



# TEACHER GUIDE

## NATURAL SELECTION GRADES 6-8

### COMMON MISCONCEPTIONS

- **Populations do not change.**  
Shifts in population can happen in many ways. Some changes can happen slowly and take hundreds of years, like the gradual shift in traits from genetic change. Some changes can happen more quickly, such as a shift in population because of environmental changes like pollution.
- **Humans cannot control natural selection.**  
Humans can manipulate both plants and animals genetically in a way that produces an organism with desired traits. This is called *artificial selection*, and it is done for many reasons such as to create disease-resistance crops, bigger animals for food, and desired looks for specific dog breeds.
- **Environmental factors cannot change traits.**  
Environmental factors can affect traits in both plants and animals. For example, the sunlight can affect the color of your skin, and it can also affect your health. Too much Sun exposure can lead to skin damage, but not enough can lead to a vitamin D deficiency.

### NATURAL SELECTION

Natural selection is a process that can lead to the evolution of a population. Sometimes called *survival of the fittest*, natural selection refers to the idea that organisms that are better suited to their environment survive and reproduce.

### VARIATION OF TRAITS

Organisms of the same species have the same characteristics, but these characteristics can differ. This variation of traits can occur through both genetic and environmental factors. Although variation of traits happens at the individual level, as these organisms survive and reproduce, it can lead to an evolutionary change in the organisms' population as a whole.

### ARTIFICIAL SELECTION

Artificial selection is the process in which humans choose the traits they want organisms to have. This process happens

with both plants and animals and allows humans to design organisms for a specific look or to perform a certain function. Artificial selection has led to new breeds of dogs and many varieties of fruits and vegetables.

## TEACHER TIPS

Students know that organisms look the same but not exactly the same. However, many students don't understand how an organism's traits can affect its ability to survive and reproduce. As they explore how traits help individual organisms survive and reproduce this process could also lead to a change in the population as a whole, where the majority of the organisms now exhibit a specific trait.

## ABOUT THIS LESSON

**This lesson was created by the National Science Teaching Association (NSTA) to pair with the Generation Genius video and support NGSS.**

**They have requested we provide the following background with this lesson:**

*The Next Generation Science Standards (NGSS)* are the national standards on how students learn science, and they are based on contemporary research presented in *A Framework for K–12 Science Education (the Framework)*. The shift in science teaching and learning required by the Framework is summarized in this infographic: [A New Vision for Science Education](#).

At the start of each Generation Genius lesson, students are presented with a phenomenon, then they try to explain it. Students will notice they have gaps in their knowledge and ask questions, which motivates them to build ownership of science ideas they need in order to explain how or why the phenomenon occurred. The way students build ownership of science and engineering ideas is through active engagement in the science and engineering practices (SEPs). This process of sensemaking, or doing science to figure out how the world works, is one of the major shifts the *Framework* encourages.

To engage in the SEPs, students should be part of a learning community that allows them to share their ideas, evaluate competing ideas, give and receive critiques, and reach consensus. Students can start by sharing ideas with a partner, then with a small group, and finally, with the whole class. This strategy creates opportunities for all students to be heard, build confidence, and have something to contribute to whole-class discussions. Each Generation Genius lesson provides conversational supports to facilitate such productive student discussions to contribute to sensemaking.

Excited to continue your shift toward the new vision for science education? Check out the [Generation Genius Teacher Guide](#) page on the NSTA website for resources and strategies to engage every student in your classroom in **doing** science.



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A non-profit dedicated to raising academic standards and graduation requirements.*