

Creating Life!

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Seminar: "Is There Any Life in the World's Beyond Our Own?"

Abstract

Overview

Rationale

Objectives

Strategies

Classroom Activities

Annotated Bibliography/Resources

Appendix

Appendix-Content Standards

Overview:

The demands of teaching literacy skills have increased over the past years with the introduction of more rigorous standards such as the PA Common Core. Students at earlier ages are asked to read, comprehend, compare and evaluate more and more complex texts in order to be perceived as proficient or advanced. Non-fiction text has also played an increased role in ELA classrooms. Traditionally, these are not the most popular types of texts. The majority of the students I teach see them as boring and uninteresting. When presented with these passages in testing situations, many have admitted to just clicking on answers or randomly choosing an answer because they refuse to even read the passages. This not only mislabels the student as one who is lacking skills that they actually may have, but it also continues a culture of not representing a student's true ability when it matters. Sparking interest in a variety of passages is key to changing this. My unit will address this problem by adding a creative slant to reading non-fiction that will hopefully intrigue students enough to engage them in more diverse texts.

Rationale:

Many of the students I teach need a variety of strategies for engagement in literacy activities. The benefits of our modern times, have been, to some extent, an ELA teacher's downfall. More accessible technology, games, apps and video systems (that can literally be at one's fingertips) have made reading a prehistoric hobby for some kids. Unfortunately, reading is also not a habit shared by many of the parents that we service, making it something that is not necessarily passed down or seen in the home.

The idea of there possibly being life on other planets is a question that I think will open up my student's minds. Not only is it something that we rarely get to discuss in an ELA classroom, the topic and this unit will allow students to pair their creativity with their curiosity and most importantly, get them to read!

This unit is intended for a 5th grade classroom, although it can be adjusted and made more complex for older grades or simplified for younger students. It should complement the School District of Philadelphia's pre-existing reading curricula, Collections, ReadyGen, Harcourt Trophies and Journey's Common Core.

The allotted time for this unit is roughly two weeks. The unit can also be used to review previously learned strategies and concepts with alternate materials.

Background:

Curiosity about life on other planets has always been embedded in our society. From organizations that constantly send out signals in the hopes that life forms will respond, to the information gathering done by space crafts and satellites to determine if there are conditions suitable for life on planets other than our own.

In order for students to be able to evaluate, even at a basic level, whether and how life can exist on other planets, they must first understand what factors are necessary for life to be sustained. Students will need to research and analyze non-fiction passages (or independently read fact sheets) about the Earth, then Europa or Mars to compare basic facts about each to determine these things for themselves.

Although students should facilitate the research themselves, the following information can be used at the teacher's discretion:

Earth

Earth's diameter is about 7,926 miles (12,756 kilometers).

Earth's temperature averages about 47.3 degrees Fahrenheit planet-wide. It can be warmer if surface air above oceans is figured in.

Two-thirds of its surface is covered in water.

Earth's weather includes rain, hurricanes, typhoons and tornadoes. Some areas are extremely dry, while others are incredibly wet. (1)

The Earth's surface is split into tectonic plates that float on a rocky mantle (the layer between the surface of the earth, its crust, and its hot liquid core). Along the boundaries of these plates, mountains and volcanoes can form.

The surface of the Earth has far fewer craters than the Mars, Venus and Mercury. The craters that were formed have sunk down or been worn away by erosion over millions of

years.

The Earth has distinguished itself from other planets in that it has a wide diversity of life and intelligent beings. This has only been possible because of the chemical composition of Earth's atmosphere, which has protected the planet and allowed life to flourish. (2)

Mars

Mars is roughly 4,222 miles (6,794 kilometers) in diameter, or 53 percent that of Earth.

Mars is cold most of the time and freezing in most places. Across the planet, it averages 67 degrees Fahrenheit (-55 Celsius). There are sometimes fleeting moments of daytime summer.

The weather on Mars consists of constant, vision-obscuring dust storms, and hurricane like storms.

The length of its day is similar to Earth.

The level of gravity is 38% less than that of Earth.

Its terrain consists of iodized iron scattered across the surface of the planet, the land is rocky, with canyons and craters.

There are only trace levels of oxygen on this planet and its atmosphere is composed of 95% carbon dioxide.

Water may have existed in liquid form in the past, it presently exists in frozen form in many places on the planet. (1).

Europa

Europa is a moon of Jupiter.

Europa's diameter is 1,900 miles (3,100 km).

Europa's surface temperature never rises above minus 260 degrees Fahrenheit (minus 160 degrees Celsius) anywhere on the planet.

This moon is believed to have an iron core, rocky mantle and tectonic plates, similar to Earth. However, the rocky interior of Europa is surrounded by a layer of water and/or ice as deep as 105 miles.

It's surface is highly reflective due to its icy covering.

There is also the possibility of an ocean existing deep beneath the surface.

Europa's atmosphere is believed to have more oxygen than hydrogen, in a ratio similar to Earth's. (3)

Objectives:

The Objectives of this unit will include students being able to:

- Read, research and understand information pertaining to what is needed to sustain life on Earth.
- Determine a set of criteria necessary for human life based on these readings.
- Read, research and understand information pertaining to physical conditions on at least one other planet.
- Compare and contrast the conditions of one planet with another.
- Use the physical conditions on at least one planet to evaluate a being's ability to sustain life given their needs.
- Determine what evolutionary adaptations may be necessary if life were to be sustained on at least one other planet (adaptations of the living being or adaptations on the planet).
- Write a realistic fiction piece using the above changes to the planet (or the beings that settle there) that illustrates what life would be like on that planet.

Strategies:

In this unit, students will be presented with two essential questions. First, whether there *can* be human life on specific planets, based on information students are presented with. In order to determine this, they must compare the conditions on the planet they have chosen with conditions they are familiar with, those on Earth. Once they have determined that, they will follow that up with the second essential question of *how* there could be life on said planet. Answering the question of how will allow students to draw on logic based on what they already know about certain situations. They will use what they already know of the human body and ways that it can adapt to various situations. They will also use their knowledge of community building to decide what type of environmental, man-made items physical structures can be created in order to sustain life if it is implanted there.

Students will work independently and/or with a partner. Students will use concept diagrams (those found in the Appendix may be used) to assist them with various aspects

of this unit. Once thoughts are organized in these diagrams, they can be used to support student writing. At the end of the unit, students may also present their work.

Because this is not a science class, students will only be concerned with the minimum amount of science needed to understand and complete the unit. Its focus is researching, reading and writing informational text and using evaluating, comparing and inferencing skills.

Activities:

Students will be presented with the questions stated above. They will be given an overview of the unit and be told that as the unit unfolds, they will be able to answer these questions.

Lesson 1- Students will watch a short video clip giving an overview of the solar system to give students an introduction to the planets (and moon) and how they interact within our system. Some suggested sites are:

<https://www.youtube.com/watch?v=Qd6nLM2QIWw-> This gives a lot of information about each planet, including the sun. It includes very clear, realistic pictures of each.

<https://www.youtube.com/watch?v=jEXWxNbpTzU-> This planet has a “teacher” that narrates, uses diagrams and is very informative.

<https://www.youtube.com/watch?v=ZHAqT4hXnMw-> This video gives a cartoon with planets that rap a few facts about themselves. Afterwards, students will discuss their understanding by answering general questions presented by the teacher about the make up of our solar system. The teacher will also introduce the goals of the unit and what activities students will be engaged in in order to reach these goals.

Lesson 2- Students will next research to gain an understanding of what Earth is like. This knowledge will be gained through researching using the graphic organizer in the Appendix, using it to obtain basic facts about Earth. Students will use this organizer to help focus the goals of their research. After researching, students should be able to deduce what is needed for life-water (in liquid form), reasonable gravity and climate, nourishment of some kind and oxygen. They will understand how these things interact in order to make life successful. Students will record information in reference to Earth’s availability of these items (water, reasonable gravity and climate, oxygen and nourishment, or criteria for life, (CFL)) in the graphic organizer.

Lesson 3- Students will research information about Mars or Europa. A graphic organizer will be used to guide the research (See Appendix) and be completed with information found on the availability of its criteria for life, or CFL.

Lesson 4- With the above information from Mars or Europa, students will choose one to compare and contrast their levels of CFL with Earth’s. They will use a graphic organizer to compare the environments (See Appendix) and record them.

Lesson 5-Students will use their comparison to evaluate if the conditions are conducive to life based on the established baseline CFL for Earth. They will record this at the bottom of the Appendix form . Students can then formally write out their comparison of Earth and Mars or Europa, incorporating their opinion of whether life can exist or be sustained based on the facts they have found in their graphic organizers.

Lesson 6-Students will then look at the challenges on the planet to life being sustained (lack of oxygen, cold temperatures, etc.). They will use these challenges to determine what adaptations can be made within a human to make life possible for them to live and thrive under the conditions of Mars or Europa. These will be discussed, then recorded in the appropriate Appendix form.

Lesson 7-Using the same challenges to life on their planet from above, or others, students will next determine what environmental adaptations could be made on the planet to help sustain life on their planet.

For example students might realize that on Mars, it is much colder than Earth and would prohibit a human from living there. However, they may decide that if humans were able to develop thicker skin, more body hair, (Lesson 6) or weather resistant shelters, tunnel systems, etc. (Lesson 7), it might be possible.

Lesson 8- Students will write out life would be like based on the information they have gained and the adaptations that they have determined were necessary to live there. This will be based on fact, but will have fictional elements as students will be allowed to use their imagination to fill in some of the gaps. Students will address how everyday things like eating, going to school, working or getting dressed, may be accomplished based on the terrain, weather conditions, etc. in a graphic organizer (See Appendix).

Lesson 9- Once the graphic organizer is complete, students will use that information to create a writing piece. Students will write a more factual writing in which they write out what a day in the life would be like given what they learned about the planet and the adaptations they decided upon in the previous lesson.

Lesson 10- Students will create a fictional creature based on the adaptations that they described in their graphic organizer. They will then illustrate what this creature looks like based on their characteristics. Students can write a *fictional* story of a day in the life of this creature or what might happen if this creature was dropped on Earth.

Bibliography:

Teacher/Student Resources

(1) Space.com-“Earth vs. Mars”

<http://www.space.com/1582-earth-mars.html>

(2) Planets for Kids

https://www.nasa.gov/vision/earth/environment/Sibling_Rivalry.html

(3) Space.com- “Europa-Facts and Information About Jupiter’s Icy Moon and It’s Ocean”

<https://www.space.com/15498-europa-sdcmp.html>

Appendix:

Name _____ Date _____

**Criteria for Life:
Earth**

Directions: Based on your reading, record the following information for planet Earth.

Criteria for Life	Availability on the Planet?
Water	
Climate	
Nourishment	
Gravity	
Atmosphere	

Name _____ Date _____

Criteria for Life:

Directions: Based on your reading, record the following information for planet or moon.

Criteria for Life	Availability on the Planet (or Moon)?
Water	
Climate	
Nourishment	
Gravity	
Atmosphere	

Name _____ Date _____

Criteria for Life Comparison

CFL on Earth	Comparison to
Water	
Climate	
Nourishment	
Gravity	
Atmosphere	

Do you think human life can be sustained on this planet as it is? Why or why not?

Name _____ Date _____

Creating Life!

1. Do you think human life can exist or be sustained on this planet (or moon)?

Yes or No

2. In what ways can life exist or be enhanced on this planet (or moon)?

What physical (evolutionary-like) adaptations can be made? List the challenge on the planet (or moon) and the way a human could adapt physically.

Challenge the Planet (or Moon) Presents	Human Adaptation to Overcome the Challenge

What environmental adaptations can be made? List the challenge on the planet (or moon) and the way a human could adapt by reasonably changing their environment.

Challenge the Planet (or Moon) Presents	Environmental Adaptation to Overcome the Challenge

3. With the above adaptations, how would a typical day play out on this planet (or moon)? You may add activities.

Activity	Activity on this Planet (or Moon)
Basic Hygiene	
Going to School/Getting Educated	
Recreational Activities	
Eating/Obtaining Nourishment	

Appendix- Content Standards:

The Philadelphia School District's college and career ready standards in Language and Writing that are supported by this unit are as follows:

Writing:

- 1.4.5.A: Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- 1.4.5.V: Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

Language:

- 1.2.5.I: Integrate information from several texts on the same topic to demonstrate understanding of that topic..
- 1.2.5.A: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- 1.2.5.B: Cite textual evidence by quoting accurately from the text to explain what the text says explicitly and make inferences.
- 1.2.5.C: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a text based on specific information in the text.
- 1.2.5.L: Read and comprehend literary non-fiction and informational text on grade level, reading independently and proficiently.