NATIONAL GEOGRAPHIC
Activity*develop*

Multidisciplinary Exploration

Why take a multidisciplinary approach to exploration and research?

Overview

Students analyze the multidisciplinary nature of the Blue Holes expedition by determining the questions the scientists and researchers involved in the expedition were attempting to answer. They then construct a multidisciplinary approach for their own micro-expedition.

For the complete activity with media resources, visit:
http://education.nationalgeographic.org/activity/multidisciplinary-exploration/

Directions

1. What is multidisciplinary work?

Ask students to imagine working in the Blue Holes expedition team. Ask: *How do you think people with different scientific expertise contributed to the Blue Holes expedition?* Explain that when people from different fields, or disciplines, work together, they are taking a multidisciplinary approach. For example, in the Blue Holes Expedition, marine biologists, paleontologists, geologists, and others worked together to answer research questions. In this activity, students will explore the interconnection in the team's work. They will use these ideas to help them later on in creating their own multidisciplinary teams for their micro-expeditions.

2. Have students investigate team contributions to an expedition.

Have students use the National Geographic magazine article "Bahamas Caves: Deep Dark Secrets" and the Blue Holes Project website to examine the multidisciplinary nature of the expedition. Then show students the **Multidisciplinary Team** video.

Have students use the **Blue Holes: The Importance of the Team** graphic organizer for information about the team. In the second column, have them describe each participant's role with the Blue Holes Project. In the third column, have students write ways that the participants worked together, relied on each other, and benefitted from each other's contributions.

3. Discuss the value of exploration teams.

Have a whole class discussion about the benefits of having a team for the Blue Holes Project. Ask: *In what ways did the work of these experts interconnect? How were they dependent on each other to get data and samples? Could any of them have done this work on their own?*

Project the excerpt below from the end of the “Bahamas Caves: Deep Dark Secrets” article. Have students expand on their ideas for the multidisciplinary nature of the work by adding any new ideas to their graphic organizers (particularly the third column) from Step 2:

“One of the rewards of the expedition's multidisciplinary approach is the constant exchange of ideas and enthusiasm among scientists with wholly different backgrounds. Swart's work on speleothems will shed light on ancient climates, which in turn may explain how and when some Bahamian animal species went extinct—Steadman's and Albury's domain. Pateman's work on human remains may reveal as yet unknown connections between Lucayans and animal bones found in blue holes. Without the unique geologic structure of the inland blue holes—deep, dark, sheltered, with little tidal flow—specialized bacteria studied by Macalady would never have gained a foothold. And if the bacteria hadn't created an anoxic environment, many of life's species wouldn't have flourished in the caves and much of the biological evidence would have vanished.”

4. Determine and assess multidisciplinary aspects of your micro-expedition.

Have students work together to determine the areas of expertise that they will need for their micro-expedition. Have them use a two-column chart to list each student as team members in the first column and the different roles and areas of expertise they will be responsible for bringing to the team in the second column. Make sure they include roles of photographer and/or videographer in the list of roles. Last, have them write a list of guidelines for how they envision working together to accomplish their micro-expedition goal, making sure to describe both anticipated successes and difficulties. They will use this preliminary analysis to guide them in their micro-expedition implementation and they can refer back to it when they assess how their micro-expeditions went.

Modification

If there are time restrictions, assign one or two researchers to each team. Have students complete the chart and report their findings to the class.

Informal Assessment

Check students’ plans and ideas for the feasibility of their micro-expedition and presence of multidisciplinary aspects. Check their guidelines for working together for cohesion and authenticity.

Extending the Learning

This activity includes a long list of scientific fields—most ending in “ology.” Have students determine what this root word means and have them list of all of the fields or disciplines this expedition

includes. Ask: Which ones have you never heard of before?

Have students contact the park or other site where they will conduct their micro-expedition. Have them ask about work that researchers or scientists do at the site. Arrange a videoconference with people in the park or the researchers to discuss how they work with teams to accomplish their goals.

Objectives

Subjects & Disciplines

Science

- Biology
- Earth science
- Ecology
- Oceanography
- Paleontology

Learning Objectives

Students will:

- Analyze the contributions that different team members make to a research project
- Determine ways to divide responsibility for different aspects of their micro-expedition

Teaching Approach

- Learning-for-use

Teaching Methods

- Discussions
- Multimedia instruction
- Research

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Media Literacy
  - Learning and Innovation Skills
    - Communication and Collaboration
    - Critical Thinking and Problem Solving
- Geographic Skills
  - Asking Geographic Questions
- Science and Engineering Practices

- Planning and carrying out investigations

National Standards, Principles, and Practices

IRA/NCTE Standards for the English Language Arts

• Standard 12:
Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).
• Standard 8:
Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

National Council for Social Studies Curriculum Standards

• Theme 3:
People, Places, and Environments

National Geography Standards

• Standard 4:
The physical and human characteristics of places

National Science Education Standards

• (5-8) Standard G-1:
Science as a human endeavor
• (5-8) Standard G-2:
Nature of science
• (5-8) Standard G-3:
History of science
• (9-12) Standard G-1:
Science as a human endeavor
• (9-12) Standard G-2:
Nature of scientific knowledge
• (9-12) Standard G-3:
Historical perspectives

Preparation

What You'll Need

Materials You Provide

- Paper
- Pencils, pens

Required Technology

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Digital camera (and related equipment), Monitor/screen, Projector, Speakers, Video camera (and related equipment)

Physical Space

- Classroom

Grouping

- Large-group instruction
- Small-group work

Resources Provided: undefined

- Multidisciplinary Team

Resources Provided: Handouts & Worksheets

- Blue Holes: The Importance of Team
- Answer Key - Blue Holes: The Importance of Team

Background & Vocabulary

Background Information

Multidisciplinary works involves a team of people, each with a different skill set and/or area of expertise, that work together, building on each other's strengths, to accomplish a goal. Expedition planning and execution can be complex, so having multiple backgrounds and skillsets involved can contribute to richer findings and deeper understandings.

Prior Knowledge

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Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
anoxic	*adjective*	no oxygen in the environment.
anthropology	*noun*	science of the origin, development, and culture of human beings.
discipline	*noun*	field of study.
ecology	*noun*	branch of biology that studies the relationship between living organisms and their environment.

Term	Part of Speech	Definition
exploration	*noun*	study and investigation of unknown places, concepts, or issues.
interdisciplinary	*adjective*	having to do with more than one academic subject, or discipline.
multidisciplinary	*adjective*	involving more than one field of knowledge or expertise.
speleothem	*noun*	rock or mineral formations, such as stalactites and stalagmites, created in a cave environment. Also called a cave formation.

For Further Exploration

Articles & Profiles

- Microbial hotspots in anchialine blue holes: initial discoveries from the Bahamas

Partner