Teacher Preparation Lesson Plan

Subject Area: Science
Unit Title: Exploring Global Warming and its Impact on the Great Barrier Reef
Grade Level: 9
Lesson Number: 1 of 10

Duration: 60 minutes
Date: March 12, 2024
Teacher: Ms. Jane Smith
Room: Science Lab

Curriculum Standards Alignment

Content Standards:

- Understand the concept of global warming and its causes
- Explain the impact of global warming on the Great Barrier Reef
- Describe the carbon cycle and its role in global warming

Skills Standards:

- Analyze data and information related to global warming
- Evaluate the opinion of the speaker(s) in unsupported extended talk
- Apply understanding of the carbon cycle to real-world scenarios

Cross-Curricular Links:

- English: Reading and writing about global warming
- Math: Analyzing data related to global warming
- Geography: Understanding the impact of global warming on the environment

Essential Questions & Big Ideas

Essential Questions:

- What is global warming and how does it affect the Great Barrier Reef?
- What are the causes and consequences of global warming?
- How can we reduce our carbon footprint and mitigate the effects of global warming?

Enduring Understandings:

- Global warming is a pressing issue that affects the environment and human societies
- The carbon cycle plays a crucial role in global warming
- Human activities can contribute to or mitigate the effects of global warming

Student Context Analysis

Class Profile:

- Total Students: 25
- ELL Students: 5
- IEP/504 Plans: 2
- Gifted: 3

Learning Styles Distribution:

- Visual: 40%
- Auditory: 30%
- Kinesthetic: 30%

Lesson Objectives

Learning Objectives:

1. Analyze the impact of human activities on the carbon cycle and its relationship to global warming
2. Evaluate the opinion of the speaker(s) in unsupported extended talk on the topic
3. Apply understanding of the carbon cycle to real-world scenarios
4. Create a visual representation of the carbon cycle

Lesson Introduction

Hook: Show a video or image of the Great Barrier Reef, highlighting its beauty and importance
Introduction: Introduce the topic of global warming and its effects on the reef, asking students to share their prior knowledge and opinions on the subject

Teaching Script

Introduction (5 minutes)

- Show a video or image of the Great Barrier Reef
- Introduce the topic of global warming and its effects on the reef
- Ask students to share their prior knowledge and opinions on the subject

Direct Instruction (20 minutes)

- Explain the causes of global warming, including the carbon cycle and human activities
- Use a diagram or graphic to illustrate the carbon cycle
- Encourage students to ask questions and participate in a class discussion

> **Engagement Strategies:**
>
> - Think-pair-share
> - Class discussion
> - Graphic organizer

Guided Practice (20 minutes)

- Provide students with a diagram of the carbon cycle
- Ask students to label and explain each stage of the carbon cycle
- Circulate to provide guidance and support

> **Scaffolding Strategies:**
>
> - Graphic organizer
> - Think-aloud protocol
> - Peer support

Guided Practice

Activity 1: Carbon Cycle Diagramming

- Provide students with a diagram of the carbon cycle
- Ask students to label and explain each stage of the carbon cycle
- Circulate to provide guidance and support

Activity 2: Carbon Cycle Simulation

- Divide students into small groups
- Provide each group with a set of scenario cards related to the carbon cycle
- Ask each group to simulate the carbon cycle and discuss the effects of human activities

Independent Practice

Beginner Activity: Carbon Cycle Worksheet

- Provide students with a worksheet on the carbon cycle
- Ask students to label and explain each stage of the carbon cycle
- Allow students to work independently

Intermediate Activity: Carbon Cycle Research

- Provide students with a list of research questions related to the carbon cycle
- Ask students to research and answer the questions
- Allow students to work in pairs or small groups

Advanced Activity: Carbon Cycle Debate

- Divide students into small groups
- Provide each group with a topic related to the carbon cycle
- Ask each group to research and debate the topic

Conclusion

Summary:

- Global warming is a pressing issue that affects the environment and human societies
- The carbon cycle plays a crucial role in global warming
- Human activities can contribute to or mitigate the effects of global warming

Reflection:

- What did students learn about the carbon cycle and global warming?
- How can students apply their understanding of the carbon cycle to real-world scenarios?
- What are some potential areas for further study or research?

Assessment

Formative Assessment:

- Observe student participation during guided and independent practice
- Review student worksheets and research papers
- Use a rubric to assess student understanding of the carbon cycle and global warming

Summative Assessment:

- Administer a quiz or test to assess student understanding of the carbon cycle and global warming
- Use a rubric to assess student projects or presentations
- Collect and review student self-assessments and reflections

Subject Knowledge

Key Concepts:

- Global warming
- Carbon cycle
- Greenhouse effect
- Climate change

Key Vocabulary:

- Greenhouse gases
- Fossil fuels
- Deforestation
- Renewable energy

Extended Knowledge

Real-World Applications:

- Rising sea levels and coastal erosion
- Changes in precipitation patterns and drought
- Increased frequency and severity of natural disasters
- Impact on human health and well-being

Interdisciplinary Connections:

- Science: biology, chemistry, physics
- Math: data analysis, graphing
- English: reading, writing, speaking
- Geography: human impact on the environment

Common Errors

Student Misconceptions:

- Global warming is only caused by human activities
- The carbon cycle is not affected by human activities
- Climate change is not a pressing issue

Teacher Misconceptions:

- Assuming students have prior knowledge of the carbon cycle
- Not providing sufficient scaffolding for struggling students
- Not allowing for enough time for independent practice

Common FAQ

Frequently Asked Questions:

- What is global warming?
- What is the carbon cycle?
- How does human activity affect the carbon cycle?
- What can we do to reduce our carbon footprint?

Answers:

- Global warming is the gradual increase in the overall temperature of the Earth's atmosphere
- The carbon cycle is the process by which carbon is exchanged between the atmosphere, oceans, land, and living things
- Human activity, such as burning fossil fuels and deforestation, can increase the amount of greenhouse gases in the atmosphere, leading to global warming
- We can reduce our carbon footprint by using renewable energy, reducing energy consumption, and protecting natural habitats

Objectives

Learning Objectives:

1. Analyze the impact of human activities on the carbon cycle and its relationship to global warming
2. Evaluate the opinion of the speaker(s) in unsupported extended talk on the topic
3. Apply understanding of the carbon cycle to real-world scenarios
4. Create a visual representation of the carbon cycle

Success Criteria:

- Students can explain the carbon cycle and its role in global warming
- Students can evaluate the opinion of the speaker(s) in unsupported extended talk
- Students can apply their understanding of the carbon cycle to real-world scenarios
- Students can create a visual representation of the carbon cycle

Vocabulary

Key Vocabulary:

- Greenhouse gases
- Fossil fuels
- Deforestation
- Renewable energy
- Carbon cycle
- Global warming
- Climate change

Definitions:

- Greenhouse gases: gases that trap heat in the atmosphere, such as carbon dioxide and methane
- Fossil fuels: energy sources formed from ancient plants and animals, such as coal, oil, and natural gas
- Deforestation: the clearance of forests, usually as a result of human activities such as agriculture or urbanization
- Renewable energy: energy that comes from natural resources that can be replenished over time, such as solar or wind power
- Carbon cycle: the process by which carbon is exchanged between the atmosphere, oceans, land, and living things
- Global warming: the gradual increase in the overall temperature of the Earth's atmosphere
- Climate change: a long-term change in the Earth's climate, such as a change in temperature or precipitation patterns

Resources

Textbooks and Articles:

- National Geographic: Climate Change
- Science Daily: Global Warming
- IPCC Report: Climate Change 2020

Online Resources:

- NASA: Climate Change
- NOAA: Global Warming
- EPA: Climate Change

Visual Aids:

- Diagrams of the carbon cycle
- Graphs of global temperature trends
- Images of the effects of climate change