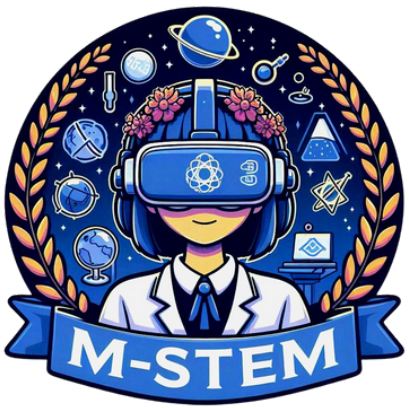

MSTEM

LESSON PLAN - SCIENCES

METAVERSE-BASED STEM EDUCATION FOR A SUSTAINABLE AND RESILIENT FUTURE

2023-1-FR01-KA220-SCH-000151516

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Purpose of Lesson:

The purpose of a lesson on Climate Change and Technological Solutions is to educate students about the causes and effects of climate change while exploring innovative technologies that can help mitigate its impact.

Description of Lesson:

This lesson provides an in-depth exploration of climate change, its causes, and its global impact, while highlighting technological innovations designed to mitigate its effects. Students will engage in discussions about greenhouse gases, global warming, and environmental consequences such as extreme weather, rising sea levels, and biodiversity loss.

The lesson will then shift focus to technological solutions, including renewable energy sources (solar, wind, hydro, and geothermal), carbon capture and storage, sustainable agriculture, green transportation, and smart city innovations. Through case studies, multimedia resources, and hands-on activities, students will analyze real-world applications of these technologies.

By the end of the lesson, students will gain a deeper understanding of climate challenges and be inspired to explore how science and technology can drive sustainable solutions. The lesson encourages critical thinking, innovation, and environmental responsibility, equipping students with knowledge and ideas for future climate action.

Lesson Teaching Method:

To effectively engage students and enhance their understanding of climate change and technological solutions, a combination of interactive and student-centered teaching methods. The aim is for students to create **immersive experiences/virtual worlds** that show the impacts of climate change, such as melting glaciers or rising sea levels.

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Lesson Objectives:

- Understand the causes and consequences of climate change on the planet.
- Explore data on climate change and its relationship with factors such as temperature and gas emissions.
- Use technological tools to analyze and propose solutions to mitigate the impacts of climate change.
- Foster the ability to work with scientific data and simulations

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Lesson Plan

1.Introduction (15m)

- Initial Activity:
  - Start the class with a brief introduction to what climate change is, addressing its main causes (greenhouse effect, deforestation, pollutant gas emissions) and the main global effects (global warming, melting of the polar ice caps, extreme weather events).
- Questions for reflection:
  - Ask students what they know about global warming and its consequences. Let them reflect on how human actions are contributing to the problem.
  - Use images or short videos of extreme weather events (such as hurricanes, droughts, floods) to illustrate visible impacts and generate discussion.

2.Development (50m)

Part A: Scientific Research and Data Analysis (20 minutes)

- Climate Data Exploration:
  - Present students with graphs and charts showing the increase in global temperature over the past 100 years. Show how scientists monitor these changes using data from satellites and weather stations.
  - Use data analysis software, such as Excel or Google Sheets, to help students visualize and interpret climate data. They can look for trends in rising average temperatures, changes in sea levels, and more.

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Group Activity:
Divide students into groups and assign each group a set of climate data (average global temperature, CO2 levels, sea level variation, etc.).
Students should create graphs and charts to visualize the data and identify patterns of change. Ask them how these changes might affect different regions of the world.

Part B: Technological Solutions and Engineering Projects (30 minutes)
Exploration of Green Technologies:
Introduce the concept of green technologies, such as solar panels, wind turbines and electric cars, and how they can help mitigate climate change.
Show videos or animations about how these technologies work and how they contribute to reducing carbon emissions.
Practical Activity in Groups:
Each group will be responsible for designing a technological or structural solution to help combat the effects of climate change. They should think about how technology can be used to reduce CO2 emissions, generate renewable energy or improve the energy efficiency of buildings.
Using paper, recycled materials or modelling software such as Tinkercad, groups should create a model or mock-up of the solution they have developed. This could be an idea such as a sustainable house, a small wind turbine or a homemade solar panel.
Challenges and Discussion:
After groups present their projects, discuss how their solutions could be applied in the real world. What challenges and limitations would they face in implementing these solutions? How could these technologies be scaled to meet global needs?

3. Conclusion (15m)

- Presentation of Projects:
  - Groups present their solutions to the rest of the class. They should explain how their idea can help mitigate the impacts of climate change and how technology was used in the process.
- Final Reflection:
  - Conclude with a discussion of how science, technology, and engineering can work together to combat climate change.
  - Ask students what they can do in their daily lives to contribute to sustainability and environmental preservation.
- Closing:
  - Propose a small challenge: what actions can students implement in their school or community to reduce their carbon footprint and raise awareness about climate change?

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Lesson table

Lesson Plan	
Introduction (15m)	Opening Question: Start with a thought-provoking question: • "What do you think is the biggest environmental challenge our planet faces today?" • "How do you think technology can help solve climate change?
Development (50m)	Causes of Climate Change Effects of Climate Change Class Discussion Technological Solutions
Conclusion(15m)	Recap the main topics covered: causes/effects of climate change, technological solutions, and student ideas. Discuss how students can contribute (e.g., reducing waste, supporting renewable energy, advocating for policy changes).

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Lesson resources

Lesson resources:

- Computers or tablets with access to spreadsheet software (Excel or Google Sheets).
- Internet access for researching climate data and educational videos.
- Recyclable materials for building prototypes (paper, pens, scissors, glue, etc.).
- Projector for presentations and viewing graphics and videos.

Resources used to create the lesson:

Websites and Online Resources:

NASA - Climate Change and Global Warming

Link:https://climate.nasa.gov

Summary:NASA provides a wealth of resources on climate change, including interactive graphics, scientific data, and educational videos, which can be used to teach about the impact of global warming.

National Geographic - Climate Change

Link:https://www.nationalgeographic.com/environment/climate-change

Summary:National Geographic offers a series of articles, videos and infographics on the impact of climate change on the planet, covering everything from global warming to extreme weather events.

The Guardian - Climate Change

Link:https://www.theguardian.com/environment/climate-change

Summary:Up-to-date news and articles on global warming, environmental policies and technological innovations that help combat climate change.consumerism and climate change.

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Work and homework

Homework:

As an extension activity, ask students to create a climate change awareness campaign using the solutions they developed, with the goal of sharing information with other classes or the school community

Evaluation/ Assessment:

- Participation:Evaluate student participation in data analysis and technological solutions development activities.
- Data Analysis:Check students' ability to interpret climate data correctly and draw relevant conclusions.
- Creativity in the Project:Evaluate the creativity and feasibility of the solutions presented by the students.
- Collaboration:Observe how students work as a team to develop their solutions and how they communicate their ideas.

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Evaluation and indicators

Observing student engagement in discussions, Q&A, and brainstorming activities

Evaluation and Indicators Specifics	
Expected Outcomes	Students will understand the causes and effects of climate change.
Assessment Methods	Class Discussions & ParticipationObserve student involvement in discussions about climate change causes, effects, and technological solutions. Measure their ability to engage with and contribute to the conversation. Indicator: Active participation and relevant contributions. Group Work (Climate Tech Challenge)Evaluate students' teamwork, creativity, and critical thinking while developing their technological solutions. Indicator: Effective collaboration, innovative ideas, and clear presentation of the solution
Success Indicators	Students can accurately explain the causes and effects of climate change.Students analyze climate issues and propose practical, feasible technological solutions.

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Overview of the lesson

This lesson explored the complex issue of climate change and examined innovative technological solutions that can mitigate its effects. Students gained a solid understanding of the causes and consequences of climate change, such as global warming, rising sea levels and extreme weather events. The class also presented various technological solutions aimed at reducing carbon emissions, promoting sustainability and adapting to environmental challenges

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