

# **Lesson 1: Introducing the Challenge**

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## **Grade Level(s)**

Biology 9-10

## **Lesson Overview**

Students will use the Design Thinking process to apply the knowledge they have obtained of the biology standards over the course of the school year in an authentic learning activity. Students will work together in groups to complete the design challenge listed below:

- “Recently an abandoned set of industrial buildings in the vicinity of your school has been torn down. Redesign the space that these buildings occupied so that it considers the needs of the city, its citizens and the environment.”

Students will work together in small groups to examine pictures of various outdoor spaces. They will consider the requirements of maintaining each space. Finally, they will examine a picture of the open space they will be designing and identify items from the previous outdoor space pictures they might like to include in the new space.

## **Learning Objectives**

- Students will develop an understanding of the design thinking process
- Students will be able to consider the costs (financial, social, and environmental) of developing open space

## **Standards**

### Utah Biology Standards

Students will understand that living organisms interact with one another and their environment.

Objective 1: Summarize how energy flows through an ecosystem.

Objective 3: Describe how interactions among organisms and their environment help shape ecosystems. (Standard 1)

### Next Generation Science Standards

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)

Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (MS-LS2-5)

### Common Core Standards

Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. (CCSS.ELA-Literacy.WHST.9-10.1.c)

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. (CCSS.ELA-Literacy.WHST.9-10.8)

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. (CCSS.ELA-Literacy.SL.9-10.1)

Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. (CCSS.ELA-Literacy.SL.9-10.3)

## **Preparation**

Set up projector for PowerPoint and make copies of the To Do List and the Item Analysis Chart.

## **Materials and Resources**

Open Spaces Power Point  
To Do List  
Item Analysis Chart

## **Activity 1: Introduction to Design Thinking (15 minutes)**

- Students will be introduced to the topic for the design-thinking project.

- Students should have a basic understanding of each component (Empathy, Define, Ideate, Prototype and Test).

## Activity 2: The Selfish Open Space (40 Minutes)

- Students will be asked to think and write about the things they would like to have if they had complete control over designing a blue print for an open space.
- Students will use what they wrote to create a diagram of their personal open space.
- Students will be asked to select their top ten items from their visual open space and complete the **To Do List** identify obstacles (financial, ecological, or social) that they would need to consider before adding each item to their **To Do List**.

## Activity 3: Various Demands for Opens Spaces (40 Minutes)

- Students will work in small groups to make careful observations of four pictures that represent different types of open space usage. While making these observations, they will identify specific items that will need to be built, obtained and maintained.
- They will complete the **Item Analysis Chart** to document their observations as well as to identify how the native species might have been affected by modification of the open space.

## Activity 4: Freedom to Create (20 Minutes)

- Student groups will examine the diagram of the open space that they will be designing.
- Student groups will use the items from their **To Do Lists** and their groups **Item Analysis Chart** to design the open space as if it were being created just for their group.

## Troubleshooting

Many students will not have a realistic idea of what it costs to build and maintain certain items. It would be a good idea to provide students with data from the city on water usage, cost of materials, maintenance expenses, ecological impact, etc.

## Assessment

Individual students will complete the think and write process and complete a “to do” list  
Student groups will complete an item analysis chart