LESSON PLAN: Save the Species Challenge

Description
During this lesson, participants work in teams and use their skills as communicators, researchers, collaborators and creative problem-solvers to assist governments in developing plans to help protect species in designated areas. This lesson fits well into Project Based Learning curriculum done in multiple sessions or as a single-day design event for a large or small group (in school or during an out-of-school time program).

Grade Levels
7 and up

Duration
One four-hour session
OR
Four to six 50-60 minute sessions

Tech Tip
Innovation Design Process

Objectives
- Create solutions that address the needs of a protected area.
- Refine ideas based on feedback from another team.
- Present a solution in a way that defines the problem, describes how the solution addresses the problem and tells an impact story.

Standards Connections

Middle School
NGSS - Engineering Design Standards (ETS)
MS-ETS1-1 Defining a design problem that includes multiple criteria and constraints.
MS-ETS1-2 Evaluating competing design solutions using a systematic process.
CCSS Language Arts - Speaking and Listening
(1) Engage effectively in a range of collaborative discussions with:
- Diverse partners (7th).
- Topics and issues (8th).

(4) 7&8: Share a summary presentation by:
- Focusing on salient points.
- Including relevant details, facts and examples.
- Using appropriate eye contact, adequate volume and clear pronunciation.

High School
NGSS - Engineering Design Standards (ETS)
HS-ETS1-1 Analyze a major global challenge using criteria and constraints that account for societal needs and wants.
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
HS-ETS1-3 Evaluate a solution to a complex problem based on prioritized trade-offs that take into account reliability, social and cultural impacts.

CCSS Language Arts - Speaking and Listening
(1) 9&10: Initiate and participate in collaborative discussions on topics and issues by building on others' ideas and expressing their own clearly and persuasively.
(4) Present information concisely and logically so an audience can follow the line of reasoning, organization and substance.

Materials

- Recording materials (one set per team)
  - Recording/posting/work surface white board, poster board, wall or window
  - Sticky notes (three colors)
  - Marker appropriate for the work surface
  - Pencils and pens
- One laptop for additional research

Prep

- Download and read through four animal student booklets (shark, orangutan, rhino, and red knot).
- Download and view slides.
- Download and watch SmartParks videos.
- Gather laptop for presenting slides to class.
- Create teams of 3-6 students so there are an even number of teams (2 to 4) working on each of the four species.
- Example: 32 students form teams of four. There are two teams working to help each animal (shark, orangutan, black rhino, red knot).
- Print a copy of one booklet for each participant.

Lesson

Four-Hour Session Option

Below is the timing guide for running this design challenge in four hours at your location. There are a few key features to this process that will be elaborated upon in the timing guide below.

25 min Slides: 1-10	**Introducing the challenge** • Welcome participants and seat them in their working groups. • Communicate schedule for the day and establish any norms for your group. SLIDE 2 • Describe The Tech for Global Good Program. SLIDE 3 • Ask a warm-up question: Share one word that comes to mind when you think about protecting species or the environment. SLIDE 4 • Share basic background on the relationships between species and the environment. SLIDES 5-6 • Take questions. • Frame the design challenge. SLIDES 7-9 ◦ *You and your team run an animal conservation foundation based out of [your city] that develops innovative technology and policy plans to help save endangered and threatened animals. Your team will use your skills as communicators, researchers, collaborators and creative problem-solvers to assist governments and communities in developing plans to help create more sustainable environments for animals and humans.* • By the end of the day - poster presentation. SLIDE 10

30 min
 	
Slides: 11-12
	Brainstorming and researching SLIDES 11-12
	• Jigsaw reading.
	  ◦ Half the team reads each information section for their team's animal.
	  ◦ Team shares out what they learned and asks questions with teammates.
	• Frame Brainstorm. (For suggestions on structuring a brainstorm session see Tech Tip: Brainstorming.) SLIDE 12
	• Brainstorm session.
	  ◦ Let teams brainstorm; encourage anything and everything.
	  ◦ Have teams review ideas and pick or combine ideas to focus on.
	  ◦ Possible facilitation questions:
	  • *What do you already know about this topic?*
	  • *What challenges will you need to confront in order to help solve this problem?*
	  • *Who are the best people to work with to help address this problem?*

32 min Slide: 13	**Create Solutions** SLIDE 13 • Teams start developing the first iteration of their solutions.
20 min Slide: 14	**Feedback** SLIDE 14 • Explain "Listen and Help" feedback protocol. • Pair up teams that are designing for the same species — assign one team as team A and the other as team B. • Keep time for all groups.
30 min Slide: 15	**Break**. If running a four-hour session, we suggest having food for participants during this break.

55 min
 	
Slides: 16-18
	Iterating on Solutions SLIDE 16
	• Teams develop the second iteration of deliverables. SLIDE 16
	  ◦ Incorporate feedback from "Listen and Help" protocol and any new thoughts.
	• Show the SmartParks Solution and Impact videos. SLIDE 17
	  ◦ Analyze these with the participants to be clear on expectations for their final work.
	• Work time. SLIDE 18

35 min Slides: 19-20	**Presenting** SLIDES 19 - 20 • Presentations (Half and half gallery walk, each group presents to the rest of the group). • Feedback from others (if applicable, e.g.,other students, invited adults).

13 min
 	
Slide: 21
	Closure SLIDE 21
	• Have students answer the slide questions on an index card.
	• Wrap up the day.
	  ◦ Pull out one thread you noticed as a facilitator from student work and questions.
	  ◦ Let participants know that they can use their booklet to share about today's design session.

50 - 60 Minute Sessions Option

Day 1: Setting the Stage (50 minutes)

- Anticipatory set: Conduct a silent brainstorm. Put out four pieces of butcher paper, each with a word written in the middle: sustainability, environment, species or preservation. Give students five minutes to circulate around the room to write or draw on the paper what that word makes them think of. You could also give students sticky notes to write on and add to the paper. Then spend five minutes as a class discussing trends they noticed. (10 minutes)
- Introduction: SmartParks and species preservation. Show all three videos. (5 minutes)
- Distribute animal booklets. (4 minutes)
    - We recommend one animal to 3-6 students and having two teams solving for the same problem to provide students with an opportunity to see different ways to solve a problem.
    - There are four animal species options for your classrooms: great white shark, orangutan, black rhino, and red knot.
- Introduce the design challenge. (4 minutes)
    - Go over the first two pages in the booklet with students.
    - *You and your team run an animal conservation foundation based out of [your city] that develops innovative technology and policy plans to help save endangered and threatened animals. Your team will use your skills as communicators, researchers, collaborators and creative problem-solvers to assist governments and communities in developing plans to help create more sustainable environments for animals and humans.* (Page 2 of the booklet)
- Research the issue. (20 minutes)
    - Fifteen minutes to read the background on the situation in the booklet.
    - Five minutes to answer and discuss questions, "From your reading" in the booklet.
- Closing: *What is one thing that you want to learn more about after your reading?* (7 minutes)

Day 2: Brainstorming and Creating a Solution (50 minutes)

- Today's topic: *What is something from yesterday's reading that stayed with you?* (5 minutes)
- Team brainstorm. (20 minutes)
    - Tips on structuring a brainstorm session can be found in Tech Tip: Brainstorming.
    - The "Brainstorm Notes" section in the booklet has questions and space for students to take notes.
- Start developing problem, solution and impact. (20 minutes)
    - Give students access to technology to explore some questions they have after reading the background and brainstorming.
    - Teams fill out "Sharing Our Solution" on page 10 of their booklets.
- Exit ticket: *Now that you have explored the problem with your team, what is your preference for solving it?* (5 minutes)

Day 3: Solutions and Revisions (50 minutes)

- Anticipatory set: W*hat informational or process questions do you have about what to do next?* (5 minutes)
- Teams prepare to present their solutions. Give students time to finish filling out "Sharing Our Solution" from page 10 in their booklets. (3 minutes)
- Listen and Help Protocol (32 minutes)
    - Give each student a "Listen and Help Protocol" worksheet.
    - Pair up teams for feedback. Teach the protocol and explain that the goal for the activity is to get thoughtful and critical feedback from friends.
    - Act as timekeeper for the class.
- Give teams time to meet and reflect on the feedback they have received to develop the next iteration of their plan. (5 minutes)
- Closing: *What is one piece of feedback that you would like to incorporate into your project? How will you incorporate it?* (5 minutes)

Day 4: Create a Presentation (50 minutes)

- Anticipatory set: *What does a quality presentation include? How can we show and tell an idea using pictures and words?* (5 minutes)
- Give students time and materials to develop their presentation for the gallery walk. (40 minutes)
- Exit ticket: *Tomorrow your team has 15 minutes to finish your project before the presentation. What are you doing as homework or what needs to be done tomorrow to prepare for the gallery walk?* (5 minutes)

Day 5: Share Presentations (50 minutes)

- Finish presentation, which needs to include a project with a focused problem, solution that addresses the identified problem and an impact story. (20 minutes)
- Gallery walk. (20 minutes)
    - Split the teams into two groups and let each team present for 10 minutes and then switch.
    - Give students sticky notes to write feedback to the different teams on their posters.
- Debrief the activity as a class. Discuss what students saw and learned from the process and each other's work. (10 minutes)

Day 6: (Optional) Celebration (50 minutes)

- Use Day 5 as an additional day for making their projects and add the sixth day for sharing their work.
- Have all students display their work and invite other classes and parents to come and see their presentations.
- Work on a community outreach project that relates to animal conservation.