5E Lesson Mars Reconnaissance Orbiter and Earth's comparison

Teacher: LaCaze

Date: 5/30/2019

Subject / grade level: 6-8th Science

Length- between 4-6 class periods

Materials: several packages of post-its or sticky notes. Pencils, one computer per 2 students. Student journals for extension piece. Access to PowerPoint or Google Slides. Internet Access for research on NASA webpages.

Essential Standards and Clarifying Objectives

MS-ESS2-5 Earth's Systems

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
Performance Expectation

Grade:
Middle School (6-8)

MS-ESS2-6 Earth's Systems

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-ESS2-5), *(MS-ESS3-5)*

ELA/Literacy –

RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5)

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-1),(MS-LS2-2),(MS-LS2-4)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS2-1)

Lesson objective(s):
Students will observe climate data of Mars using the Mars Reconnaissance Orbiter website and make a comparison to that of Earth's by making a PowerPoint contrasting the two planets. Students finish with summarizing the differences of the two in a short presentation.

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Differentiation strategies to meet diverse learner needs:
Collect pictures or webpages related to Mars Reconnaissance Orbiter and pictures or webpages of Earth's climate printed out and ready for students to use.
Students may use a graphic organizer to portray the information without technology
Students may highlight material important to the Mars Reconnaissance mission and Earth's climate
Extension:
Students may make predictions about Earth or Mars' climate in the future based off data researched, students can do this in a journal or research paper.

ENGAGEMENT ½ class period

- Begin with a discussion about Earth's weather and climate with students. On the board, teacher writes Earth Weather and Climate. Hand out post it notes to students and have them fill out information about Earth's weather and climate. Answers could be, pressure, thick atmosphere, heating of the sun causes air to be less dense, convection, wind, air masses flow from high to low pressure. Humidity, precipitation, hurricanes, tornadoes etc. This is a formative assessment and a review for previous lessons on Earth's atmosphere and climate according to the NGSS standards.
- Have students write down their thoughts and post their sticky notes on the board. Teacher will leave this up for students to use as a reference when there is a discussion about Mars.
- Teacher writes Mars' weather and climate on the board and asks students what they think Mars may be like as a discussion.
- Teacher shows students NASA jet Prolusion Laboratory video about the Mars Reconnaissance Orbiter. https://www.jpl.nasa.gov/video/details.php?id=1418
- Teacher discusses with students about the Mars Reconnaissance Orbiter mission and allow students to discuss and work with a partner on the similarities and differences of Earth and Mars. Have students fill out post it notes and put them under Mars' atmosphere and weather. These are only quick observations and students will add to or change the post-it notes later on. Both Mars and Earth's post-it information will be left up for the duration of the lesson for student reference.

EXPLORATION 1/2 class period

- Arrange students into groups of 2 and allow them computer access. Allow students to play around with the Mars Reconnaissance Orbiter website https://mars.nasa.gov/mro/multimedia/images/?start=55#
- While they are exploring the website, have students think about what the weather must be like on mars and begin brainstorming with your partner some things such atmosphere, heat, storms, they could write about

EXPLANATION 1 class period

- As students continue their investigation on the website, give students Handout: Mars Reconnaissance Orbiter Walkthrough. The questions involved will help set up students thought processes for their project.
- When students are complete, teacher will discuss answers with students. This is a formative assessment to gage whether students are understanding climate and weather as per noted on the NGSS website standards.
- Students write down (or take away) and add any additional post-its to the Mars Weather and Climate portion of the board to use as a reference.

ELABORATION 1 -2 class periods

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- Give students access to a computer. It is important students are familiar with PowerPoint or google slides.
- Tell students they are now making a short 2-3 PowerPoint presentation comparing Mars and Earth's weather and atmosphere using the Mars Reconnaissance Orbiter webpage. Additional resources about the comparison of Mars and Earth can be here https://mars.nasa.gov/allaboutmars/facts/#detailedFacts
- A final PowerPoint slide must be a summarization of the two planets with a brief description of how climate conditions are for each planet based on a chosen latitude such as the poles or the equator.
- Students may extend the presentation with a more detailed analysis of the composition of the atmospheres such as specific gases and measurable thickness of the atmosphere of both planets and finalize with how the future climate may look for both planets. Students may do this work on their PowerPoint presentation or in their interactive journals.

EVALUATION- presentations/ 1-2 class periods

- Students present their PowerPoint presentations to the class with their partner within a 3-5-minute time span.
- presentations will be graded on a rubric (see rubric below)

Lesson resources, links and citations

Handout: Mars Reconnaissance Orbiter Walkthrough- file:///C:/Users/Admin/Downloads/Handout%20Mars%20Reconnasiance%20Orbiter%20walkthrough.pdf

Resource Links
https://mars.nasa.gov/mro/multimedia/images/?start=55#

https://mars.nasa.gov/allaboutmars/facts/#detailedFacts

https://mars.nasa.gov/mro/files/mro/MRO-060303.pdf

Mars Reconnaissance Orbiter video introduction https://www.jpl.nasa.gov/video/details.php?id=1418

Rubric and references below

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Student Name_____

Multimedia Project : Mars and Earth, the comparison

CATEGORY	4	3	2	1
Attractiveness	Makes excellent use of font, color, graphics, effects, etc. to enhance the presentation.	Makes good use of font, color, graphics, effects, etc. to enhance to presentation.	Makes use of font, color, graphics, effects, etc. but occasionally these detract from the presentation content.	Use of font, color, graphics, effects etc. but these often distract from the presentation content.
Mechanics	No misspellings or grammatical errors.	Three or fewer misspellings and/or mechanical errors.	Four misspellings and/or grammatical errors.	More than 4 errors in spelling or grammar.
Oral Presentation	Interesting, well-rehearsed with smooth delivery that holds audience attention.	Relatively interesting, rehearsed with a fairly smooth delivery that usually holds audience attention.	Delivery not smooth, but able to hold audience attention most of the time.	Delivery not smooth and audience attention lost.
Content	Covers topic in-depth with details and examples of the weather conditions of both Mars and Earth. Subject knowledge is excellent. Summation slide is clearly presented.	Includes essential knowledge about the topic. Subject knowledge about Earth and Mars' weather appears to be good. Summation slide is good.	Includes essential information about the topic but there are 1-2 factual errors.	Content is minimal OR there are several factual errors.

Total possible points = 16

Your Score _____/16

Notes:

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References

Images - Mars Reconnaissance Orbiter. (n.d.). Retrieved from https://mars.nasa.gov/mro/multimedia/images/?start=55#

Magnificent Mars: 10 Years of Mars Reconnaissance Orbiter. (n.d.). Retrieved from https://www.jpl.nasa.gov/video/details.php?id=1418

Mars Facts. (n.d.). Retrieved from https://mars.nasa.gov/allaboutmars/facts/#detailedFacts

Newsroom - Mars Reconnaissance Orbiter. (n.d.). Retrieved from https://mars.nasa.gov/mro/news/newsroom/