

“MAGIC OF HUBBLE” Lesson Plan

Written by Caroline Goode, STEM Education Consultant/Teacher

Need Hubble background before teaching the lesson? Fact sheets can be found at:

http://hubblesite.org/the_telescope/hubble_essentials/quick_facts.php

The Hubble Story and Hubble Factoids at: http://www.nasa.gov/mission_pages/hubble/story/index.html

This lesson plan follows the 5E Instructional Method (for more information on the 5E model, go to:

<http://www.nasa.gov/audience/foreducators/nasaclips/5eteachingmodels/index.html>

PURPOSE: This lesson can be used with students in grades 5-12 as an introduction or follow-up to the study of the universe and space objects including our Sun, Moon, stars, planets, asteroids, and comets. The slideshow and music can be used for adult presentations.

NSES STANDARDS:

Unifying Concepts and Processes: Content Standard: K-12>All students should develop understanding and abilities aligned with the concept and processes of evidence, models, and explanation

Teaching Standard B: Teachers of science guide and facilitate learning

Assessment Standard A: Assessments must be consistent with the decisions they are designed to inform

Content Standard D>Science as Inquiry>Earth and Space Science: All students should develop an understanding of objects in the sky

Content Standard E>Science and Technology>Content Standard E: All students should develop understanding about science and technology

FOR THE TEACHER: Prior to teaching the lesson, review the Magic of Hubble PowerPoint slideshow, slide notes. Download the interactive diagram of Hubble at: <http://www.imax.com/hubble/>.

MATERIALS:

- Computer connection to white board or LCD projector and screen
- Student copies of Hubble diagram at: <http://quest.nasa.gov/hst/images/HSTdigram.gif>
- 9x12 black construction paper, one per student
- 4-5 pcs. chalk for each student (1white/4 colored)
- Container of Wet Ones hand wipes
- Computer paper, 1-2 sheet per student
- Notebooks or paper, pencil for each student

ENGAGE

1. Display the first slide, The Magic of Hubble, and ask students to share what they know about Hubble and what types of space objects they think they might see in today's presentation.
2. Record student responses on chart paper or board to refer to during the Q&A following the slideshow presentation.
3. Ask students to take a moment to draw the Hubble Space Telescope (many won't be able to do this but that is okay).
4. If possible, go to the IMAX Hubble site at: <http://www.imax.com/hubble/> and display the Hubble animation on a large screen.
5. As you scroll over the telescope, discuss the parts of Hubble and ask students to draw and label the telescope in their notebooks.
6. If you are unable to connect to the internet to display the interactive telescope, you can print a picture to display or print one per group of students at: <http://quest.nasa.gov/hst/images/HSTdigram.gif>

EXPLORE

1. Use the engagement activity to begin the “Magic of Hubble” lesson.
2. Ask students to take 1-2 minutes to record what they have studied about space and the universe. Suggest that they begin with filling in the blank, “The universe is full of space “stuff” like _____.” Ask them suggest some of the objects that make up our universe. (You may want to record student responses on the board and add to it in the wrap-up)
3. Next, ask students to take 3-5 minutes to draw a simple pencil sketch of what they visualize the universe to look like. ***(pre-assessment)**
4. Introduce the “Magic of Hubble” slideshow using the student generated list of objects in our universe. Inform students that they will be learning about the Hubble Space Telescope (HST) and viewing a slideshow of the incredible images taken by Hubble including many of the objects they identified earlier.
5. In science notebooks or on a sheet of computer paper, students will make three columns labeled “STARS”, “GALAXIES”, and “PLANETS”.
6. Instruct students to sketch 3-4 images and record an interesting fact from each category while viewing the slideshow presentation.
7. Begin the slideshow with slide #2.

EXPLAIN

1. Take some time for a Q & A session and discussion following the slideshow.
2. Using their drawings from the presentation, students will create an “Our Universe” pastel drawing. ***(post-assessment)**
3. Reflecting on the Magic of Hubble slideshow, students will use the chalk to create their own drawing of “Our Universe”.
4. Allow ample time for students to complete their universe drawings.
5. Collect chalk and pass out hand wipes to each student to remove chalk.
6. Pass out one sheet of computer paper to each student to place over their drawing to prevent smudging when you collect them.
7. Ask students to pass in their pre-assessment universe pencil sketches with their drawings.

Options:**Galaxy Song:**

1. Prior to the lesson, download the “Galaxy Song” by Monty Python from iTunes for this extension activity.
2. Tell students that they will be listening to a song about our universe called “The Galaxy Song”.*
3. Play the song once and have students just listen, play it again and ask students to create a word “splash” of words in their notebooks. To organize the word splash, have students draw a box or circle in the middle of the paper and write “UNIVERSE” in it. As students listen to the song, have they write words and numbers about the universe anywhere on the paper.

YouTube Songs:

1. Prior to the lesson, download the NASA “Sun Song” YouTube video at <http://www.thechromatics.com/multimedia.shtm> and/or the “Space School Musical” YouTube video at <http://www.youtube.com/watch?v=Yh6cN1eKmp0>
2. Play the video(s) before students begin their drawings as a motivator.

EXTEND

1. Students will use their universe drawings and facts to write a brief narrative titled “The Magic of Hubble”.
2. Have students share their drawings and narratives with their group members and choose several students to share their work with the whole class.
3. Student artwork and stories should be filed in their portfolios or displayed on a bulletin board.

EVALUATE

1. Collect student pre-assessment pencil sketch, word splash, drawing, and narrative and grade using rubric: (each score is worth up to the total points. Ex: word splash is worth 10 points based on having at least 5 words that accurately identify space objects such as galaxies, stars, planets, asteroids, moons, satellites, etc. (Use the pre-assessment as a formative assessment tool to compare student learning)

Magic of Hubble drawing is creative and accurately displays space objects found in the universe	50 pt
Magic of Hubble narrative shows a clear understanding of the vastness of the universe and the objects found there	40 pt
Magic of Hubble narrative has accurate facts	10 pt

RESOURCES:

- 5E Instruction Model
<http://www.nasa.gov/audience/foreducators/nasaclips/5eteachingmodels/index.html>
- Hubble background and facts sheet
http://hubblesite.org/the_telescope/hubble_essentials/quick_facts.php
- Want to know more about the color and shape of Hubble images?
http://hubblesite.org/gallery/behind_the_pictures/
- Make a simple Hubble model http://hubblesite.org/the_telescope/hand-held_hubble/
- Hubble Diagram <http://www.pbs.org/deepspace/hubble/diagram.html> and
<http://quest.nasa.gov/hst/images/HSTdigram.gif>
- Hubble Timeline: A Decade of Discovery 1990-2000
http://hubblesite.org/hubble_discoveries/10th/
- How Hubble Works http://hubblesite.org/the_telescope/
- Explore Astronomy with Sky Charts, GSKY Browser and more
http://hubblesite.org/explore_astronomy/
- Find simple explanations for light-year and parsecs <http://www.wisegeek.com/what-is-a-light-year.htm>

Technology Integration:

- Milky Way galaxy facts http://www.windows.ucar.edu/tour/link=/kids_space/milky_way_ask.html
- WGBH, Teachers' Domain, "Hubble's Expanding Universe" video clip (3:50 min)
<http://www.teachersdomain.org/search/?mode=simple&query=universe>
- WGBH, Teachers' Domain, "Light Years" video clip (3:45 min)
<http://www.teachersdomain.org/search/?mode=simple&query=universe>