



STEM

PLAYGROUNDS & SUSTAINABILITY

How can we design a playground that is not only fun to play on, but also good for the environment?

Elementary

How can we design a playground that is not only fun to play on, but also good for the environment?

<p>Next Generation Science Standards (NGSS)</p>	<p>ESS3.C, ESS3.B, LS2.A, ETS1.B, ETS2.A</p>
<p>Materials Needed</p>	<p>See below</p>
<p>Phenomenon</p>	
<p>Engage</p>	<ul style="list-style-type: none"> • Activity: Show students images or short videos of green playgrounds in Germany and discuss the features (e.g., trees, plants, shaded areas, water features). • Guiding Question: "What makes these playgrounds different from the ones you know, and why might they be better for the environment?" • Purpose: Spark curiosity and introduce the idea of sustainable design in urban environments.
<p>Explore</p>	<ul style="list-style-type: none"> • Explore Images of Green Playgrounds: Show a variety of images of green playgrounds from Germany. Ask students to identify features like trees, grass, and water features. • Class Discussion: Ask students to think about what these features might do to help the environment (e.g., providing shade, reducing heat, supporting animals). <ul style="list-style-type: none"> ◦ "What happens to the temperature when there are more trees around?" ◦ "How do plants and trees help animals?" ◦ "Why do you think cities in Germany use green spaces like this in their playgrounds?"
<p>Featured Sources</p>	<ul style="list-style-type: none"> • Green Playgrounds in Germany: Sustainability in Urban Spaces. (2020). Sustainable Cities Report. Retrieved from [https://www.sustainablecitiesreport.com] • Biodiversity and Urban Playgrounds. (2019). European Green Spaces Journal. Retrieved from [https://www.europeangreenspacesjournal.com]
<p>Explain</p>	<ul style="list-style-type: none"> • Discuss the concept of urban heat islands and how traditional playgrounds with asphalt and concrete can contribute to higher temperatures in cities. • Introduce the concept of sustainability and biodiversity: Explain how green playgrounds support ecosystems by providing habitats for plants and animals. • Discuss how green spaces can reduce stormwater runoff, help cool cities, and support better air quality
<p>Create a Prototype</p>	<ul style="list-style-type: none"> • Students will work in small groups to design a green playground prototype. They will create a 3D model or a sketch of their playground that incorporates features like trees, grass, water features, or shaded areas. • They should include at least three features that contribute to sustainability or help the environment. Students can use materials such as paper, cardboard, natural elements (twigs, leaves), and scissors to create their models.
<p>Elaborate</p>	<p>Understand: Students will research their choice of modern problem that needs reforming. They will research the problem; and how people, institutions and governments are trying to take action.</p> <p>Assess: They will determine which course of action to advocate for.</p> <p>Act: They will share their findings and recommend action through a short PSA-style video.</p>
<p>Evaluate</p>	<ul style="list-style-type: none"> • Have students present their designs to the class, explaining the features of their green playgrounds and the environmental benefits of each. • The class can vote on the most creative, environmentally-friendly design.

Phenomenon

In many cities around the world, urban heat islands are becoming a big problem, where areas with lots of buildings and concrete are hotter than surrounding areas. In Germany, cities are designing green playgrounds to help cool down these urban spaces, provide outdoor play opportunities, and protect local plants and animals.

Target Grade Level: 3

Target Course: Science, technology, engineering, art, and math

Inquiry Overview

Discovering and Designing a Green Playground

In this lesson, students will:

- Learn about sustainable playgrounds and green spaces in Germany.
- Design a playground that incorporates eco-friendly features.
- Present their design ideas to the class.

Teacher Background Information

1. Green Playgrounds:

- Definition: Green playgrounds are outdoor play areas that integrate nature, including plants, trees, natural materials (like wood, stones, and sand), and sustainable practices, into the design of the playground. These playgrounds aim to provide a more natural environment for children to explore and play, which is healthier for both the kids and the planet.

2. The Concept of "Nature Play":

- Nature play emphasizes free, unstructured play outdoors in natural environments. It's based on the idea that children benefit from engaging with the natural world by fostering creativity, physical activity, and a stronger connection to nature.

3. Importance of Green Spaces:

- Green spaces, like parks and playgrounds, are essential for children's physical, emotional, and cognitive development. They encourage outdoor activity, reduce stress, improve air quality, and support biodiversity.

4. Green Playgrounds in Germany:

- Germany is known for its environmental consciousness and innovative urban planning. Many cities in Germany have designed green playgrounds that focus on sustainability, ecological balance, and the importance of integrating nature into everyday life. For example, cities like Berlin and Hamburg have playgrounds that blend plants, trees, and water features into play areas.
- These playgrounds are often built using eco-friendly materials, and many incorporate features like rainwater harvesting, composting, and recycling stations to teach children about sustainability.
- Some example to refer to: Spielplatz im Stadtpark (Hamburg), Kleine Anomalie Playground (Berlin), Playground at the IBA Hamburg (Hamburg), and Freibad Grünberger (Munich).
- <http://www.hamburgerstadtpark.de/spielen/spielen.htm>
- <https://www.visitbalve.de/en/free-time/families-kids/playgrounds-village-squares>

Teacher Background Information Cont'd

5. Environmental Education in Germany:

- In Germany, environmental education is often incorporated into early childhood education programs, encouraging children to understand concepts like sustainability, conservation, and the importance of protecting the environment from a young age.

6. Benefits of Green Playgrounds:

- **Physical Benefits:** Play in green spaces encourages active play, outdoor exploration, and physical exercise.
- **Mental Health:** Natural environments help reduce stress and promote emotional well-being.
- **Educational Benefits:** Green playgrounds can also be learning environments where children learn about the environment, plants, and animals.

7. Sustainable Design Principles:

- Green playgrounds often incorporate principles of sustainability, such as using recycled materials, creating habitats for wildlife, and conserving water. Understanding these concepts is important for teaching children how human activities can impact the environment and why it's important to be responsible caretakers of the Earth.

Additional Points to Consider:

- **Cultural Context:** Germany is a leader in environmental sustainability, and its commitment to eco-friendly infrastructure. It could be an important factor to help students grasp the idea that different countries approach sustainability differently.
- **Children's Connection to Nature:** Many children in the US today spend less time outside and more time on screens. Green playgrounds can be used as an opportunity to inspire a love for nature and the outdoor and alternative to how they may spend the majority of their day

Suggested Time Frame

1-2 hours for initial design, plus additional time for refining and presenting

Concept List

- Playing outside in nature
- How trees and plants help the Earth
- Taking care of our planet
- Why parks and green spaces are important
- Some vocabulary: Green Playgrounds, sustainability, environment, community, outdoor play, and Germany

Materials Needed

- Paper (for sketching and drawing)
- Markers, crayons, or colored pencils
- Rulers or measuring tapes
- Recyclable materials (cardboard, plastic bottles, caps, string, etc.) for model making (optional)
- A large piece of chart paper or poster board for group planning (optional)
- Computers or tablets (for research or digital design, if available)

Featured Sources

- Green Playgrounds in Germany: Sustainability in Urban Spaces. (2020). Sustainable Cities Report. Retrieved from [<https://www.sustainablecitiesreport.com>]
- Biodiversity and Urban Playgrounds. (2019). European Green Spaces Journal. Retrieved from [<https://www.europeangreenspacesjournal.com>]

Next Generation Science Standards (NGSS) / State Content Area Standards

- ESS3.C: Human Impacts on Earth Systems
 - Grade 3 Focus: "Human activities can affect the world around us in both positive and negative ways. Cities, agriculture, and human activities can impact the environment, and understanding how these activities influence systems is essential for making responsible decisions."
 - Relevant to the lesson: Designing green playgrounds involves understanding how human activities (like building playgrounds) can affect the local environment. Students will explore how green playgrounds help improve the local environment by cooling the area, increasing biodiversity, and reducing pollution.

Outcomes for Student Learning

- Understand the concept of green playgrounds and how they differ from traditional playgrounds.
- Recognize the environmental benefits of green playgrounds, such as reducing heat and supporting biodiversity.
- Explore the idea of sustainability and how green spaces can help communities in Germany (and elsewhere).
- Design and build a simple prototype of a green playground that addresses the needs of the environment and the community

Germany-Related Learning Goals

- Students will learn about green playgrounds in **Germany**, exploring how these playgrounds are designed to support the environment (e.g., reducing urban heat, fostering plant and animal life) and the community.
- Students will explore **sustainable design** in urban environments, particularly focusing on the role of green spaces in cities like Berlin, Hamburg, or Munich.
- Students will understand the importance of **biodiversity** and how green playgrounds can provide habitats for local plants and animals.

Phenomenon / Main Problem

In many cities around the world, urban heat islands are becoming a big problem, where areas with lots of buildings and concrete are hotter than surrounding areas. In Germany, cities are designing green playgrounds to help cool down these urban spaces, provide outdoor play opportunities, and protect local plants and animals.

- **Main Question:** How can we design a playground that is not only fun to play on, but also good for the environment?

Engage

- Show students pictures or short videos of green playgrounds in Germany, such as playgrounds that feature plants, trees, grassy areas, water features, and natural materials instead of concrete
- Discuss the difference between traditional playgrounds (asphalt, metal) and green playgrounds (plants, grass, trees).
- Ask students: What do you notice about these green playgrounds? How do they look different from the playgrounds you know?

➤ Anticipated Guiding Questions

- What makes a playground “green”?
- How do green playgrounds help the environment?
- Why is it important to have plants and trees in playgrounds?
- How could a green playground help make a city cooler and more comfortable?
- What are some things we could add to our playground to make it more sustainable and eco-friendly?

Explore

- **Observation Walk:** Take students on a brief walk around the school or classroom to observe features of their playground. Have them note areas that could benefit from more greenery, such as shaded spots or places that feel hot.
- **Group Exploration:** Provide students with a set of images and simple descriptions of green playgrounds from Germany. Ask them to explore what features they see in these designs and how each feature benefits the environment (e.g., shade, water management, biodiversity).

➤ Featured Sources

- Green Playgrounds in Germany: Sustainability in Urban Spaces. (2020). Sustainable Cities Report. Retrieved from [<https://www.sustainablecitiesreport.com>]
- Biodiversity and Urban Playgrounds. (2019). European Green Spaces Journal. Retrieved from [<https://www.europeangreenspacesjournal.com>]

Explain

- Teacher Explanation:
 - Explain the concept of urban heat islands and how green playgrounds help cool down the environment.
 - Introduce the idea of biodiversity and how green spaces in cities can provide a home for different types of plants and animals.
 - Discuss the benefits of sustainable design, including reducing pollution, improving air quality, and providing natural play areas for children.

Create a Prototype

- **Design Challenge:** Students work in small groups to design their own green playground.
 - Provide materials like paper, crayons, cardboard, and nature-based items (e.g., leaves, twigs) to build their designs.
 - Students should incorporate at least three features of green playgrounds they learned about (e.g., trees, grass areas, water features, shaded spaces, animal habitats).
 - Encourage students to think about how their design helps the environment (e.g., cooling the air, providing homes for animals).
- **Prototype Creation:** Students will create simple prototypes of their green playground using the materials available. These could be drawings, models, or dioramas.

Elaborate

Understand: Discuss how the designs students created are similar to green playgrounds in Germany. How do their designs help make the playground more sustainable and eco-friendly?

Assess: Ask students to consider how their playground designs could help the community in terms of both play and environmental benefits. What improvements could they make to their designs?

Have students complete a quick reflection worksheet: "One thing I learned about green playgrounds is..." and "One thing I would change about my design to help the environment more is..."

Act: Encourage students to take action in their school or community to make a space more sustainable, such as planting a tree, organizing a clean-up, or discussing green spaces with their families.

Evaluate

- Have students present their designs to the class, explaining the features of their green playgrounds and the environmental benefits of each.
- The class can vote on the most creative, environmentally-friendly design.

Virtual Exchange

Connecting with German Students: If possible, connect with a classroom in Germany (or another international school) via video conference. Share designs and discuss green playgrounds in both countries.

- **Question to Explore:** How are green playgrounds in Germany different from those in your community? What ideas can we share to make our playgrounds better for the environment?

Career Connection Exploration

- Introduce students to the idea that people design parks, playgrounds, and green spaces to improve cities and the environment.
- Discuss careers in urban planning, landscape architecture, and environmental science that involve designing sustainable, green spaces.
- Invite a guest speaker (local park designer or landscape architect) to talk about their job and how they create green spaces for communities.

Modifications for Differentiation

- Visual Learners: Use diagrams, photos, and videos to demonstrate green playgrounds.
- Hands-on Learners: Offer a variety of materials (e.g., blocks, cardboard, fabric) to build the models and prototypes.
- Language Support: Provide vocabulary cards with pictures to support ELL (English Language Learner) students with new vocabulary.
- Group Work: Have students work in pairs or small groups for brainstorming and model-making to provide peer support.
- Challenge for Advanced Learners: Encourage advanced students to research specific environmental issues related to playground design (e.g., water conservation techniques, urban heat islands) and incorporate that into their design.



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