

Biological Science

Adaptations of Living Things

Year 5 Unit of Inquiry

Planeteers Game-based Learning Platform

Science and Technology, Arts, Math and Engineering

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Outcomes and Content

Science and Technology

Curriculum Content Code: ACSSU043

Learning Outcomes

Explore general adaptations for particular environments; Identify how living things adapt to suit their environment in different ways

Standards: Adaptations of Living Things

1. How does the environment affect living organisms?
2. How do organisms' traits help them survive in different environments?
3. What happens to organisms when the environment changes?
4. How do animals and plants adapt and survive in their particular habitat?
5. How do we take care of plants and animals in our community?
6. How can we prevent plants and animals from going extinct?
 - Explain that living things have structural features and adaptations that help them to survive in their environment
 - Explain that organisms' traits can be influenced by the environment
 - Infer that body structures help animals and plants adapt and survive in their particular habitat
 - Discuss the interaction among living things
 - Describe some types of beneficial interactions among living things
 - Appreciate the importance of each living thing to the environment

Mathematics & Engineering

STEAM Curriculum Code: ED 1.1 | ED 1.2

Learning Outcomes

Construct 3-D simple and complex structures using geometric shapes/blocks, polygons; select appropriate materials to meet a design need

Standards: Geometry and Design Process for Innovation

1. What shapes should be used in creating useful products such as garden beds and animal pens for species conservation?
 - Reason with shapes and their attributes
 - Apply design thinking to build and create real world projects
 - Build products that use appropriate elements and parts

Arts & Photography

STEAM Curriculum Code: AP1.2

Learning Outcomes

Take photos of flora and fauna to survey animals and plants in the community

Standards: Photography and Journal Writing

1. How do you effectively take photos to capture different species and their environment?
 - Demonstrate understanding of the use of a camera and journal
 - Apply different techniques of taking photos such as using a camera flash, zoom, and shutter
 - Write captions for the photos taken

Social Studies

Learning Outcomes

Support activities and practices for sustainable development

Standards: Civic Efficacy and Well-being

1. How can plant and animal conservation be sustainable?
2. How do we encourage and organize plant and animal conservation in our community?
 - Develop a plan to conserve crucial plants and animals
 - Develop community awareness about plant and animal extinction and conservation

Unit Summary

Grade:

5

Subject:

Science, Technology,
English, Arts and Math

Duration:

1 week (50 minutes/day)

Syllabus Mapping:

- Evolution and Biodiversity
- Geometry
- Photography & Journal Writing
- Design Assessment and Making

Integration:

- Science
- Mathematics
- Arts
- Engineering
- Technology

Outcomes:

ACSSU043

Inquiry and Focus Questions:**Driving Question:**

With the impending threats of population decline among crucial plants and animals, how can you protect and conserve this species to prevent extinction in the next decades?

Science and Technology Inquiries:

- How does the environment affect living organisms?
- How do organisms' traits help them survive in different environments?
- What happens to organisms when the environment changes?
- How do animals and plants adapt and survive in their particular habitat?
- How do we take care of plants and animals in our community?
- How can we prevent plants and animals from going extinct?

Mathematics and Engineering Inquiries:

- What shapes should be used in creating useful products such as garden beds and animal pens for species conservation?

Social Studies Inquiries:

- How can plant and animal conservation be sustainable?
- How do we encourage and organize plant and animal conservation in our community?

Learning across the Curriculum:**Cross-curriculum priority**

- Sustainability
- Environmental Awareness

General Capabilities

- Teamwork & Collaboration
- Critical & Creative Thinking
- ICT Capability
- Numeracy
- Literacy
- Community Awareness

Skills Focus:**Working Scientifically**

- Communicating
- Questioning and predicting

Design and Production

- Researching and planning
- Design and innovation
- Producing, implementing, testing, refining

Skills Focus:

This unit of investigation explores concepts from the core science standards for biological sciences, with a focus on adaptations of living things, particularly animals and plants. Students use an individual inquiry-based approach to explore solutions to a multi-layered real-world question. They experiment with a number of in-game tasks to survey species in the community. They also design, test and refine effectiveness of materials used in building garden bed and an animal pen as part of species conservation. They learn about sustainable practices in preventing plant and animal extinction. They take action in improving their own and others' social and environmental wellness.

Teaching, Learning & Assessment Activities

NOTE: 'Quest Game Activity' describes activities that happen in-game while 'Unplugged' occur outside the game

Lesson 1: Project Orientation and Research

Summary: Teacher discusses the importance of each living thing to the environment. As part of the project-based lesson, the teacher poses a challenge on the threats to animals and plants and their possible extinction if not addressed. Students are tasked with researching possible consequences of this phenomena to the ecosystem at a larger scale. As part of the research, students learn about ways to protect and conserve species in their community, such as building innovative animal pens and garden beds.

Assessment: Quiz about adaptations of living things (10 minutes)

Unplugged Activity: *Driving Question (15 minutes) – Brainstorm (Guided)*

Begins with a discussion about the adaptations of living things and the different levels of biodiversity in different habitats, especially for animals and plants.

Teacher says, "According to Princeton University, habitat loss remains the main driver of extinctions, but it may act synergistically with other drivers such as over-harvesting and pollution, and in the future, climate change. Extinction can disrupt vital ecological processes such as pollination and seed dispersal, leading to cascading losses, ecosystem collapse, and a higher extinction rate overall."

Teacher poses driving questions for the students to investigate and discover possible solutions:

Q. With the impending threats of population decline among crucial plants and animals, how can you protect and conserve their species to prevent extinction in the next decade?

Science and Technology Inquiries:

- How does the environment affect living organisms?
- How do organisms' traits help them survive in different environments?
- What happens to organisms when the environment changes?
- How do animals and plants adapt and survive in their particular habitat?
- How do we take care of plants and animals in our community?
- How can we prevent plants and animals from going extinct?

Mathematics and Engineering Inquiries:

- What shapes should be used in creating useful products such as garden beds and animal pens for species conservation?

Social Studies Inquiries:

- How can plant and animal conservation be sustainable?
 - How do we encourage and organize plant and animal conservation in our community?
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Lesson 1: Project Orientation and Research (Continued)

Project Orientation (5 minutes)

- Teacher introduces the project and relates it to the discussion outcomes
- Teacher divides the class in research groups (recommend 4-6)
- Provides project guide and overview of the timeline of activities and assessments to students (organized by lesson)

Research and Design Journal (20 minutes)

- Students research, watch documentary videos, and read infographics about plant and animal extinction and the potential detrimental effects of the declining population of crucial species.

Science and Technology Inquiries:

- How does the environment affect living organisms?
- How do organisms' traits help them survive in different environments?
- What happens to organisms when the environment changes?
- How do animals and plants adapt and survive in their particular habitat?
- How do we take care of plants and animals in our community?
- How can we prevent plants and animals from going extinct?

Mathematics and Engineering Inquiries:

- What shapes should be used in creating useful products such as garden beds and animal pens for species conservation?

Social Studies Inquiries:

- How can plant and animal conservation be sustainable?
- How do we encourage and organize plant and animal conservation in our community?

- Students brainstorm, draft their design and plans on a sheet of paper or project journal**

** If teachers run out of time in the lesson to meaningfully allocate time for this exercise, students can be given the design plan during extra time.

Lesson 1 Assessment Ideas

Teachers should consider different assessment options throughout the project phases, including for example:

1. Pre-test adaptations of living things
2. Quality of student research and project journal
3. Design assessment and reasoning, problem solving
4. Group skills, time management, collaboration
5. Project works (later lessons)
6. Photo Essay (later lessons)

Lesson 2: Surveying and Prototyping

Introduction to the Lesson

Teacher guides the students in identifying animals and plants in different habitats. Students explore, survey and take photos of the different plant and animals, within the game. They identify materials that can be used to build an innovative animal pen and garden bed to help protect and conserve certain plant and animal species. The students may also survey animal species in the Polar Cap continent of the game. Based on their design plan from lesson 1, students can start prototyping within the game. They should be able to explain the innovation and the usefulness of their creation.

Teacher-Led Unplugged Activity (10 minutes)

- Teacher gives an overview of lesson goals, and reiterates the driving question.
- Teacher gives students the opportunity to ask questions before beginning their prototype.

Guided Game Quest Activity (30 minutes)

Exploration using the Game Camera

1. Students explore the area and have a photo survey of the different plants and animals they see around.
2. They may also survey other species found on the Polar Cap continent in the game.
3. Students should name the photos of various plants and animals they've taken.

In-Game Prototype:

1. Use the Builder tool to make an inventory of blocks and construct an innovative animal pen and garden bed.
 - Ideally, the pen and the bed should be multi-layered, observe appropriate height, and include animal and/plant-friendly structure.
 - They may also use the *Painter tool* to color their creation.

Documentation using Game Camera and Mission Journal:

- Using the Camera, students should take pictures of their prototype animal pen and garden bed at different stages of construction.
- Later, in lesson 5, the photos will be used in their reflection and assessment i.e. they will create a photo essay about their project.

Lesson 2 Assessment Ideas

Teachers should consider different assessment options throughout the project phases, including for example:

1. Quality of student research and project journal
2. Literacy and photography skills, specifically for the Mission Journal
3. Design assessment and reasoning
4. Time management, collaboration, problem-solving skills
5. Engineering approach, including aspect, sizes, structure and other considerations students should describe/explain

Lesson 3: Testing and Refining

Introduction to the Lesson

Students test and refine their animal pen and garden bed by discovering different textures in the Builder tool, adjusting height, size, and structure. With consideration of the social and environment impact of potential extinction to the community, students should explain and consider campaigns on how to protect and conserve crucial animal and plant species.

Teacher-Led Unplugged Activity (10 minutes)

- Teacher gives an overview of lesson goals, and reiterates the driving question.
- Teacher gives students the opportunity to ask questions before they begin testing and refining their prototype.

Guided Game Quest Activity (30 minutes)

Refining the Prototype:

1. Using the game's Builder Tool, students should spend time to finish their innovative animal pen and garden bed.
2. When their prototype is completed, students should test their construction by planting crops in their garden bed, using the *Farming tool* in game.
3. They should also grow and farm animals, and place them inside the animal pen they made.
4. Students should explain their reasoning behind refining the design in their project journal.

Documentation using Game Camera

- Students should take pictures of their prototype at different stages of construction.
- They should take photos to illustrate how they refined their designs based on the animals and plant they grew.
- Later, in lesson 5, the photos will be used in their reflection and assessment i.e. they will create a photo essay about their project.

Lesson 3 Assessment Ideas

Teachers should consider different assessment options throughout the project phases, including for example:

1. Quality of student research and project journal
2. Literacy and photography skills, specifically for the Mission Journal
3. Design assessment and reasoning, including material uses and reasoning in relation to functionality and its benefit to the community
4. Creativity, time management, collaboration, problem-solving skills
5. Engineering approach, including aspect, construction, and other considerations that the student should describe/explain
6. And specifically for Lesson 3:
 - Design changes to improve functionality based on students' observation and analysis
 - Their reasoning and explanation for making these changes

Lesson 4: Project Finalization

Introduction to the Lesson

Teacher explains the social and environmental impact of declining populations of crucial species. Teacher presents the possible detrimental effects of plant and animal extinction in the community, especially in the next decades. Teacher highlights the importance of protecting and conserving these species.

Teacher-Led Unplugged Activity (10 minutes)

- Teacher gives an overview of lesson goals, and reiterates the driving question.
- Teacher gives students the opportunity to ask questions before using game to finalize their design/project.

Game Sandbox Activity (30 minutes)

Final Project

1. Use the Builder tool to make any final improvements to the composition, parts, sizes, and structure of the animal pen and garden bed.
2. Students should finalize any additional design strategies to ensure effective protection and conservation of these species.

Documentation using Game Camera

- Students should take photos to illustrate and record their final designs.
- Later, in lesson 5, the photos will be used in their reflection and assessment i.e. they will create a photo essay about their project.
- With their project complete, students should write captions for each photo taken using the *Mission Journal*.
- They should explain the usefulness of their innovative animal pen and garden bed, especially in protecting and conserving plant and animal species.

Lesson 4 Assessment Ideas

Teachers should consider different assessment options throughout the project phases, including for example:

1. Quality of student research and project journal
2. Literacy and photography skills, specifically for the *Mission Journal*
3. Design thinking and reasoning
4. Creativity, time management, collaboration, problem-solving skills
5. Engineering approach, including aspect, construction, and other considerations that the student should describe/explain
6. And specifically for Lesson 4:
 - Final project design, including all components based on their own merit
 - Explaining changes and modifications to their prototype and why they made them

Lesson 5: Presentation and Reflection

Introduction to the Lesson

Teacher asks the students to write about their project and design assessment using the game's photo essay tools.

Game Sandbox Activity (30 minutes)

Photo Essay

1. Using the game's Mission Log, students finalize their photo essay about the project.
2. In the photo essay, students should organize and name photos by activity and stage of the project, and insert them into their essay.
3. For example, some questions students might be asked to answer in their photo essay, may include:
 - How does the environment affect living organisms?
 - How do organisms' traits help them survive in different environments?
 - What happens to organisms when the environment changes?
 - How do animals and plants adapt and survive in their particular habitat?
 - What conservation practices must be done to revive population decline of endangered animals and plants?
 - How do we take care of plants and animals in our community?
 - How can we protect and conserve plant and animal species?
 - How can we prevent plants and animals from going extinct?
 - What are some crucial plants and animals that are currently threatened?
 - What are the threats faced by plants and animals in your community?
 - How can plant and animal conservation be sustainable?
 - How do we encourage and organize plant and animal conservation in our community?
 - What shapes should be used in creating useful products such as garden beds and animal pens?
 - How many blocks and what kinds of blocks were used?
 - What were the differences in design considerations and materials for each? And why?
 - What changes did you make after the initial prototype and why?
 - What else would you have done, or do differently if you had more time?

Assessment: Post-test about adaptations of living things (10 minutes)

Final Assessment

1. Photo essay
2. Post-test
3. Previous assessments made during the other lessons

Teacher Handy Links and Resources

From Us to You!

- Read the National Geographic's resource library on 'endangered species'. [READ HERE.](#)
- Read about species biodiversity and its impact on the natural environment. [READ HERE.](#)
- Read about the importance of animals and plants in human life. [READ HERE.](#)
- Read about 12 things to do to promote wildlife conservation. [READ HERE.](#)
- Check out this infographic on 10 actions to take to protect endangered species. [SEE HERE.](#)

Other Multimedia Resources

- Watch this basic explanation on animal and plant adaptation. [WATCH HERE.](#)
- Natural and artificial ecosystems are home to many biological interactions. Check this video out to know more. [WATCH HERE.](#)
- Why is biodiversity so crucial to the living world? TED-Ed explains. [WATCH HERE.](#)
- UN reports that the unprecedented decline in nature is caused by, and is threatening, humanity as we know it. [WATCH HERE.](#)
- The World Wildlife Fund International (WWF) shares how we can save our planet and all living species with it. [WATCH HERE.](#)

Other Reference Material

- Australian Curriculum (ACARA) Science Sequence of Content F-6: Strand [READ](#)

Support & Help

Please feel free to contact the STEAM Craft Edu team for any inquiries or support needs

Email: education@steamcraftedu.com