



Case Study: Building a Sustainable World in Minecraft – A High School Science Collaboration

In this advanced study unit, a group of high school students majoring in science embarked on a project to create a sustainable world using Minecraft. The students worked in cooperation with sister schools in Germany and the Czech Republic, as well as their chemistry teacher, to explore renewable energy sources, with the primary goal of building a functional, environmentally sustainable society in the game.

The project was designed to engage students in collaborative learning, combining science with creativity. The chemistry teacher played a key role in guiding students on how to conduct research by identifying scientifically sound sources, evaluating their credibility, and sharing findings with group members.

Project Overview: Sustainability through Energy Choices

The Minecraft world was designed to simulate real-world environmental and geographical challenges. Students were tasked with choosing the best possible energy source for their virtual society, keeping in mind sustainability, efficiency, and ecological impact. Solar energy and hydropower were the two main energy sources considered, but students were encouraged to explore new developments in renewable energy as part of their research. The final decision on which energy source to use was made through a debate followed by a vote.

Exploring Energy Sources: Solar vs. Hydropower

Solar Energy

The students first investigated solar energy, starting with the basics: how solar panels convert sunlight into electricity. They identified three benefits of solar energy: it is renewable, abundant in many areas, and produces no direct emissions. However, they also discussed the downsides, such as its inefficiency in cloudy or shaded regions and the initial high cost of solar panel installation.

In their Minecraft world, the students analyzed different geographical areas to determine where solar panels would be most effective. They found that while solar energy would work well in open, sunny areas, it would not be as reliable in regions with less sunlight, such as those near mountains or dense forests.

Hydropower

Next, the students explored hydropower, researching how electricity is generated by using water flow. They listed three advantages: it is renewable, highly efficient, and can provide consistent energy in areas with reliable water sources. However, they also noted limitations, including the environmental impact of building dams and the



dependence on consistent water flow, which can be affected by drought or seasonal changes.

In their Minecraft world, the students identified rivers and lakes as ideal locations for hydropower stations. They discussed how the geography of the world—mountainous regions with flowing rivers—made hydropower a practical choice for certain areas, but less feasible in regions without adequate water resources.

Critical Questions and Group Debate

To guide their decision-making process, the students posed several critical questions, such as:

- What makes an energy source renewable or non-renewable?
- Why is it important to prioritize renewable energy sources in their Minecraft world?
- How does climate and geography affect the feasibility of solar energy vs. hydropower?

Students researched the latest developments in both solar and hydropower technologies, discovering advancements like more efficient solar panels and smaller, environmentally-friendly hydropower systems. They discussed how these innovations could be applied to their Minecraft world.

The Debate and Final Decision

The class then held a debate to determine which energy source was best for their Minecraft society. Groups representing solar energy and hydropower presented their findings, weighing the ecological impact, efficiency, and practicality of each energy source. They also considered factors such as geography, available resources, and future scalability.

After a lively discussion, the students voted. Hydropower was ultimately chosen as the main energy source for their Minecraft world due to its consistency in providing energy in areas with abundant water flow, although solar energy was implemented in sun-rich areas to complement the hydropower system.

Outcomes and Reflections

The project taught students valuable lessons about energy sustainability, critical thinking, and teamwork. By simulating real-world energy challenges in Minecraft, they gained a deeper understanding of the complexities involved in choosing sustainable energy sources. The collaboration with international sister schools further enriched their experience, providing diverse perspectives on global environmental challenges.



This study unit showcased how Minecraft can be used as an educational tool to foster creativity, collaboration, and scientific inquiry, while also addressing real-world problems like sustainability and renewable energy use.