

Upper Grades- Lesson Topic: Stars, Constellations, and Planets

Unit Description:

In this lesson students will explore the stars, constellations, and planets using the free software Stellarium. Stellarium is a free planetarium to be downloaded on your computer with ease. It provides realistic 3-D images of stars, planets, and constellations including features like simulations of the sunrise and sunset, catalog of over 600,000 stars, constellation stories for fifteen different cultures, the planets and their satellites, artistic illustrations of the constellations, and more. Students can choose the location from which they are viewing the night sky and use oculars to zoom. They can also choose how they view the sky in terms of individual stars, constellation lines, or constellation illustrations. This program has unlimited opportunities for engaging students learning about the stars, constellations and planets.

Free videoconferencing software is an excellent opportunity for students to understand the concept that different stars and constellations are visible not only at different times of the night and year, but also from your location in the world. It is interesting to think that people living in the Southern Hemisphere see an entirely different set of stars and constellations than people living in the Northern Hemisphere and having the technology to share the stars and constellations that are uniquely visible to your location for free is an opportunity that should not be passed up. Teachers should choose an educator from one of the 15 cultures that have their constellation stories shared on Stellarium to contact and set up a videoconferencing session with.

The Cooperative Educational Services Agency (CESA 7) and The Center for Interactive Learning and Collaboration (CILA) in the technology tools sections list thousands of different schools in areas inside the United States that have access to videoconferencing and their contact information. The classrooms listed in these directories are interested in establishing educational partnerships and should be contacted before the beginning of the year to effectively plan for an upcoming unit. The planning needed for this type of unit is extensive the first time that it is completed, however, once initial partnerships are established they can be strengthened and continued for years to come. Use the sample letter in the resources section for an example of what could be sent as an initial contact to potential cooperating classrooms.

Objectives:

- ⌚ Students will become aware of the stars, constellations, and planets that are visible from their location on Earth and compare these with a different location on Earth.
- ⌚ Students will gain an understanding of how the Sun, Earth, and Moon orbit through the solar system.
- ⌚ Students will collaborate on a visual presentation of the stars, planets, and constellations and present their knowledge to another group of students.

Standards (California State Content Standards):

CA- California K-12 Academic Content Standards

Subject : Science

Grade : Grade Three
Area : Earth Sciences
Sub-Strand 4: Objects in the sky move in regular and predictable patterns. As a basis for understanding this concept:
Standard a: Students know the patterns of stars stay the same, although they appear to move across the sky nightly, and different stars can be seen in different seasons.
Standard b: Students know the way in which the Moon's appearance changes during the four-week lunar cycle.
Standard c: Students know telescopes magnify the appearance of some distant objects in the sky, including the Moon and the planets. The number of stars that can be seen through telescopes is dramatically greater than the number that can be seen by the unaided eye.
Standard d: Students know that Earth is one of several planets that orbit the Sun and that the Moon orbits Earth.
Grade : Grade Four
Area : Investigation and Experimentation
Sub-Strand 6: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
Standard a: Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
Grade : Grade Five
Area : Earth Sciences
Sub-Strand 5: The solar system consists of planets and other bodies that orbit the Sun in predictable paths. As a basis for understanding this concept:
Standard a: Students know the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.
Standard b: Students know the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets.
Standard c: Students know the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet.

Sample Lesson:

Individual Instruction: In the computer lab, students should have a period of time, about a half an hour, to freely explore Stellarium after receiving a brief tutorial from either the teacher or one of the tutorial videos available on the Stellarium website. Then, students should be grouped into twos or threes and asked to map the stars, planets, and constellations that are visible at certain times in the night sky from their current location and season on large poster paper by using Stellarium as a guide. For example, one group of students could map the night sky as it is visible between

sunset and an hour after sunset, another group can map an hour after sunset to two hours after sunset, and so on until sunrise. The date and time can be selected on Stellarium so the times of sunrise and sunset and the visible stars will vary by what time of year the students are completing this activity. During this lab time, students should also read the different constellation stories from different cultures and observe the artistic illustrations that go with them.

Whole Group Instruction: Once students have mapped out the night sky from their location, set up the videoconferencing session with the chosen country/culture (should be from a different hemisphere than your own) to share what the students have created. Ideally, the other classroom will have completed the same activity that your classroom has so that the students can visually compare the two hemispheres. The students can line up according to their time in the night sky and each group can present the stars, constellations, and planets that were visible on their posters including the fables behind the meaning of the constellations using the constellation illustrations as a guide. If you want to get creative, you can have one of the students holding a sun poster, one holding a moon poster, and another holding an Earth poster to demonstrate how they orbit through the sky. This lesson is fun, engaging, and effective for facilitating a strong understanding of the stars, constellations, and planets while also enhancing multicultural understanding and global awareness.

Assessing the Tool:

1. Was the tool simple to use as a teacher? For the students?

2. Did the use of this tool increase student global awareness?

3. What could be done differently to maximize the effectiveness of the tool?

Assessing the Lesson:

1. Did this lesson enhance student multicultural understanding?

2. Did this lesson develop collaborative skills amongst the students?

3. Did this lesson allow students to reach an understanding of the overlying concepts and objectives?