

# **Lesson 4: Prototyping and Testing**

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## **Grade Level(s)**

Biology 9-10

## **Lesson Overview**

In this lesson, students will join new groups. Each group will consist of a three members, each member representing a different user. Student groups will design an open space layout that considers the needs of each of the three users.

## **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**

Gather prototyping supplies.

## **Materials and Resources**

Cardboard, glue, paper, markers, scissors, wire, and a variety of art supplies (pipe cleaners, fabric, cotton balls, yarn, etc.)

### **Activity 1: Open Space Design (30 minutes)**

- Students will work in their Design Group to create a prototype of the open space they have designed. The prototype will be designed considering the needs of each of the three users (City Developer, Resident, and Environmental Conservationist).
- Students should be ready to discuss how their choices considered the needs of all users.

### **Activity 2: Open Space Evaluation (30 Minutes)**

- Students will work in their Empathy Group to evaluate other open space designs to offer feedback to the designers from the perspective of the user they represented.

### **Activity 3: Open Space Re-Design (60 Minutes)**

- Students will work in their Design Group to review feedback and make changes to their open space design.

## **Troubleshooting**

Students will need to be shown how to offer and accept feedback. It will be important to walk them through the process of a tuning protocol.

## **Assessment**

Students will submit their final open space layout.