

Contents

| | |
|--|-------------|
| <i>Introduction</i> | <i>v</i> |
| <i>Project Skills Chart</i> | <i>vii</i> |
| <i>Project Assessment Rubric</i> | <i>viii</i> |
| Climate Change in Your Neighbourhood | 1 |
| Best Soils for Planting | 21 |
| BioBlitz | 44 |
| Tracing Family Health | 65 |
| Prescription for Health | 84 |
| Bike Routes to School | 108 |
| Household Hazardous Waste | 123 |
| Sound Around | 145 |
| Solar Energy Planning | 168 |
| Oil Spill | 188 |

Introduction

Students learn effectively when they have an opportunity to apply their knowledge to real-life problems. This book contains ten expeditions that engage students in real learning. Expeditions typically have greater scope and complexity than the usual classroom project. They are bigger, more ambitious undertakings which, in turn, offer opportunities for greater student engagement and more profound learning. Each project links students to a bigger issue in their community. The expeditions illustrate how education has relevance in students' lives today and in the future. Each one strives to give students new skills that can help them both inside and outside the science classroom. Many projects reach out to other content areas within a student's year level, allowing students to tap into knowledge from English, mathematics, geography, history or art.

You may choose to use some or all of the expeditions, and use them in the given order or in any order that suits your students' needs. For example, you might wish to start off the school year with the Prescription for Health expedition so that students can track their progress towards a healthy lifestyle throughout the year.

Expeditions in Your Classroom: Science Middle Years provides activities and materials that scaffold student tasks, set clear criteria for final products, and offer assessment tools and a detailed outline of project steps so that teachers can focus energy on instruction rather than on project management. Teachers will need to spend time with these materials in order to get a sense of each expedition and all of its components. Each expedition provides accessible routes to understanding for a broad audience of students.

Given the scope of each expedition, advance preparation is critical to successful implementation. As you prepare materials for each expedition, consider the needs of your classroom. You may wish to print out the student pages as a packet to give in its entirety to students, rather than hand them out in the suggested order. This will streamline your preparation time, as well as allow students who complete activities ahead of time to move on to the next phase as expeditions allow.

About Project-Based Learning

In *Real Learning, Real Work*¹, Adria Steinberg describes the qualities of powerful projects: the six A's.

Authenticity

Students work problems and questions that are meaningful and real. People outside school walls tackle the same challenges. What students create and do has value beyond school.

Academic Rigour

Students encounter challenging material and learn critical skills, knowledge and habits of mind essential for success in one or more disciplines.

Applied Learning

Students put their knowledge and skills to work in hands-on ways and learn how to organise and manage themselves along the way.

¹Steinberg, Adria. *Real Learning, Real Work (Transforming Teaching)*. New York, NY: Routledge, 1998.

Climate Change in Your Neighbourhood

Suggested Steps

Preparation

- Review all the materials and activities for the expedition. Note Student Pages that you'll need to photocopy.
- If desired, contact the local council, your state parks department and conservation organisations to invite them to class in support of the student expedition.
- Access weather data and prepare data tables of monthly average temperatures and monthly total precipitation for the past year for students. A good website for this information is the Bureau of Meteorology website, www.bom.gov.au/climate/current. Another good resource for Australia and other countries is www.weatherbase.com. You will need to click on the °C button at the top to change the degrees from Fahrenheit to Celsius.
- Access weather data and prepare data tables of monthly average temperatures and monthly total precipitation for the past 10 years for students. A good resource for this information is the Bureau of Meteorology's reports on climate, at www.bom.gov.au/climate/current.
- Access regional climate data and prepare a table with the monthly average temperatures and monthly total precipitation for your region.
- It might be beneficial to have a mathematics teacher to support analysis of data and a geography teacher to discuss geography, climate and influence on civilisations.

Day 1

1. Have students complete a quick-write, a short 5-minute written response to the following question: How has the climate changed in your area over your lifetime or over your parents' lifetime?
2. Have students discuss responses in pairs and as a whole class.
3. Clarify definitions of *climate* and *weather*.
4. Distribute **Before You Go: Weather Patterns**.
5. Have students complete **Section 1: Cycles of Weather** and discuss responses to the questions.

Homework

Students should complete **Section 2: Patterns of Weather** by describing the annual patterns of temperature and precipitation. Students will write a summary of an article on climate change found in the news media.

Day 2

1. Discuss student ideas on the annual patterns of temperature and precipitation.
2. In pairs, students share their summaries of the articles they read.
3. Distribute **Activity 1: Climate Discovery and Expedition Tool: 100 Years of Weather**.
4. Have students graph local temperature and precipitation data for the previous year and compare the data with their predictions.

Climate Change in Your Neighbourhood

Before You Go

Section 2: Patterns of Weather

Weather and climate are closely related, but they are not the same. Weather is what happens in the atmosphere around us every day. Climate is the pattern of weather over longer periods such as 100 years, and over broader areas, such as a region or the globe.

Examine your predictions for precipitation and temperatures for your area. Precipitation and temperature are the two key measurements analysed over 100 years to determine climate. Then answer the following questions.

4. What season of the year do you predict receives the most precipitation in your area – summer (December, January, February); autumn (March, April, May); or winter (June, July, August); spring (September, October, November)?

5. Look at the graphs of your predictions. Describe the two lines, noting any possible relationship between precipitation and temperature.

6. Find an article on climate change in the newspaper, on the Internet or in a magazine. Print or cut out the article to bring to class. On another sheet of paper, write a three-paragraph summary of the article to share with your class. The summary should identify the key points made in the article. Be sure to record the name of the publication, its date and/or the website.

Climate Change in Your Neighbourhood

Off You Go

Activity 1: Climate Discovery

| | |
|-------------------|---|
| Goal: | To learn about the climate of your area |
| Materials: | graph paper, notebook, weather and climate data |
| Tool: | 100 Years of Weather |

Directions

1. On a sheet of graph paper, use the data from your teacher to graph the local average monthly temperature and monthly total precipitation for the previous year.
2. Compare these new graphs with your predictions.
3. How did your predictions compare with the weather data from last year? Write the similarities and differences in the chart in the **100 Years of Weather Expedition Tool**.
4. Why do you think there were differences between your predictions and the actual data for last year?

5. Graph the climate data for your area.
6. How does last year's temperature and precipitation graph compare with the graph of regional climate data? Write three similarities and three differences in the chart in the **Expedition Tool**.
7. Why do you think the weather data varied from the climate data?

8. Think of a question you would like to investigate that could be answered by examining an additional 5 years of data. Write your question in the **Expedition Tool**.
9. With a partner, select either precipitation or temperature to investigate.
10. Select one of your questions to investigate, or write a new question to investigate using an additional 5 years of data. Write your final Investigation Question in the **Expedition Tool**.

Copyright © 2011 by Hawker Brownlow Education. All rights reserved. Reprinted from *Expeditions in Your Classroom: Science Middle Years*, by Henrietta List. Melbourne, Vic: Hawker Brownlow Education, www.hbe.com.au. To the extent not permitted by Part VB of the Copyright Act 1968, and subject to the terms of use for this resource, the purchaser of this resource may photocopy this page for their teaching purposes. Reproduction authorised only for use in the school site that has purchased the book.