



Climate Change and Natural Disasters

TOPIC FLOOD

Deliverable: O2/A3: Lesson plans



STEM4CLIM8

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Executive Summary

In a recent OECD survey (OECD- Education and Skills Today 2018), covering 25 European countries, almost all countries report shortfalls of skills that teachers need to meet school needs, combined with difficulties in updating teachers' skills. However, digitisation is expected to profoundly change the way we learn and work. Many children entering school today are likely to end up working in jobs that do not yet exist. Preparing students for these uncharted territories means that we not only have to make sure that they have the right technical capabilities but that we must strengthen their emotional and social skills. Resilience, the individual capacity to overcome adverse circumstances and use them as sources for personal development, lies at the core of being able to successfully adapt to change and thus actively engage with our digital world. At the same time, we need to acknowledge Internet addiction and behaviours at risk of IAB (Internet Addiction Behaviour) as emerging problems for our youth. A STEM approach bridging physical computing with environmental consciousness while focusing on off-screen collaborative activities is an excellent way of improving technical capabilities while strengthening emotional and social skills.

STEM4CLIM8 has as primary objective to produce approaches and tools to help those working with children reach out to them with a view to help them engage with programming and develop STEM related skills. It aims to achieve this not by increasing screen time but by encouraging hands on play through the creation of a custom virtual world using Minecraft modding and the execution of missions dealing with natural disasters and using physical computing blocks which will be programmed to interact with the virtual world through the Raspberry GPIO. The missions will reveal the science behind natural phenomena frequently associated to climate change and inspire environmental consciousness while at the same time enhance STEM skills.

Reference:

*OECD- Education and Skills Today, Succeeding with resilience-Lessons for schools, January 29, 2018, Retrieved February 18, 2021 from: <https://oecdutoday.com/succeeding-with-resilience-lessons-for-schools/>

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1. Introduction

1.1 Brief Description

This lesson aims to support and enhance classroom lectures on topic of floods as a natural disaster. The goal is to raise awareness and educate on preparedness for floods, which can reduce its disruptive impacts on communities.

2. Lesson Information

2.1 Main Subject Domain

Environmental Education, Earth Sciences, Meteorology

2.2 Connection to other subject domains:

Engineering, Geography, Geology

2.3 Keywords

Floods, Natural Disasters

2.4 Age Range / Grade Level

Grade 5-6

2.5 Didactical Hours:

120 minutes (3 40-minute lessons)

2.6 Learning Objectives and Expected Outcomes

Students will learn about:

- how floods occur
- relationship of floods with climate change and other natural disasters
- what are the impacts of floods in the physical environment
- what is the human impact of major floods
- How to prepare for floods

2.7 Main Skills involved / acquired competences:

Students during this lesson will demonstrate the following 21st Century Skills:

- Information Literacy: Students will be using informational books to gather further information on floods.
- Media Literacy: Students will use console and Minecraft explaining floods in an effective and easy way to understand.
- Communication and Collaboration: students will work in groups to do activity.
- Creativity and Innovation will also be key in Minecraft.

3. Lesson Contents

3.1 Lesson Procedure

In this lesson, students will study what floods are and perform activities to investigate the role of soil and topography in floods.

Start by asking them some questions in order to measure their prior knowledge and to reveal their alternative conceptions, if any:

- What are floods?
- What causes floods?
- Are there floods in your area?
- Are floods becoming more common?

Ask your students to talk with their families to gather information about the historical evolution of floods.

Then, share this video with your students:

<https://www.youtube.com/watch?v=4PXj7bOD7IY>

Let the class discuss the questions above.

Activity 1: Flood and Soil types

In this activity, students will study how different types of soil have different capacities for retaining rainwater.

Materials Needed:

- Three soil samples: sand, clay, and potting soil
- Water
- Measuring cups
- Funnel
- Filter paper (used for coffee filtering)
- Support for the filter

Procedure:

- Divide the students in groups. Hand each group equal amounts of the three types of soil
- Fill the funnel lined with filter paper with one type of soil. Do not overflow the filter paper with soil (use about 80% of the capacity). Place a measuring cup below the funnel.
- Pour a fixed amount of water (200 ml is enough) through the funnel. Measure how much of the water has passed through the filter.
- Repeat the experiment for the other two types of soil and compare the amounts of water collected.

- Now, repeat the experiment with the soil types in saturated state. To saturate the soil, pour water in the samples until no more water passes through the filter.
- With the samples saturated, pour water in the funnel and observe what happens.
- Discuss with the class which soil held the most water when dry and which saturated soil held the most water. Which type of soil would be most likely to cause flooding problems?

Activity 2: Simulating a flood

In this activity, students working in groups will build a small model of a river and its tributaries, and observing the effects of increased water flow in the river banks. Then, students will place some levees in the rivers and observe how these control the flow of water, preventing floods.

Materials Needed:

- a large flat container or tray with sides, such as an aluminum baking pan
- a sufficient amount of modeling clay to cover the bottom of the pan
- water
- drawing paper
- pencils

Procedure:

- Sketch a rough map of a river that will run from one end of the pan to the other, at least 3 cm wide. Add some tributaries that will feed into the river as it heads downstream.
- Cover the bottom of the container with clay and build a model of the river map. Ensure that the river banks are approximately 1 cm deep.
- With the container laying flat on a table, pour some water (no more than 500 ml) in the tributaries and river. Have the water level at around half of the depth of the main river.
- Incline the container slightly so that the water runs downstream. Observe how the tributaries feed into the river, increasing the depth of the water as it flows. Now pour more water into the top part of the model, simulating an increase in rain at the river head. Observe what happens.
- Empty the water and build some levees. About two-thirds of the way down the main river, build walls approximately 3 cm high on both sides of the river, narrowing it to less than 2 cm.
- Discuss with you colleagues what should happen now that there are levees in the system.
- Pour water again in the top part of the container and observe what happened. Compare it with the previous case with no levees.

Activity 3: Flood mitigation and preparedness

Materials Needed:

- STEM4CLIM8 Console
- Minecraft Education Edition
- STEM4CLIM8 "Floodina" Minecraft Education World

This world targets to instruct students about floods, how to be prepared for them, and how to prevent them.

Please follow the instructions described in the "STEM4CLIM8 Minecraft Worlds Scenario and Tips for Educators" document.

3.2 Questions/Assignments

After performing the activities, you may ask some of the following questions:

- What factors cause rivers to flood?
- What happens to the physical environment when flooding occurs?
- What is the human impact of major floods?
- How to prepare for a flood?

3.3 Learning Variabilities

Visual impaired students will benefit if they have access to audio descriptions of the images presented during the activities.

3.4 Assessment and Evaluation

Teachers can assess the student's achievements in multiple ways. In addition to quizzes about the lesson's contents, teachers can also include the participation in the practical activities, and creativity in completing the Minecraft World scenario.

3.5 Links to supportive materials and ICT tools

<https://thefloodhub.co.uk/ks2-flooding-lessons-access/>

<https://weather.com/safety/floods>