NSDL/NSTA Web Seminar
Beyond Penguins and Polar Bears: Integrating Science and Literacy in the K-5 Classroom--Polar Geography

Tuesday, May 27, 2008
Today’s NSDL Experts

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Overview of Presentation

1. Characteristics of the Arctic
2. Characteristics of Antarctica
3. Teaching strategies and K-5 resources from *Beyond Penguins and Polar Bears*

http://nsdl.org
“The first step toward understanding the polar regions is to develop a sense of place about the Arctic and Antarctic that makes them as separate in our minds as Austria and Australia, New York and San Francisco, or the Himalaya and the Adirondacks.”

– Galen Rowell, *Poles Apart*
Poll Question!

Where does the Arctic begin?

A. The Arctic Circle
B. 10 °C isotherm
C. Where treeline begins
D. Geopolitical borders
Where is the Arctic?

Several definitions:
1) Arctic Circle
2) 10 °C isotherm
3) Treeline
4) Political

“Where Does the Arctic Begin? End?”

Blog post
http://expertvoices.nsdl.org/polar
The Arctic: An ocean surrounded by land

Arctic Ocean: approximately 2 miles deep; ice cover ranges from 6 inches to 6 feet

Land includes portions of 8 countries and territories

Seasonal variation in Arctic pack ice

Tundra and permafrost

Photo by Chris Linder, Woods Hole Oceanographic Institution

Photo by Jef Maion, www.maion.com

http://nsdl.org
Arctic Weather and Climate

Mean summer temperature (°C)  Mean winter temperature (°C)
Plants: small shrubs, birch, alder, willow, grasses, mosses, and berries

Animals: terrestrial and marine mammals, birds, & fish

All images courtesy of U.S. Fish and Wildlife Service
Climate Change in the Arctic

Animation: Sea Ice Decline – Sept comparisons
National Snow and Ice Data Center

Age of winter sea ice in 2007-2008
Image courtesy of National Snow and Ice Data Center
Let’s pause for questions from the audience....
Poll Question!

How big is Antarctica

A. Twice as big as Alaska
B. About 1.5 times as big as the continental U.S.
C. About the same size as Africa
D. About half the size of the continental U.S.
From NIX (NASA Image Exchange)
http://nix.larc.nasa.gov/

http://library01.gsfc.nasa.gov/svs/a000987.mpg

NASA/Goddard Space Flight Center
Scientific Visualization Studio
Temperature trends in the last 50 years

Red = + 0.2 degrees C per year
Blue = - 0.2 degrees C per year

http://nsdl.org
West vs. East

Make a fist with your right hand, but leave your thumb out. This resembles the shape of Antarctica.

West Antarctic Ice Sheets

East Antarctic Ice Sheet

Cross Section of Antarctica's Ice Sheets

West Antarctic Ice Sheet

East Antarctic Ice Sheet

2 kilometers thick (1.25 miles)

3 kilometers thick (2 miles)

Sea Level
Land surrounded by water... the Southern Ocean

About 8.8% of Earth’s ocean area
About 8.7% of Earth ocean volume

Ocean moderates coastal temperatures

Sea ice extends the solid area around Antarctica every winter.

*Image courtesy of British Antarctic Survey*
Antarctic Weather and Climate

Mean summer temperature (C)

Coastal

Inland

Mean winter temperature (C)

Coastal

Inland
Seasonal Variation in Daylight

Polar day — period in summer in which sun doesn’t set
Polar night — period in winter in which sun doesn’t rise

Stamp the month marking the middle of winter in Antarctica:

|------|------|------|------|-----|------|------|------|-------|------|------|------|

http://nsdl.org
Living things on land

Adelie penguins

Emperor penguins

Wandering albatross

Skua
  (like a large gull)

Weddell seals on ice shelf
Living things in the ocean
Physical Geography

Continental-scale features:
Potential for sea level rise

https://www.cresis.ku.edu/research/data/sea_level_rise/index.html
Let’s pause for questions from the audience....
Strategies for introducing the polar regions to elementary students:

Content area reading

Reading, writing, and speaking

Graphic organizers

Nonlinguistic representations and kinesthetic experiences

Open inquiry and research
Develop student content knowledge through children’s literature and expository text

http://nsdl.org
Our **Virtual Bookshelf** lists children’s literature and suggestions for use.

http://nsdl.org
**Graphic organizers** assess prior knowledge and help students organize information.

<table>
<thead>
<tr>
<th>What do you know about the Arctic?</th>
<th>What do you know about Antarctica?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Prior Knowledge**

**Note-taking and organizing information**

<table>
<thead>
<tr>
<th>Location</th>
<th>Arctic</th>
<th>Antarctica</th>
<th>My hometown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography &amp; Landforms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3 volunteers: Compare and contrast the Arctic and Antarctica

http://nsdl.org
We highlight integrated **science and literacy** lessons and activities.

**Expedition to the Poles (Grades 3-5)**

[http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html)

Students will pretend they have just returned from a year in the Arctic or Antarctic. They will look at web sites about these regions and expeditions to them, and they will create posters illustrating their experiences. Students will conclude by writing paragraphs explaining what it would be like to visit the polar region that they did not focus on in this lesson. Use the feature story, virtual bookshelf, and downloadable informational articles (found in the virtual bookshelf) for student reading and research. Students can use a graphic organizer, such as this [table](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html), to record information.

This lesson meets the National Geography Standards: [Four](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html) and [Five](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html) and the National Science Education Standards: Science in Personal and Social Perspectives content standard for grades [K-4](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html) and [5-8](http://www.nationalgeographic.com/xpeditions/lessons/05/g35/expedition.html).

To further integrate literacy skills into this lesson, try the following:

**Exploring Compare and Contrast Structure in Expository Texts**


This lesson focuses on identifying and analyzing the compare and contrast text structure within expository texts. First, students are introduced to the terms compare and contrast and asked to find similarities and differences between two common items. Next, students work in small groups to identify texts that are comparing and contrasting information. Students are then introduced to the Venn diagram as a tool that demonstrates similarities and differences and aids in learning new material.

This lesson meets [NCTE/I.B.A Standards: 1, 3, 6, 12](http://www.readwritethink.org/lessons/lesson_view.asp?id=54).
An example of science/literacy integration for grades K-2:

**A Vacation to the Polar Regions**

Students learn about the polar regions and draw pictures or write stories depicting themselves on a vacation to one of them.

**Draw a Story: Stepping from Pictures to Writing**

Students draw a series of pictures to tell a story. They ‘read’ their story to others, transcribe their oral story into writing, and create an accordion book with drawings on the front and writing on the back.
An example of science/literacy integration for grades 3-5:

What Do People Know About the Arctic and Antarctic?

Students research the polar regions, interview people about the areas, and write compare/contrast paragraphs.

Exploring Compare and Contrast Structure in Expository Texts

Students learn to identify and analyze the compare and contrast text structure within expository texts.
Create **nonlinguistic** representations and provide **kinesthetic** experiences

Salt Dough Recipe:
- 2 cups flour
- 1 cup table salt
- 1 cup water

http://nsdl.org
A SENSE OF PLACE - ISSUE 1, MARCH 2008

Place and Location are two of the five themes of geography and a natural question for students to ponder. Location answers the question, “Where am I?” while the study of place connects the question, “What place connect to my hometown?” This issue of Beyond Penguins and Polar Bears is filled with ideas on teaching place and location. Students will learn about the dramatic differences in environment of the two dramatically different areas as well as their own hometown. Get ready for a lesson on sense of place!

Photo: Nuuk, Greenland. Copyright 2007 Thomas Overly.
Open inquiry and research allows students to explore topics of interest.

**Task**: Explore the *Beyond Penguins and Polar Bears* magazine and find one interesting article/idea/strategy to share with the group.

How could you incorporate this into your classroom?

Write your responses in the chat.
Interested in learning more about the polar regions?

More Beyond Penguins web seminars in fall 2008 and spring 2009

Beyond Penguins Tapped In Group: 
June 4, 2008 at 7 pm Eastern
http://www.tappedin.org

Beyond Penguins and Polar Bears: 
http://beyondpenguins.nsdl.org

http://nsdl.org
http://beyondpenguins.nsdl.org

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THANK YOU!

http://beyondpenguins.nsdl.org

http://nsdl.org
Go to [http://nsdl.org](http://nsdl.org) and click on the K-12 audience page to:

- Download our Seminar Resource List
http://www.elluminate.com