



In Search of ... Stellar Populations

Description

Using the “NGC 346 in the Small Magellanic Cloud” lithograph, engage your students in a Level One Inquiry activity to compare young and old stars. A Level One Inquiry activity can help prepare students to be more independent thinkers. Students conduct research to answer questions they have about young stars.

Grade Level

High school: grades 10–12

Prerequisites

Students should be aware that gravity is a force of attraction between all masses in the universe. They should know that a star is a gaseous, self-luminous object held together by its own gravity and that stars vary in brightness, color, mass, temperature, and age.

Misconceptions

Teachers should be aware of the following common misconceptions and determine whether their students harbor any of them. Students may have misconceptions regarding the true nature of stars and think that all stars are exactly the same. All stars are not the same. Stars vary in brightness, color, mass, temperature, and age. For example, blue stars tend to be hot, bright, and very massive. They burn through their available fuel quickly and thus have short life spans. When they die, massive stars end their lives as supernovae. In contrast, yellow stars are cooler stars that slowly fuse hydrogen into helium and have a longer life span. When one of these stars dies, it gently puffs off its outer layers to form a planetary nebula and a white dwarf. Students may think that the only groups of stars that exist are galaxies, whereas star clusters are smaller groups of stars that reside within a galaxy.

Purpose

The purpose of this activity is to apply a Level One Inquiry technique, using images and text to compare young star to old stars. In this activity, the components of inquiry learning that students can practice are:

asking questions, planning and conducting investigations, using critical thinking skills, making comparisons, and communicating results. Students will make comparisons, formulate questions, and read for a purpose.

Materials

- “NGC 346 in the Small Magellanic Cloud” lithograph.
- Computer with Internet connection for researching answers.

Instructions for the Teacher

Preparation

- Obtain a lithograph for each student. Lithographs are available as PDF files at <http://amazing-space.stsci.edu/eds/tools/type/pictures.php>.
- Bookmark or identify as favorites the following suggested Web sites, and /or prepare a list of Web sites that students can access to obtain additional information about stellar populations.
 - Young Stars Sculpt Gas with Powerful Outflows:
<http://hubblesite.org/news/2005/35/>
 - Hubble Finds Infant Stars in Neighboring Galaxy:
<http://hubblesite.org/news/2005/04/>

Procedure

Evaluate your students’ misconceptions about stars by having them write down anything they know and understand about stars. Have students volunteer their ideas about stars. From those ideas, identify their misconceptions and discuss them with the class. Or, collect the papers containing their ideas about stars. From those ideas, compile a list of their misconceptions about stars and discuss them with the class.

Ask students to look at the images of NGC 346 and to write down three questions they want answered about the different colored/aged stars visible in this image. Compile a list of questions, and group students by common theme. Ask students to read the information on the back of the lithograph and check if any of their questions have been answered. Allow

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students to refine their questions by discussing them with their group. Have students use the Internet to research their questions. The Internet sites listed above can provide a starting point for their research. Instruct students on how to access other Web sites that may be appropriate.

Ask students to prepare a report in which they compare young stars to old stars. This report could be in the form of a slide show, a skit, a story, a graphic organizer, a Power Point presentation, or a written report—anything that conveys their understanding of the topic to another student, a group of students, or the entire class. Ask students to review their original questions to see if they were answered. Then ask them if they have any additional questions.

Instructions for the Student

Your teacher will ask you to write down things you know and understand about stars. You may be asked to share this information with the rest of the class. Study the images of the different colored/aged stars, and write down three questions about what you see in the images. Then read the back of the lithograph, and check if any of your questions were answered.

Your teacher will assign you to a group to research the answers to your questions. You can research your answers by using the Internet sites provided by your teacher. To demonstrate your understanding, your teacher will ask you to give a report that compares the similarities and differences between young and old stars. This report could be a slide show, a skit, a story, a graphic organizer, a Power Point presentation, or whatever presentation you think will communicate the information you learned about stars. You may be allowed to work individually or in small groups. You can make your presentations to another classmate, another group of students, or the entire class.

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At the conclusion of this activity, you will be asked to review your original list of questions and reflect on whether, through your research, they were answered fully, partially, or not at all. Your teacher also may ask if you thought of any other questions when you were researching the answers to your original questions.

Education Standards

Benchmarks for Science Literacy

American Association for the Advancement of Science:

<http://www.project2061.org/tools/benchol/bolframe.htm>

Grades 9–12:

The Physical Setting

A. The Universe

By the end of the 12th grade, students should know that:

- The stars differ from each other in size, temperature, and age, but they appear to be made up of the same elements that are found on the earth and to behave according to the same physical principles. Unlike the sun, most stars are in systems of two or more stars orbiting around one another.

McREL Language Arts Standards and Benchmarks

<http://www.mcrel.org/compendium/Benchmark.asp?SubjectID=7&StandardID=7>

Reading Standard 7:

Level 4 (Grade 9–12)

1. Uses reading skills and strategies to understand a variety of informational texts (e.g., textbooks, biographical sketches, letters, diaries, directions, procedures, magazines, essays, primary source historical documents, editorials, news stories, periodicals, catalogs, job-related materials, schedules, speeches, memoranda, public documents, maps).