GENERATIONGENIUS
ALWAYS QUESTION. ALWAYS WONDER.

TEACHER GUIDE

PREDICTING NATURAL DISASTERS

GRADES 6-8

COMMON MISCONCEPTIONS

- **Natural disasters are random events.**
  Natural disasters are not random events. Some types of natural disasters, like tornadoes, are able to be predicted based on weather data—humidity, wind speed, dew point, temperature, barometric pressure, and others. Other types of natural disasters, like earthquakes, can have predicted locations, but not time of activity.

- **Earthquakes always cause severe destruction.**
  Earthquakes are measured on something called the Richter scale. Earthquake magnitude ranges from 1.0 to 9.0 and above on the Richter scale. Small earthquakes are valued with lower numbers, and larger earthquakes causing more serious damage are valued with higher numbers.

- **Scientists know when and where natural disasters will occur.**
  Scientists can use data to predict when and where some types of natural disasters may occur, like earthquakes and tornadoes, but not for other naturally occurring events like wildfires. Wildfires are unpredictable natural disasters that are usually the result of drought and lightning strikes.

SEISMIC WAVES

Earthquakes occur when rock beneath the surface of the ground breaks as a result of tectonic plates rubbing or compressing on one another. The sudden release of energy when this happens causes a seismic wave that can be measured with an instrument called a seismograph. The magnitude of earthquakes is measured on something called the Richter scale, a system developed by Charles Richter in 1935 that assigns values ranging from 1.0 to 9.0 and above to indicate the magnitude of the earthquake.

EARTHQUAKE PATTERNS

Earthquakes are more likely to happen in areas where tectonic plates meet and earthquake activity over time shows patterns. For this reason, specific areas of the United States have higher risks for earthquakes than others. For example, the coast of California and Alaska are along plate boundaries that have higher chances of having high magnitude earthquakes. Earthquakes occur all over the world, sometimes on the ocean floor causing natural disasters, like tsunamis.

NATURAL DISASTERS

There are many types of natural disasters, some which are predictable and others that are not. Wildfires and hurricanes are not preventable but can be predictable enough to provide people warning to evacuate certain areas that are at a high risk for destruction. Weather events like tornados provide people less time to prepare because they arise more spontaneously and are difficult to predict. Natural disasters of all kinds can cause severe property damage from flooding, collapsing, burning, or high winds.

TEACHER TIPS

Encourage students in the engineering design challenge to compare models and identify similarities and differences that combine to make the most effective structural design. It is critical to support students in the revision of their thinking. This infuses authentic engagement and normalizes the evolution of understanding as new evidence is compiled.

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.