Teachers' Card

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General Introduction

The "active mining in Minecraft" toolkit is a longer exercise that fits best as a homework or project-style exercise done over a few days. As a challenge and a competition, the students create groups to get together and build and explain a real mine in the game Minecraft. The objective can be based around one or several given real mines in the world that the students should copy to the best of their ability in Minecraft. A presentation is done after the creation stage and then a winner can be decided!

Key words:

Mining, exploration, sustainability, waste, entrepreneurship, creativity

Extended background information

Minerals and metals are important in our daily lives, without minerals extraction and metal refining, we would not have houses, cars, phones, airplanes, or other objects we rely on every day. Minerals and metals are found in the bedrock under our feet, and they are extracted in mines. Recycling processes allows to recover some minerals and metals, yet their consumption and demand is higher than the amount that we technically can recycle with current technology. Therefore, we still need to mine new raw material in order to sustain our way of life.

Mining activities are often done in large scale industries, with massive machines and high-tech facilities to maximize efficiency. There are also certain concerns related to environmental and climate effects, for example the way waste is handled and what machines are used to transport material.

Mining is important, it gives us the materials we need to produce all kinds of goods. In this toolkit, students are introduced to mining and how mining is carried out. They get to see how different facilities in the mine look, what kind of scale it has as well as how it effects the landscape and environment. They also get to follow the steps from a rock to a metal we can use in products.

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Learning Outcomes

By the end of the lesson the students will be able to:

- Recognize the different facilities connected to a mine, such as an open pit, a shaft of an underground mine, a tailings dam, waste rock dumps etc.
- Outline the mining cycle and explain the way from rock to metal concentrate in a mine based on real world examples
- Prepare a 3D model of a real mine within the game Minecraft, constructing the different parts by distinguish them from information gathered from the internet, such as maps, satellite images, photos, documentation etc.

Key Competence European Framework

Literacy competence
S1. Ability to understand and interpret concepts, feelings, facts or opinions in oral and written form.
S2. Ability to express concepts, feelings, facts or opinion in written and oral form.
S3. Ability to interpret the world and relate to others.
S4. Ability to interact in an appropriate and creative way in any situation.
Digital competence
S1. Critical use of information technology for work
S2. Basic skills in ICT
S4. Ability to use and handle technological tools and machines
Personal, social and learning to learn competence
S1. Ability to pursue and persist in different kinds of learning.
S2. Identifying available opportunities.
Citizen competence
S1. Ability to effective interaction with other people
S2. Ability to adapt to the changing situation, being flexible and work under pressure
S3. Ability to work effectively and collaborate with other team members
Cultural awareness and expression competence
S1. Ability to turn idea into action
S2. Creativity/innovation
S3. Ability to plan and manage tasks
S4. Independence, Motivation and Determination

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United Nations' Sustainable Development Goals

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice.

	Enable access to basic services		Equal access to global expertise
	Safe medical devices	✓	Sustainable urbanization
	Access to education	✓	Responsible consumption and production
	Less hardship, more opportunities		Strengthen resilience, reduce disaster impact
✓	Safe and affordable water	✓	Reduce marine pollution
✓	Energy – the golden thread	✓	Sustainable use of terrestrial ecosystems
✓	Safety of workers and economic growth		Promote peaceful and inclusive societies
✓	Resilient infrastructure and sustainable industrialization		Better access to technology and innovation

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Learning Pathway

To complete the exercise in this toolkit, about two to three days should be allocated. The students can either work in a classroom or at home. The students will work by looking for information on the internet, such as maps, satellite images, photos and other documentation as well as work in Minecraft to build their mines. During the preparation phase, students should be given access to Minecraft licenses in case they do not already have these. If all students do not have a Minecraft account and license, students can take turns to build the mine.

If several students in a given group have access to Minecraft, they need to be able to connect to each other as a group. These can be done by starting servers on the game. Follow the link below for tips:

https://help.minecraft.net/hc/en-us/articles/360058525452-How-to-Setup-a-Minecraft-Java-Edition-Server

The students could use the modification BetterGeo for this exercise, as it gives more options in relation to rocks, minerals and rocks. Instructions on how to download the modification (free) and how to install and use it can be found on: www.bettergeoedu.com

Step 1- Preparations, Minecraft:

If necessary, set up the appropriate Minecraft server and hand out licenses for students to start the game ahead of the toolkit competition. Divide students into groups of 1-5 students.

Step 2- Preparations, Mines:

Find a few real mines for the groups to work with. You can either find a few yourself and give them to different students or let them find the mines themselves by searching the internet. Google maps is a good place to start for finding mines.

Step 3- Starting the competition, lecture, 30 minutes:

To start the competition, it is highly recommended that the teacher prepares a short lecture on mining and the different stages of a mining operation. This will help students in the way they will build their mines and also how they will present for each other when they are done.

Step 4- Building, 2 days:

Students are handed over their mines and are allowed to start building. The building phase could take a few hours or a few days, but it is recommended that students get a lot of time for this stage. They should work independently in groups but may need to be able to contact the teacher if they

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are having issues. Certain rules should be set up for the challenge, for example that students cannot use other modifications for the game other than the BetterGeo modification.

Step 5- Presentations:

When the time is up for the challenge, students present their mine replicate to the rest of the class. This can be done by screen sharing the Minecraft session on a projector and describing the different facilities. Groups should show the path of extracted rocks from the mine to the refine product. The best mine replicate and presentation wins!

Evaluation

The assessment should be done through the presentation as well as a few short questions after the competition. We recommend:

- What different facilities can you find in a mine? List a few!
- Describe the path from rock to metal or refined concentrate metal? What are the different steps?
- What kind of scale does a mine have? Is there a different scale in different mines? (check the scale of the legend in your map)
- What kind of technology does a mine use?

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