Life in a Petri Dish

Evolution and Natural Selection

Grade Level	9th – 12th Grade	**Time Frame**	3-4 class period(s)
Subject	Science	**Duration**	200 minutes
Course	Biology		

Essential Question

How do environmental forces change a species?

Summary

In this lesson, students will learn about the concepts of evolution and natural selection through playing Perfect Strain, a digital game-based learning (DGBL) module. The DGBL module allows them to explore and apply the concepts they are learning within an interactive world using artificial selection to see the effects of selection pressures such as mutations and evolutionary adaptation.

Snapshot

Engage

Students watch the "What is Natural Selection?" video, then discuss it in pairs and share out.

Explore

Students play the first two missions of Perfect Strain to explore the concepts of evolution and natural selection.

Explain

Students use the Concept Card Mapping strategy to learn more about the relations between the concepts they've learned so far.

Extend

Students play the third mission of Perfect Strain to continue exploring and applying the concepts they have learned about evolution.

Evaluate

Students use the Human Scatter Graph strategy to demonstrate learning.

Standards

ACT College and Career Readiness Standards - Science (6-12)

IOD302: Understand basic scientific terminology
IOD304: Determine how the values of variables change as the value of another variable changes in a simple data presentation
SIN503: Determine the experimental conditions that would produce specified results

Oklahoma Academic Standards for Science (Grades 9, 10, 11, 12)

B.LS4.2: Construct an explanation based on evidence that biological diversity is influenced by (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
B.LS4.4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Attachments

- Concept Cards—Life in a Petri Dish - Spanish.docx
- Concept Cards—Life in a Petri Dish - Spanish.pdf
- Concept Cards—Life in a Petri Dish.docx
- Concept Cards—Life in a Petri Dish.pdf
- Game Portal Guide—Life in a Petri Dish.pdf
- Lesson Slides—Life in a Petri Dish.pptx
- Perfect Strain Teachers Guide DGBL—Life in a Petri Dish.pdf

Materials

- Lesson Slides (attached)
- Concept Cards (attached; one set per small group)
- Game Portal Guide (attached)
- Perfect Strain Teacher's Guide DGBL (attached)
- Chart Paper

20 minutes

Engage

Use the attached **Lesson Slides** to facilitate the lesson. Display **slide 2** to introduce the lesson topic. Use **slides 3–4** to go over the essential question and lesson objectives. Move to **slide 5**. Instruct students to take notes on things they found interesting or surprising as they watch the "What is Natural Selection?" video.

Embedded video
https://youtube.com/watch?v=0SCjhI86grU

This video is nine minutes long and introduces many of the concepts that students will be further exposed to as they begin playing the Perfect Strain DGBL module.

Display **slide 6** and ask students to pair up to discuss the video. Then, ask each pair to share out their takeaways with the rest of the class.

50 minutes

Explore

Move to **slide 7** and introduce them to the DGBL module Perfect Strain. Ask students to navigate to the K20 Center Game Portal and login to have them play through the first two missions, which should take roughly 30 minutes. You do not need to give them further instruction here. The game will introduce them to its mechanics, concepts, and story. At this point, take time to walk around the room, observing students' progress and helping students who are confused or stuck.

Teacher's Note: Alternative For Technology Limitations

If it is not possible to supply each student with access to the game, having students play the game in pairs or small groups will also work. However, Perfect Strain is a real-time game, so if it is played in groups, it will most likely require a single student to play the game while other students watch and give advice on which actions to take.

30 minutes

Explain

Move to **slide 8** and ask students to set aside their devices for the time being. Introduce students to the Concept Card Mapping strategy to allow students to review what they've learned and go into deeper explanations of the concepts.

Divide your class into small groups and give each group a set of the attached **Concept Cards**. Then have them build a concept map using the cards. Once all the concept maps are complete, discuss them as a class. Record the connections students make on a piece of chart paper to build a whole-class concept map.

Teacher's Note: Concept Cards

The Concept Cards contain the terms and definitions as presented in the Perfect Strain DGBL module and accompanying teacher's guide, along with spaces to add additional cards. You can either print the cards double-sided so the definitions are on the reverse side of the terms, or you can print them all as separate cards to provide additional challenges and learning opportunities for your students.

Use this discussion and the resulting concept map to identify any areas where students are confused or have questions about specific concepts. Then you can spend additional time better explaining those specific concepts.

40 minutes

Extend

Move to **slide 9.** Ask students to return to the Perfect Strain game and play the third mission. This module is more difficult than the first two, and you can expect it to take at least 30 minutes for them to play through it.

Teacher's Note: Perfect Strain

Perfect Strain consists of five missions. For the purposes of this lesson, students will only need to play through the first three missions. The fourth and fifth missions provide a greater challenge and can be used to occupy students who advance significantly faster.

40 minutes

Evaluate

Display **slide 10** and introduce students to the Human Scatter Graph strategy. Label two perpendicular walls in your classroom to be the *x*-axis and the *y*-axis.The *y*-axis should be labeled with sections called A, B, and C. These will be choices for the students later on in the activity, so leave enough room for multiple students to stand in the same area. Label the side of the *x*-axis that is closest to the *y*-axis "low confidence" and the side that's farthest away from the *y*-axis "high confidence." Use **slides 11–22** to present the students with the question and answers. Before revealing the answer, ask students to justify their answer with the class.

Resources

- K20 Center. (n.d.). Concept card mapping. Strategies. https://learn.k20center.ou.edu/strategy/123
- K20 Center. (n.d.). Human scatter graph. Strategies. https://learn.k20center.ou.edu/strategy/172
- K20 Center. (2020, November 9). Perfect strain [Game]. Authentic Lessons for 21st Century Learning. https://learn.k20center.ou.edu/game/1035
- Stated Clearly. (2013). What is natural selection? [Video]. YouTube. https://www.youtube.com/watch?v=0SCjhI86grU