

Creature Feature Design Challenge

SUMMARY

In this hands-on design challenge, participants will create a unique "creature" and tell the story of how it might evolve through various environmental changes predicted because of the effects of climate change.

LESSON INFO

Grade: 6–8th grade.

Lesson Author: ExpandedED Schools, New York Hall of Science, and STEM Educators Academy educators Michelle Darden and Suraia Fattah

MATERIALS

Hyperlinks:

- [Lesson slidedeck](#)
- [Vocabulary Words:](#)
 - Adaptation
 - Trait
 - Evolve
 - Environment

[These links are clickable!](#)

To prepare enough materials for your class, you'll need multiple sets. For example, a class of 28, you will need 7 sets of the materials listed above ($7 \times 4 = 28$).

Materials per group of 4:

- Building materials that youth will use to draw or build their creatures. If youth will draw creatures, you'll need:
 - 12 pieces of a selection of different paper (index cards, construction paper, etc.)
 - A selection of markers, crayons, or colored pencils
- If youth will build creatures, you'll need:
 - 4 packs of modeling clay or playdough
- 4 [design challenge worksheets](#)
- 1 pack of [evolution cards](#)
- 1 pack of ["change in environment" cards](#)

PREPARATION

Before every lesson, be sure to:

- Purchase or gather the activity materials.
- Prepare materials and lay them out in the classroom.
- Project the lesson slide deck.
- If your room does not have a stable internet connection, download the powerpoint and videos beforehand.

Print:

- 1 [design challenge worksheet](#) per youth.
- 1 pack each of the [evolution cards](#) and ["change in environment" cards](#) per group of 4 youth.

Cut:

- [Evolution cards](#) and ["change in environment" cards](#).

LEARNING OBJECTIVES & STANDARDS

STEM Learning Goal: Content (What youth will KNOW)

MS-LS4-6: Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common.

STEM Learning Goal: Skill (What youth will DO)

[Next Generation Science Standards](#): Constructing explanations and designing solutions

POSSIBLE ACTIVITY TIMELINE

Session 1

- Hook
- Evolution cards
- Creating first version of creature

Session 2

- Creating two different adaptations of the creature, using two "change in environment" cards

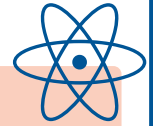
Bring learning to the community

- Youth can share their creature evolution with a partner, their group, or the whole class.
- Engage in a youth-led exploration of how climate change will impact their community in the short term, and how humans might adapt to these changes. For inspiration, check out [this NY Times article outlining emerging climate change fashion trends](#).

Delivering the Lesson

HOOK

Start a discussion on traits by asking youth to brainstorm some physical traits they have in common with their classmates. Ask youth how these traits might help humans survive. Ask youth what physical traits might be useful for survival if the environment changed drastically (example: what if the city became covered in water and we had to live underwater?)

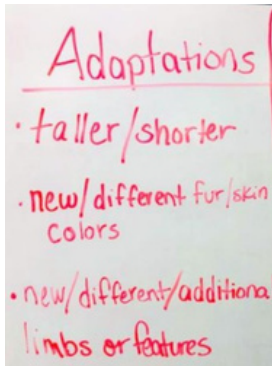


EDUCATOR CHOICE POINT:

The hook provided above is just one idea, and may not be the right fit for your youth. Can you think of a more relevant and engaging hook or plan one together with the youth in your program?

INTRODUCTION

1. Begin by giving each group of participants one stack of [evolution cards](#).



2. Each group should look at and discuss the photos with their group and then put them in order from the oldest ancestor of that animal up to today (answer key for educators is included in the [evolution card printout](#)).

3. Have groups share their animal and how it has evolved over time. As the discussion continues, create a running list of adaptations that come up in discussion. See the image of an adaptation list (left) for an example of what the running list could look like.

QUESTIONS TO ASK DURING INTRODUCTION



How did you recognize the animal that you were given?

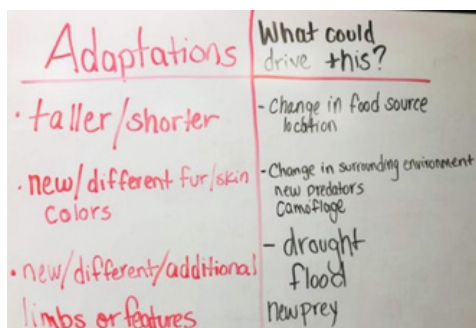
What do you think happened that made the animal change over time?

Did you notice any traits that stayed with your animal throughout its evolution, or that it lost?

DESIGN CHALLENGE

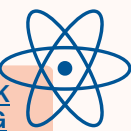
Our world is changing through global warming, and scientists predict even more dramatic changes to come. Can you design a creature that evolves in response to examples of these environmental changes?

PLANNING



1. As a group, revisit the list of adaptations that you made during the hook. Discuss how or why those adaptations came to be, generating a list of “driving forces” that might cause that change (see right hand column in the image at left). For example, a species changing color over time might have been due to a change in the coloring of the environment.

2. Youth will build their creature by drawing or sculpting with modeling clay. They can use an existing creature, or make one up. Youth can use the [design challenge worksheet](#) to sketch ideas during this planning stage.



BUILDING

3. Provide 10 or so minutes to create the “base version” of the creature, either by drawing or sculpting with modeling clay.
4. After they create the initial version of their creature, youth will draw one [“change in environment” card](#). This card describes a change that scientists actually predict might occur because of climate change.
4. Give participants a few minutes to share their card with their group and allow them to brainstorm how their creature’s population could adapt to survive this change in environment. For the first adaptation, you may want to engage youth in a whole group discussion so that you can be sure that everyone understands the goal of this design challenge.
5. When a majority of participants have decided on their adaptation, they can begin drawing or sculpting the second version of their creature with an adaptation to help them survive in this environment.
6. Have youth pull another [“change in environment” card](#) and sketch or sculpt the final version of their creature.

QUESTIONS TO ASK DURING PLANNING

What type of creature do you want to start with? Do you want to create a land, air or sea creature?

What features (legs, arms, wings, fur, horns, etc.) will your creature have?

QUESTIONS TO ASK DURING BUILDING:

What would you do if this change happened to your neighborhood?

Do you think your creature can survive this change?

What trait(s) would help your creature to survive this change?

CLOSING



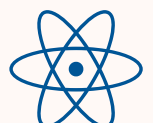
1. After at least two rounds of adaptations, have your participants organize their creatures in order to show their evolution.
2. In order to tell the evolutionary story of their creature, youth can create or share a few captions for their designs that would allow a visitor to learn about the progression of their creature.

3. Youth can share with a partner, their group, the whole class, or the larger school community. As youth share, be sure to ask them about the connection between each environmental event and how the adaptation is crucial for the survival of their creature’s population.

QUESTIONS TO ASK DURING CLOSING:

What change occurred in the environment?

What adaptation was necessary for your creature’s survival?



Educator Choice Points

You can adapt or maximize this lesson for the young people you work with. Use the guiding questions on this page to help you make choices to understand what youth know ("assessment"), to partner with youth ("youth role"), and to ensure all youth feel successful ("differentiation"). Each section includes a few ideas and space for you to choose a strategy that will work for your group.

ASSESSMENT

Educator choice point: How will you know that youth understand this content? Decide how you will check that youth understand the content from this lesson.

- Circulate around the room during the activity to ask reflection questions to small groups. Can youth explain how and why their creature changes over time?
- Take notice how youth are working together in teams. Is everyone participating? Are decisions being made with input from all or just a few?
- Pay attention during the group discussion after pulling the first "change in environment" card. Are most youth contributing accurate ideas about how their organisms might adapt to this change?

To check that the youth understood the content from this lesson, I will _____.

YOUTH ROLE

Educator choice point: Where do youth have voice and choice in this lesson? Decide where and when youth can shape the activity.

- Picking their groups (4 youth/group).
- Picking and designing their creatures.

Youth will have voice and choice when _____.

Educator choice point: How can you make opportunities for youth-to-youth interaction? Decide how youth will interact in this lesson.

- Small- and whole-group discussions.
- Sharing their designs with each other during the closing.

Youth will be able to interact with each other when _____.

DIFFERENTIATION

Educator choice point: How will you support all youth to feel successful in this lesson? Decide how you will support youth working at different paces and with different needs.

- Keeping youth who finish early engaged by assisting other teams.
- Engaging participants who are disinterested in the activity sitting with them to figure out what is going on. Consider allowing this participant to help with the materials distribution table. You can also allow them to circulate among the groups to pick another table to join.

I can support youth working at different paces and with different needs by _____.

ADDITIONAL BACKGROUND INFORMATION

To learn more about the content in this lesson, educators and youth can...

- [Watch this 4:36 video from Crash Course Kids](#)
- [Read this news article](#) about creatures' adaptations to pollution in the Hudson River (warning: the article is long and may be advanced for some readers).
- [Listen to this "But Why" podcast about evolution](#)

As you seek out additional content, consider who is represented in the instructional materials. What voices are missing? Where might implicit biases be showing up in this content?

