

Astrophysics

Students will be able to: Explain how scientists use observational technology to investigate exoplanets; describe the conditions necessary for life on a planet; synthesize knowledge of exoplanets into a newscast that includes visual, textual, and auditory information.

CONCEPT OVERVIEW

As space technology continues to advance, astrophysicists have increased their search for exoplanets, or planets that orbit stars outside of our solar system. Some of these exoplanets are in close enough proximity to their stars to possibly support life. During this lesson, students work together to produce a newscast on exoplanets and the most recent discoveries related to them.

Fundamental concepts

- Astronomy: observational technology, e.g., telescopes and space probes; electromagnetic spectrum; galaxies; solar systems
- Writing skills: summarizing articles

ACTIVITY OVERVIEW

Begin the lesson by asking students to describe the objects in our solar system. Ask them if they think there are other similar solar systems throughout the universe. Inform students that scientists have discovered many planets that revolve around stars outside of our solar system. Introduce the term *exoplanets*. Indicate that some exoplanets may even have conditions that could support life. Allow individual time to define key terms and answer pre-activity questions. Then lead a class discussion on the objectives of the activity.

Breaking News: Exoplanets: Students work as a group to develop a newscast that will report the latest news on exoplanet exploration. Students will take on different roles to produce and deliver the newscast to cameras as well as a live audience.

KEY TERMS

- exoplanet
- star cluster
- spectroscopy
- parsec
- light-year
- habitable zone
- electromagnetic spectrum
- space probe

PRE-ACTIVITY QUESTIONS

1. What technologies have scientists used to discover exoplanets?
2. How many exoplanets have scientists discovered?
3. How close is the nearest exoplanet?
4. What kind of information have scientists gathered about exoplanets?
5. What kinds of factors must be present for an exoplanet to be in the habitable zone?

Common Core Standards:

CCSS.ELA-Literacy.RST.11-12.2, CCSS.ELA-Literacy.RST.11-12.4, CCSS.ELA-Literacy.RST.11-12.7, CCSS.ELA-Literacy.RST.11-12.9

National Professional Organization Standards (Next Generation Science Standards):

HS-ESS1-2, HS-ESS2-7, HS-PS4-5

Curriculum Standards Description:

Determine central ideas in a text and summarize complex concepts; determine the meaning of key technical terms; integrate multiple sources of information from diverse media to address a question; synthesize information from a range of sources to understand processes; communicate technical information in multiple formats through a presentation; utilize different wavelengths of electromagnetic radiation to compare space objects; construct an argument supporting the relationship between certain factors and the presence of life; communicate technical information related to objects in the universe; explore technological systems.

MATERIALS / SOURCES

Internet access; computers with PowerPoint and projection capabilities; printer

BREAKING NEWS: EXOPLANETS

1. Divide the class into two groups. Have each group discuss who will fill each role to produce and deliver a newscast about the latest discoveries involving exoplanets.
 - a. Roles could include the following: researchers, writers, reporters, anchors, camera operators, producers, production assistants, and visual effects people.
 - b. Depending on the size of the groups, some people may be able to cover more than one role. For example, anchors and reporters may research and/or write some of their own stories.
2. Have the researchers search the Internet for background information and current stories related to exoplanets.
 - a. Have the researchers bring the background information and story ideas to a meeting of all class members.
 - b. As a group, read and discuss the background information, so all students in the class have a basic understanding of exoplanets and their discovery.
 - c. Then, as a group, choose the five or six current stories that sound most interesting.
 - a. Assign a writer and reporter to each of these chosen stories (reporters could serve as writers, if the group is small).
 - b. Also assign a writer to put together a summary of the background information, to be presented by the anchors at the beginning of the newscast.
3. Allow the writers to summarize each current story to be reported during the newscast.
 - a. Writers should aim to make the story as interesting and understandable as possible.
 - b. Writers should limit the story to a length of two to three minutes.
4. As the writers are working, have visual effects people come up with images to use for each story. If appropriate, these students could come up with simple animations to demonstrate concepts.
5. As the writers and visual effects people are working, have producers and production assistants construct the set and figure out the way that the anchors and reporters will work together to deliver each story.
6. When the stories are finished and visual effects are chosen, reporters, producers, and production assistants should work together to finalize how each story will be delivered. All involved should practice the newscast before it goes live.

Evaluation

Each group presents its newscast live in front of the other group. All participants should work together to make the delivery as smooth as possible. Camera operators record the newscast for future viewing by the participants. The group that views the newscast gives feedback to the other group's participants about content; they are asked to discuss which stories were most interesting and why. They also give feedback about delivery; they are asked to discuss which stories were presented in the most successful way and why.

Closure: Participants view the recording of the newscast. They discuss the content of the stories, and whether there were any stories that they wished could have been reported. They also discuss the process they used to research, develop, enhance, and report stories. Were there any things about the process that they would have changed? Students are then invited to write a page-long journal entry about what they learned about exoplanets and whether the newscast was a successful vehicle for communicating and learning.

RELATED LITERATURE

Inglis, Michael. *Astrophysics Is Easy! An Introduction for the Amateur Astronomer*. London: Springer, 2007. Print. Patrick Moore Practical Astronomy Ser.

National Research Council. *New Worlds, New Horizons in Astronomy and Astrophysics*. Washington, DC: Natl. Acad. P, 2010. Print.

Related Database Search - (exoplanet or "habitable zone" or "extrasolar planet")

Related Image Search - ("habitable zone" or planets)