students are encouraged by the teacher to guess what are the actions that the characters are doing in the infographic. At this stage, students do not complete the empty spaces yet.
13. Debate in class: What should you do before and after a storm when you are at home? The teacher moderates the debate introducing information about the correct answers, helping the students.
14. After the debate, the teacher gives some time to the students to complete the empty infographic on their own.
15. Last stage of the learning activity: the teacher corrects the infographic out loud; students can also participate and share their point of view.



Assessment methods:

- Qualitative method: The teacher analyses the performance of the exercise conducted in class.
- Qualitative method: Debate with students → questions and oral interaction in the class during the learning activity. The teacher fosters debate and interventions from students.
- Quantitative method: Measured through the number of correct answers that the students have in the infographic plus rAn's serious game, playing the minigame associated with the learning sheet, in this case, the minigame with the activities, true or false.

Content source: Center for Preparedness





Answers to the infographic (answers appear in order)

Before a storm/hurricane

- Close windows and try to secure them with shutters or even other more resistant material.
- Turn on the news! It is important to know about the development of the storm and forecast predictions.
- Do you or your parents know how to turn off your gas, electricity, and water? This is important if you need to evacuate, or if the storm is damaging the system.
- If you have objects outdoor, try to secure them. Maybe you can move them to the garage or another part of the house.
- Remember to make an emergency kit with all the necessary supplies.
- Have you located in your house a shelter area? If the storm is too strong and you cannot evacuate, find a room without windows!

After a storm/hurricane:

- If your home is damaged, do not enter! Call an expert to examine the building and its safety.
- After a storm, it is common to find mold in the walls and ceilings. Remember to air the rooms and disinfect them!
- Tap water may not be safe to drink. Maybe pipes are clogged and water is infected. Listen to local warnings.
- The same happens with food. Throw away food that seems rotten or unsafe.
- Prevent carbon monoxide poisoning. Use generators, stoves, and grills outside and away from windows and doors.

Learning sheet: FLOODS



Concepts covered by the learning activity:

The goal of this scenario is to help children recognize the fundamental causes of flooding and learn basic ways of dealing with and preventing (if possible) the phenomenon.

Overall educational objective:

To promote flooding prevention and safe behaviour against the phenomenon.

- To help students realise what causes floods
- To demonstrate for students how they can tackle flooding.
- To help them realise potential dangers

Expected learning outcomes:

This learning sheet has been designed to help raise awareness about preventing and tackling floods that can occur in real life conditions. This activity will prepare children to develop the necessary knowledge in order to keep themselves safe and to act as multipliers of this useful knowledge. In addition, we aim:

1. To help children have a first acquaintance and reflection with the phenomenon.
2. To explore their previous knowledge on the matter.

3. To help children identify what facilitates and causes flooding.
4. To promote the development of critical thinking by analyzing causes, actions.
5. To help children know how to deal with emergencies.
6. To let the children understand that prevention is even more important than dealing with the phenomenon.
7. To promote teamwork, decision-making and critical-thinking.

Methods and Materials

The methods used in this teaching scenario are teamwork, brainstorming, interdisciplinary approach and storytelling.

The specific teaching scenarios last approximately 4-6 hours (180'-270') in total.

Required Materials

- ❖ 5 tablets and 5 computers or 10 tablets or 10 computers
- ❖ 1 projector
- ❖ The «rAn» digital game
- ❖ Internet connection
- ❖ Blank drawing pages
- ❖ Colored markers.
- ❖ 3D printer (optional)
- ❖ Piece of cloth
- ❖ Empty plastic bottles of soda (minimum 1.5lt)
- ❖ Some pebbles
- ❖ Pair of scissors

Children's age: 7-9 years old

Prerequisite knowledge or experiences of children



Children might already know what flooding is, how it relates to the water-cycle and which are the main causes. In addition, it is more likely that children are aware of the dangers of flooding and are expected to have some knowledge about it from discussions at school or at home. But they might not know how to behave in such an extreme situation. Besides, some of the parents of the children may be volunteers in the Civil protection of their place or they might know someone related and this is expected to help us with our subject.

In order to identify if and to what extent, children understand that flooding is a consequence of other natural phenomena, we can show a water-cycle diagram and ask them to think either individually or discuss in small groups about what they already know about about the water cycle or any other useful information that relates to water, rain and the connection of both. We can ask them to share their idea with one of their partners and then with the whole class.

For the above activity, we can use a tool to create mind maps (eg <https://www.mindmeister.com>, <https://miro.com> etc.) or draw something similar on the classroom's board.

Introductory activity

We show a video related to the water cycle and try to explain to children that in order to understand what a flood is, we should know how the water “travels around” and how this can affect our lives. We explain in a comprehensive way what the water cycle is, how water can change from a liquid state to a vapour (and back again) and how humans can measure a catching rainfall in order to be prepared for future problems. The purpose of the introductory activity is to help children understand the physical changes of the state of water and how these changes, on a large scale, affect some of the features of weather. We can wrap up the activity by running a simple experiment: sometime during the day, we can draw childrens' attention to a damp cloth spread out in a suitable place and come back to it later towards the end of the experiment and discuss with children about what they understood of what they finally happened.



Sample questions that could facilitate the discussion: “How does the cloth feel now and how it felt earlier?”, “What has happened to it?”, “Where has the water gone?”. We take children’s feedback and draw out key points and explain that the material feels drier because the water has evaporated. We could also ask children to consider how the window or mirror in the bathroom might look after a shower. Sample questions that could facilitate the discussion: “What has formed on the window or mirror?”, “Where has it come from?”, “Why does it form there?”. The teacher should explain that this is the so-called condensation and how it relates to the formation of the clouds at a larger scale.

SUGGESTED VIDEO: <https://www.youtube.com/watch?v=3T9UqTmbr0M>

Extended introductory activity

Time for action and a bit of “story-telling”. For this activity we pick the “Scratch Junior” tool either in the form of an application (App) for mobile devices (<https://www.scratchjr.org>) or in its experimental but fully functional desktop version for computers (<https://ifo8000.github.io/ScratchJr-Desktop/>). Scratch Junior will be useful as the first contact to pique the interest of children while inviting them to think in order to represent their ideas and what they learnt so far about the water-cycle, condensation and evaporation. In collaborations with the teacher, children in groups of two, could easily create a simple story regarding water-cycle and share their creations with their classmates.

Activity 1: Investigation

This activity is based on an experiential learning process. The teacher shows the following picture to the class and asks pupils if they understand what this tool is used for.

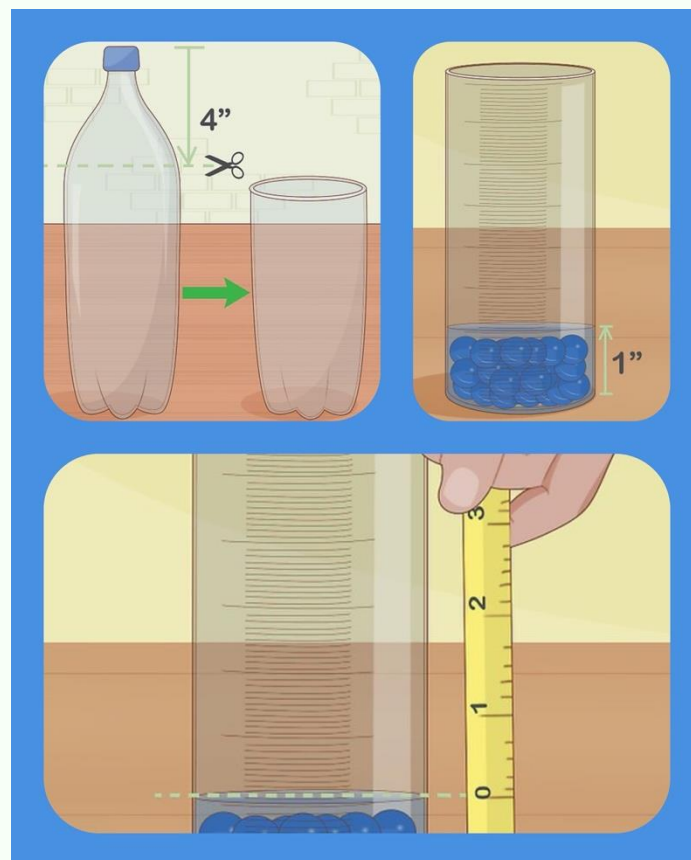


Photo source: https://www.alibaba.com/product-detail/Industry-used-tipping-bucket-rain-gauge_60537873087.html

Then, the teacher asks for ideas about how we measure rainfall and how important this could be in terms of prevention of flooding. Responses are collected and considered and then he/she suggests that children could design their own rain gauge and ask what equipment they might need as well as what kind of location would be suitable to place it. This activity could then be used as the basis for pupils to construct and test their rain gauges. Besides, giving an opportunity for using materials in the design and construction of useful tangible product (Design Technology), this experiment also provides the opportunity to children to know how to gather data and comment on its value.

The teacher could explain that even if most of the professional devices for this purpose use electronic systems nowadays, however anybody can construct their own gauge to measure rainfall at home. Children are asked to find and bring from home a clear, cylindrical plastic container such as water bottle (1,5lt) of at least 30cm tall. In addition, the shape is important because it has to be the same diameter all the way through. With help from the teacher, children will have to use scissors in order to cut the top 10cm of the bottle off. Because rain will often be accompanied by wind, children will want to steady their gauge so that it can always stay upright. For this reason, they should fill the bottom with pebbles (that won't absorb any of the water), no higher than 3cm or so. Once that will have been done, children will need to fill their container with water, to provide a level starting point for their scale. Afterwards, a scale should be inscribed upon the container and this can be achieved with a ruler and a waterproof marker. Last but not least, all the finalized gauges can be placed

under the open sky, on level ground ensuring that it has no obstructions above it. To determine how much rain will have fallen in a rainy day, the class will need to regularly check it every 24 hours! It's important to check the gauge every day even if there hasn't been any rain in order to avoid losing water from evaporation. In case of consecutive rainy days, children should empty their gauges after each "recording" to ensure an accurate reading and after that, mark the amount of rainfall on a graph or chart (eg a 6 x 6 chart on an x-axis and y-axis basis).



Activity 2: being prepared

The teacher explains to children that it is important to interpret key information, appreciate the impacts and consequences of severe weather and to plan ahead so that if severe weather conditions occur we are more prepared. This is important because children understand that floods are a natural phenomenon that doesn't "just happen", but there are reasons for this, as well as solutions.

SUGGESTED VIDEO: https://www.youtube.com/watch?v=8up66_Lelxo

Most importantly, do we all know how to be prepared against a flood or even how to react accordingly? A discussion with the class is highly recommended.

Activity 3: Create an emergency kit using Scratch or Scratch Jr

Imagine somebody needs to create an emergency kit. Which items are considered absolutely useful? Let the children discuss freely and present their ideas in plenary. After that, the teacher can ask them to create a simple game in the Scratch/Scratch Jr environment. The player will have to pick the correct items and drag them onto the emergency kit icon in order to successfully complete his/her mission.

Activity 4: Investigation

The teacher asks children to design and draw a house that they think would be good at resisting the effects of a flood. They should discuss about materials, doorways and windows positioning, height, foundations, garden, drain system, accessibility, safety features, cost etc. All the designs and drawings should be shared in the classroom and facilitate discussion.

(take a look at Activity sheet 3)

Extension activity 4: Web quest

The teacher explains to children that in a flood situation there are lots of organisations who have an involvement. However, different organisations have different roles so the teacher will ask his/her class to make a web quest in order to gather the necessary information, roles and contact info and then present all this information in a common data table.

(take a look at Activity sheet 2)

Activity 6: step-by-step use of the rAn serious game in the context of the learning activity:







At the end of all the above activities, we gather the class in the computer room of the school, where we briefly present the game "rAn", inviting them to form groups of 2 and take their seats in front of a tablet or computer (depending on the equipment available in the school at the moment). This activity is expected to last 2 teaching hours, in addition to any assessment or free discussion activity that will follow depending on the time available in each class. The use of the game, can work either as a “learning trigger” or assessment tool in relation to raising awareness of primary school children about natural disasters. The time of use of the "rAn" game, depends exclusively on the teacher and the respective learning context. In any case, the teacher should have already pre-installed the game (on a tablet or computer) prior to the activity in order to avoid losing the children's interest.






Once all the activities are completed, the children should have understood and be able to answer to the following questions:



- Are they able to recognize the danger of the phenomenon in every aspect?
- Are they able to recognize what it takes to tackle a flood?
- Do they know where and why to go in case of flood?
- In case of flood, can they take the right steps to protect themselves and help others if needed?
- Can they realize that by taking precautionary measures, it is possible to avoid the risk of flood?
- Can they work collaboratively with their classmates in order to solve problems?

Activity Sheet 1

Classify the following objects according to their importance in case of a flood and explain with your own words why they might be useful.

| Really important or Important or Useful or Not so useful | Object | Why might it be useful? Please explain. |
|--|---|---|
| |  Radio | |
| |  Rain Boots | |
| |  First-aid kit | |
| |  Torch | |

| | | |
|--|--|--|
| |  <p>Mobile phone</p> | |
| |  <p>Blankets</p> | |
| |  <p>Tinned food</p> | |
| |  <p>Batteries</p> | |
| |  <p>Hairdryer</p> | |
| |  <p>Lamp</p> | |

| | | |
|--|---|--|
| |  <p>Broom</p> | |
| |  <p>Snorkel</p> | |
| | <p>(design your own object)</p> | |

Activity Sheet 2

Find relevant information on-line about organisations that could play a role in the formation of a flood and complete the table below.

| Organization | Role | Contact information |
|--------------|------|---------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



Co-funded by the
Erasmus+ Programme
of the European Union

| | | |
|--|--|--|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |



Activity Sheet 3

Sketch a flood-resistant home and annotate your design ideas with notes alongside your drawings to give additional information such as:

- information about materials and size
- how your design would be suitable for the community
- how the design meets the specification points

Learning sheet: FLOODS - BE PREPARED



Concepts covered by the learning activity:

- The impact of floods
- How to be prepared for floods: know your local flood history, act on flood warning.
- How to act during a flood if you need to evacuate or if you need to stay.
- How to act after a flood.

Overall educational objective:

The aim of this learning sheet is to complement the information in the game and teach students the overall process of how to act before, during and after a flood.

Expected learning outcomes:

This learning activity has been designed to achieve general and specific learning outcomes. Learning outcomes are descriptions of specific knowledge, skills, or expertise that the learner is expected to get after finishing the activity.

In this activity, a learning sheet with different questions is presented. Students have to guess the answers to the questions about floods and how to be prepared. The expected learning outcomes are:

- Learners are aware of the impact of floods



- Learners have general ideas about how to be prepared for floods: local flood history, and flood warning.
- Learners increase their interest about evacuation plans in their city/region.

Step-by-step use of the rAn serious game in the context of the learning activity:

This learning sheet complements rAn's serious game adding more tips related to safety measures especially at home. In this case, the minigame associated with the learning sheet is

The minigame should be played before using this learning sheet.

16. After playing the minigame related to floods, the teacher hands the learning sheet with the empty information.
17. Students are encouraged by the teacher to guess what the answers to the questions are.
18. Debate in class: What should you do before and after a flood when you are at home? The teacher moderates the debate introducing information about the correct answers and guiding the students.

Assessment methods:

- Qualitative method: The teacher analyses the performance of the exercise conducted in class.
- Qualitative method: Debate with students → questions and discussion in the class during the learning activity. The teacher fosters debate and interventions from students.
- Quantitative method: Measured through the number of correct answers that the students have in the infographic plus rAn's serious game, playing the minigame associated with the learning sheet, in this case, the minigame with the activities.



FLOODS: BE PREPARED

BEFORE A FLOOD: KNOW YOUR LOCAL FLOOD HISTORY

HAS YOUR CITY EVER FACED A FLOOD? IF SO, WHEN AND WHY DID IT HAPPEN?

DOES YOUR REGION HAVE A SAFETY PROCEDURE IN CASE OF A FLOOD? WHERE IS THIS INFORMATION? DISCOVER BY THE LOCAL AUTHORITIES (POLICE OFFICE, FIRE STATION, MUNICIPALITY, ETC.)

IF YOU WERE TO CREATE A SAFETY PROCEDURE FOR YOUR FAMILY, WHAT WOULD BE THE MOST IMPORTANT SAFETY STEPS?

ACT ON FLOOD WARNINGS: LOOK AT THE PICTURE. WHAT TIPS WOULD YOU GIVE TO SOMEONE THAT RECEIVED A FLOOD WARNING IN THEIR CITY?





Learning sheet: WILDFIRE PREVENTION



Concepts covered by the learning activity:

The goal of this scenario is for children to learn basic ways of dealing with and preventing a fire.

Overall educational objective:

To promote wildfire prevention and fire safe behaviour.

- To demonstrate for students how they can prevent a wildfire
- To explain the role of their involvement in preventing a wildfire
- To help them realise potential dangers

Expected learning outcomes:

This learning sheet has been designed to raise awareness regarding the prevention of wildfires that can occur in real life conditions due to lack of information. This activity will prepare the kids to develop the necessary knowledge in order to keep themselves safe and to work as multipliers of this useful knowledge. In addition, we aim:

1. To help children have a first acquaintance and reflection with the subject.
2. To explore their previous knowledge on the matter.
3. To help children identify fire hazard signs and fire extinguisher signs.

4. To promote the development of critical thinking by analyzing causes, actions and proposals related to the protection of forest fires.
5. To help children know that water is the key to putting out a fire.
6. To let children know that in case of fire they should immediately call the fire department and how this can happen.
7. To help children know how to react calmly in case of fire in the house.
8. To let children understand that prevention is even more important than dealing with the phenomenon.
10. To promote collaborative work.

Methods and Materials

The methods used in this teaching scenario are collaborative work, brainstorming, interdisciplinary approach and storytelling.

The specific teaching scenarios last approximately 6-8 hours (270'-360') in total.

Required Materials

- ❖ 5 tablets and 5 computers or 10 tablets or 10 computers
- ❖ 1 projector
- ❖ The «rAn» digital game
- ❖ Internet connection
- ❖ Blank drawing pages
- ❖ Colored markers.
- ❖ Cardboard
- ❖ 3D printer (optional)
- ❖ Markers
- ❖ Toothpicks
- ❖ Soil
- ❖ Matches
- ❖ Cardboard box
- ❖ Cardboard



- ❖ Pair of scissors
- ❖ Glue

Children's age: 7-9 years old

Prerequisite knowledge or experiences of children

Children might already know what fire is and what we use it for, such as to warm ourselves in the fireplace or to light the candles on our cake, and even to burn the dry leaves. They also have basic knowledge such as that the fire lights up, it is very hot and when it goes out it emits smoke and usually ash. In addition, it is more likely that children are aware of the dangers of fire and are expected to have some knowledge about it from discussions at school or at home. But they do not know how to behave in such an extreme situation. All they know in advance is that the fire department is the one that can help in such cases. Besides, some of the parents of the children may be volunteers in the fire department of their place or firefighters themselves or they might know someone related and is expected to help us with our subject.

Introductory activity

For the introductory activity we pick the "Scratch Junior" tool either in the form of an application (App) for mobile devices (<https://www.scratchjr.org>) or in its experimental but fully functional desktop version for computers (<https://jfo8000.github.io/ScratchJr-Desktop/>). Scratch Junior will be useful as the first contact to pique the interest of children while inviting them to think in order to answer some questions that we will ask, such as:

- "What do you think of when you hear the word "fire"? (Children are asked to paint in the empty canvas of the application)
- What materials can cause a fire? (Children might look out for relevant icons in the application's panel in order to find something that can be used, if not, they will design icons of their own with the aid of the design tool)



- Who / What is to blame for the fire phenomena? (They usually pick the icon of a human figure)
- Who is at risk in case of fire? (They search and add icons with animals, people, but also plants – trees and even houses)

This way we will be able to see if they know or can immediately master the ways of using the program and if they are familiar with such applications, since they will then have to use them. In case they do not know some words (eg arson) the teacher will help them understand their meaning. The teacher can also divide into three categories the main causes of forest fires, such as:

- Natural or accidental causes.
- Arson by negligence.
- Intentional arson.

For the above activity, we can use a tool to create mind maps (eg <https://www.mindmeister.com>, <https://miro.com> etc.) or draw something similar on the classroom's board.

In order to kick-off this activity, we can show a short video about the respect we should pay to nature and especially to the forests (https://www.youtube.com/watch?v=lv3W_YlDnOs). At the point that kids get to watch the cutting of the trees we stop the video and add to the parallel discussion the word and concept of arson. After watching the video, we discuss in plenary about what they just watched and make the children think that a fire can be caused either accidentally (by natural cause like lightning) or intentionally.

Activity 1.2: Investigation

In this activity, we show a Smurfs video-episode (or any other related cartoons that usually appeals to children's interest), in which, their small village runs the danger by fire and they must quickly put it out (eg <https://www.youtube.com/watch?v=5hVavNHNrJg>). Watching the video is expected

to give rise to discussion and some concerns such as: they should not have had a fire protection plan beforehand, what preventive measures they could have taken in their village for such a phenomenon, how else could they extinguish it, etc.? The kids answer to the questions in turn. At the end of the activity and discussion, we can ask them to collaborate in order to create/draw an improvised user guide with instructions on how to prevent a possible fire in the future. Each group should also design a different instruction. In the end, the children's drawings and final designs will be photographed with a digital camera and after being imported into a computer environment, they will be converted into an e-book (PDF) which will be sent to the parents via mail.

Activity 2

In this activity we distribute to the class some activity sheets, the first (see... ..) depicts a board with six pictures showing the fire in different stages and the kids are asked to note below each picture if the fire is useful or harmful. In the second activity sheet (see.....) there are again six images that must be put in the correct chronological order of the fire phenomenon, ie from the green landscape to the tree planting, through the stage of arson or negligence, uncontrollable fire that burns the forest, the intervention of firefighters to extinguish it and so forth. This will help the children to have a better picture of this phenomenon and understand its various stages. The last activity sheet (see) shows five pictures and next to the column they are in, there is a list of words which correspond to a different image. It should be mentioned that if a child who does not know the meaning of a word will let him/her find which one may be in the picture on his/her own through a trial-error process.

Activity 3: Investigation

This activity is based on an experiential learning process. The teacher gives to the children some information about what is going to happen next and what materials will be needed. In order to better implement the activity, the children should be gathered in the school's courtyard or in any other suitable open space. Before that, however, the preparation will be done in the classroom, ie the children will cut A4



white papers in half and paint them green on one side. Then they will pierce the paper in the middle with the toothpick so as to make a hole. After that they will crumple the paper so that it becomes a ball with the painted side out. Immediately after that, they will place the toothpick in the hole and finish up the construction of the tree. Upon finishing up this construction, the class moves the trees outside to add them to the rest of the construction based on soil and natural materials (e.g. grass, leaves etc.). The children will collect some soil from the school garden creating a small hill on top of which they will place the trees. In this scene, children will observe in miniature how the fire phenomenon evolves. The teacher lights two matches in order to set the "forest" in fire with the help of two children who will have to blow imitating the power of wind. At the same time, we explain that the wind multiplies the fire so that it ignites and spreads faster. Finally, we discuss in plenary and solve any doubts about what the kids just watched happen. Possibly a useful idea would be to redesign and reconstruct the same miniature landscape, this time after discussing about preventive measures on a large scale (eg fire zones, deforestation, etc.) or on a smaller scale (avoiding the use of fire by individuals in forest areas, appropriate signage) etc. The class could gradually recreate the model of the relevant landscape after the suggested interventions.

Activity 4: Investigation

In this activity, we will use an alternative tool (Tinkercad) in order to represent the ideas that emerged during the previous activity. The teacher invites children to design and create digital objects related to fire prevention and/or prevention. Before we get into the Tinkercad app (<https://www.tinkercad.com>), we introduce them to the philosophy of 3D design, so we will watch a random video on the internet related to 3D design and show it in plenary in order to engage children in a relevant discussion. To get acquainted with the Tinkercad environment, the teacher will give them a small demonstration of its basic functions, while inviting children to experiment with free creations of their choice. This is an introductory activity and then through the Tinkercad environment children are asked to co-create fire warning signs or represent tools and means of prevention, a fire extinguisher they have first searched



the internet to see what it is like and then recreate in 3D mode. In this STEAM activity, besides discussing about issues related to the fire phenomenon, children are successfully engaged in concepts and processes of space, geometry, mathematics, estimation, design, modeling, instruction to third parties, etc in an interdisciplinary way.

Activity 5: Exploration - Consolidation

In cooperation with the local Fire Brigade, we organize their regular visit to the school so that they can talk to the children and carry out the standard fire safety exercise together. On the occasion of this visit, we will be prepared in advance. Children will be given blank pages to freely represent what they will have learned and to summarize in a brief message to all regarding the prevention and / or treatment of a fire.

Activity 6: step-by-step use of the rAn serious game in the context of the learning activity:

At the end of all the above activities, we gather the class in the computer room of the school, where we briefly present the game "rAn", inviting them to form groups of 2 and take their seats in front of a tablet or computer (depending on the equipment available in the school at the moment. This activity is expected to last 2 teaching hours, in addition to any assessment or free discussion activity that will follow depending on the time available in each class. The use of the game, can work either as a "learning trigger" or assessment tool in relation to raising awareness of primary school children about natural disasters. The time of use of the "rAn" game, depends exclusively on the teacher and the respective learning context. In any case, the teacher should have already pre-installed the game (on a tablet or computer) prior to the activity in order to avoid losing the children's interest.

Once all the activities are completed, the children should have understood and be able to answer to the following questions:



- Are they able to recognize the danger of the phenomenon in every aspect?
- Are they able to recognize what it takes to put out a fire?
- Do they know where and why to go in case of fire?
- In case of fire, can they take the right steps to protect themselves and help others if needed?
- Can they realize that by taking precautionary measures, it is possible to avoid the risk of fire?
- Are they able to look out for and recognize signs useful in case of fire (eg fire extinguisher symbol, EXIT, etc.)
- Are they able to understand the damage caused by an arson?
- Are they able to identify the flammable materials that cause a fire?
- Are they able to understand that our behavior towards the environment can affect not only us but also other organisms?
- Can they work collaboratively with their classmates in order to solve problems?



Learning sheet: WILDFIRE



Activity 1

Circle as many- safe to play without causing a fire hazard- objects as possible.



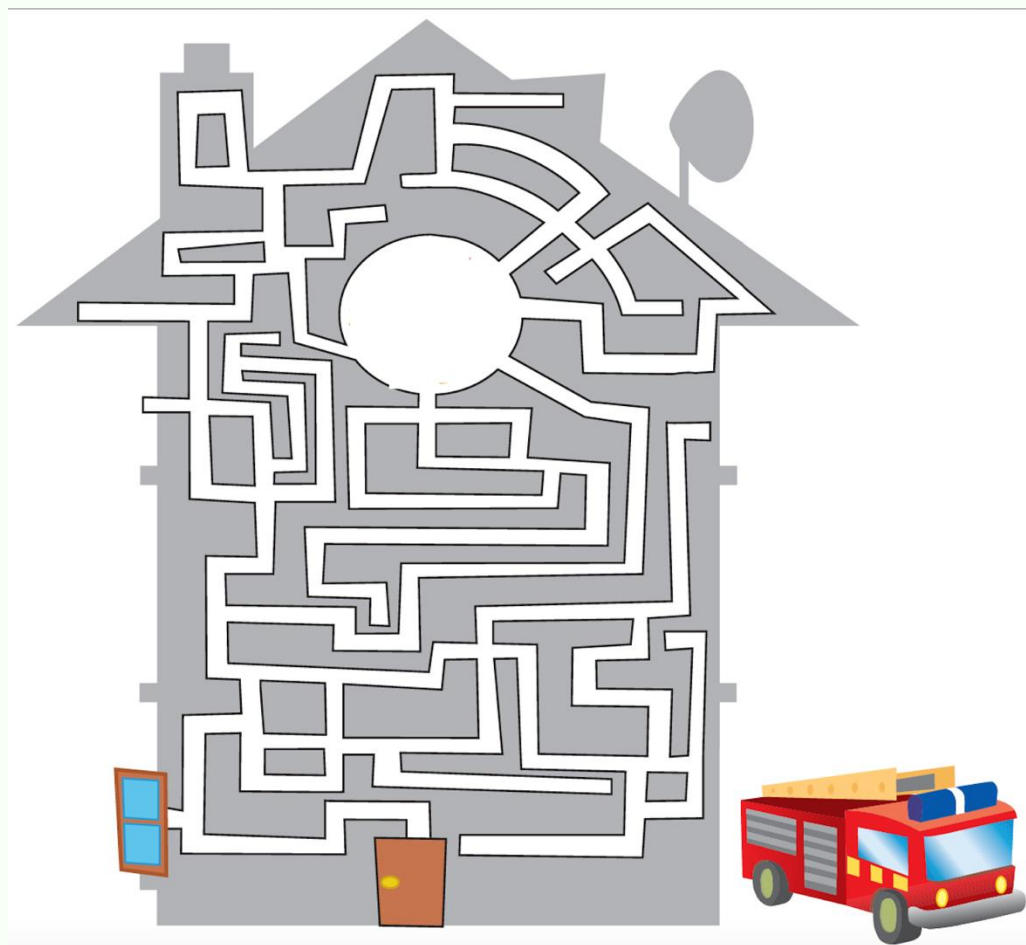
Activity 2

Look carefully at the picture and circle as many objects as possible that could cause a fire hazard if used incorrectly.



Activity 3

Start the shortest route which will lead you safely to the exit





Activity 4

In order not to look for where to go if a fire breaks out in your school, create a blueprint based on all the relevant useful points, e.g. emergency lights, fire extinguishers, etc. Do not forget that prevention saves both you and others if they need your help. So, work in group with other children to create a fire-plan of the school. Remember that this map should "speak" quickly and effectively to anyone who needs to consult it. At the end of the activity, compare all the maps that will have been created, design the final fire-plan of the class and place it in a central part of the room.



Activity 5

What should we do in case of fire? We need your help so that the 6 tips that follow and you should apply if you find yourself in a fire situation, are understood by children who can not yet read. Can you create an understandable sketch for each tip?

| | |
|--|--|
| <i>Stay away from objects that burn or may cause fire.</i> | |
| <i>We never play with a lighter or matches. If it happens and we find something like that, we immediately give it to someone bigger</i> | |
| <i>If your clothes catch fire, you fall to the floor and start rolling "like a barrel" until the fire goes out.</i> | |
| <i>In case of fire and intense smoke, we proceed by crawling as low as we can and under the smoke so that we do not get dizzy and have the best possible visibility.</i> | |



| | |
|--|--|
| <i>Always have in mind an escape route and a safe predetermined meeting point with your parents and / or other people. Even better if you have a makeshift map with all the possible routes and emergency exits.</i> | |
| <i>If I see smoke and / or flames coming out of nowhere that I suspect, I contact the Fire Department (199) or I quickly notify an older one.</i> | |