How Does a Body of Water Affect Climate? Lesson 7   Grade 8, Science and Technology

Critical Learning

- Large bodies of water, such as oceans and lakes, have a moderating effect on surrounding places.
- This moderating effect results in milder temperatures in winter and cooler temperatures in summer.
- Larger bodies of water interact with the atmosphere, potentially causing severe weather conditions.

Guiding Questions

- What is the relationship between the water cycle, climate, and weather?
- How do large bodies of water affect the climate?

Curriculum Expectations

Understanding Basic Concepts

3. demonstrate an understanding of the characteristics of the earth's water systems and the influence of water systems on a specific region.

   3.1 identify the various states of water on the earth's surface, their distribution, relative amounts, and circulation, and the conditions under which they exist (e.g. water is a solid in glaciers, snow, and polar ice-caps: a liquid in oceans, lakes, rivers, and aquifers: and a gas in the atmosphere)

   3.5 explain changes in atmospheric conditions caused by the presence of bodies of water (e.g., differences in temperature near large bodies of water; microclimates; storms off coastal areas

Learning Goals

Students will be able to:

- identify the various states of water and how the various states of water are distributed around the world
- describe how lakes and oceans affect the weather

Instructional Components and Context

Readiness
- Note-taking strategy, e.g. Cornell Note Taking
- Choice Board

Terminology
- Moderate
- Variable
- Cause-and-effect
- Relationship
- Explanation
- Credible
- Reliable
- Timely

Materials
- Internet and/or library access
- Images of weather, e.g., photographs or drawings from a variety of sources
- Handout: **How Does a Lake Affect Climate?**

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Minds On (Elicit and Engage)

Pairs ➔ Making Connections

Display images of weather, (e.g., rain, snow, clouds, and fog). Using a **Think-Aloud**, **model** how to **explain** how the water cycle plays a role in creating one of the weather conditions illustrated. Emphasize that explanations describe components, how things work, and how parts interrelate.

Student pairs select an image and in a **Think-Pair-Share** practise explaining the role of the water cycle in their weather phenomenon.

Debrief with the whole class, pointing out that they are discussing cause-and-effect relationships, which are a particular kind of relationship or connection. Add that scientists are interested in cause-and-effect relationships and that this lesson focuses on the effect bodies of water have on climate in surrounding places.

A for L Assess students' understanding of conditions, relationships, and making connections. Students may need additional guided practice.

QuickTip
Use examples of graphic organizers to show different ways of representing cause-and-effect relationships.

A for L Check for understanding, noting which students may require additional guided practice. See **Strategy Implementation Continuum.**

Action! (Explore and Explain)

Investigation and Research Teams ➔ Using Documents

Pose the following: "People who live in coastal areas experience more moderate climates because of the effects of the ocean currents. Although we do not live near an ocean, in some places in Ontario and Canada people live near large bodies of water. I wonder if those bodies of water have a similar effect on the climate in those areas?"

With a Think-Aloud, model how to clarify (1) what you want to find out, (2) how to locate sources of information, (e.g., line graph), (3) where to locate sources of information, and (4) whether the source of information is credible, reliable, and timely. Explicitly connect modeling to the Continuum for Scientific Inquiry and Research Skills . See **The Ontario Curriculum, Grades 1-8: Science and Technology (Revised, 2007**), pages 15-16. The continuum describes the development of skills such as locating information, and determining which sources are credible and reliable.

Using an overhead, LCD projector or interactive whiteboard, show students a **line graph** that represents average monthly temperatures and precipitation for a city located at near Lake Erie. Model with a Think-Aloud, (1) how to orient yourself the document, (2) interpret the graph by making connections between components, and (3) take notes, e.g. using Cornell Note Taking or jot notes.

Guide students through a preview of the table: **How Does a Lake Affect Climate?**

Using the handout as a scaffold, groups continue analysis, interpretation, and graphing activities. Groups repeat the process for the other graphs.

In a Think-Pair-Share, students summarize their learning about the relationships between the water cycle, large bodies of water, and the climate of a particular region. Volunteers share with the whole group. Record their comments to reinforce learning.

QuickTip
Graphic texts can be excellent sources of information.

A for L Check for (1) understanding of impact of society on the environment and (2) explanation of relationships

Consolidation (Elaborate, Evaluate, Extend)

Whole Class/Individual ➔ Making Connections

Students briefly discuss to whom this kind of information is valuable, and why, (e.g., grape growers in Niagara or a new retiree who wants to live where there is less snow to shovel). In their Why do I care? Water Portfolio, students describe how they made connections between (1) the various elements of line graphs and tables in order to interpret them, (2) causes and effects, or (3) personal knowledge and new information.

Individual ➔ Independent Practice

Students select a topic from the **Choice Board,** (e.g., microclimates, snowstorms, or severe weather conditions such as hurricanes and tornadoes).

Students respond to the question in their Water Portfolio: What is the relationship between the weather condition you selected, the water cycle, and large bodies of water?

Home Connection

Extension: **Do Canadians talk a lot about the weather? A Journalist's Investigation**

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Minds On

Think-Aloud

Think-Aloud is an instructional scaffold that models thinking processes, making the invisible visible. In a Think-Aloud, the teacher verbalizes how effective readers process the text, e.g., by monitoring comprehension and using strategies to construct meaning. While teachers can think aloud at any point in an instructional sequence, Think-Alouds are frequent during the modeling phase of the gradual release model and during Read-Alouds.

See **Think Literacy Subject-Specific Examples : Language/English, Grades 7-9**, *Engaging in Reading: Reading Between the Lines/ Inferenc*e, page 3.

A Think-Aloud is a form of explicit instruction that requires teachers to be aware of their own thinking processes and that helps student think about their thinking. Developing metacognitive awareness is an important aspect of learning.

See **Metacognition Guide**.

Model

Modelling is a component of explicit instruction that is particularly helpful for struggling learners. According to the gradual release of responsibility model for instruction, modeling is done by the teacher and students observe (I do, you watch). This is followed by shared practice (I do, you help) and guided practice (you do, peers help), and finally independent practice (you do, I help if necessary).

See the **Strategy Implementation Continuum** for a detailed chart of this framework.

Explain

To be able to explain, students needs first to be able to identify, describe, define, and narrate. The question becomes: What distinguishes "explaining" from these other thinking processes? One answer is that explanations identify and describe parts but also show how those parts are connected to each other and to the whole. Explanations are about making connections.

See the **Types of Processing on the Mosenthal Taxonomy**.

Think-Pair-Share

Bennett and Rolheiser (2001) describe Think-Pair-Share as "one of the simplest of all the tactics" (page 94). As pointed out by Bennett and Rolheiser and Think Literacy (page 152), students require skills to participate effectively in Think-Pair-Share, for example:

- active listening
- taking turns
- asking for clarification
- paraphrasing
- considering other points of view
- suspending judgement
- avoiding put-downs

These skills can be modeled and explicitly taught. During group work, teachers can provide oral feedback and reinforce expectations.

Bennett and Rolheiser (2001) note additional considerations:

- the level of thinking required in a Think-Pair-Share
- accountability and level of risk, e.g., are all students expected to share with the whole group? (page 94)

See **Think Literacy Cross-Curricular Approaches, Grades 7-12**, pages 152-153.

Bennett, Barrie, and Rolheiser, Carol (2001). *Beyond Monet: The artful science of instructional integration.* Ajax, ON: Bookation.

Vocabulary

The words "affect" and "effect" are commonly confused. Take this opportunity to clarify or review the difference,(i.e. "affect" is a verb that describes a process of influencing something, whereas "effect" is a noun that refers to the result or consequence).

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Action!

Graphical Texts

See **Think Literacy Cross-Curricular Approaches** and **Think Literacy Subject-Specific Examples: Science and Technology** for approaches to reading graphical text. See the **Think Literacy Subject-Specific Examples: Library Research,** Grades 7-12 for organizers and approaches to resource evaluation, pp. 20-23. Criteria include: authority, accuracy, currency, completeness, objectivity and format of the information source.

Line Graph

Line graphs display information, or data, that changes over time.

Cornell Note-Taking and **Jot Note**s are two approaches to making notes.

Cornell Notes:

- Put the topic and date at the top of the page
- Draw a vertical line about 1⁄3 of the way across the page
- In the left-hand column, record main ideas
- In the right-hand column, record details and examples
- Use point form
- Begin a new point on a new line
- Draw a horizontal line across the whole page below the column notes
- Summarize the notes in 1-3 sentences
- Review notes as soon as possible.

See, for example, **Cornell Notes, The Learning Toolbox**.

Jot Notes

- Put a title and date at the top.
- Record in point form using bullets.
- Record a key word or phrase that will help recall important ideas.
- Do not worry about capitalization or punctuation.

Consolidation

Choice Boards are an instructional strategy for differentiating instruction. Students self-select from a menu of options. Choice is related to motivation, because it allows students to select according to their interests, learning preferences, and degree of challenge. It also helps develop self-regulated, independent learners who have some control over their learning process. For this activity, options may include ICT, (e.g., Inspiration or Smart Ideas). Choice Boards are most effective when both the choice board strategy and each of the options have been explicitly taught and practised and when students are enabled to make informed choices, (e.g., based on understanding of their learning preferences). Each choice must have clear assessment criteria. They are closely related to assessment as learning.

Home Connection

Do Canadians talk a lot about the weather? A Journalist's Investigation

You are a journalist. Your editor is interested in developing a feature for the newspaper or magazine on the belief that Canadians talk a lot about the weather.

Think about places and situations in which you might hear "weather conversations, (e.g., the dinner table, television, school, radio, internet).

Focusing on the 5 W's and H, note *how many* conversations you hear, *where* and *when* you hear them, what aspect of the weather is discussed, and *how* the weather impacts society.

Make a matrix (table) on which to record your information.

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What to Do

Think about what you already know about the water cycle and about how ocean currents affect the air above them.

Jot down 3 things that you think you'll be able to apply during this lesson.

Preview the table.
- Locate the title. What information does it give you?
- Locate the city column. In which direction do you read to locate information about that city?
- Locate the labels for each of the columns of data. What categories of information are given?

Climate Patterns for Four Cities near Lake Erie				
City	Distance from lake (km)	Average monthly temperature range (°C)	Number of frost-free days per year	Annual precipitation (cm)
A	0.0	7.6	205	73.6
B	1.6	8.8	194	81.4
C	48.3	10.8	162	94.0
D	80.5	11.9	154	97.5

Notes:
- "Average monthly temperature range" is the average difference between the maximum and minimum temperatures for the month.
- "Annual precipitation" is the total amount of precipitation per year.

Analyze each column.
- Examine the 2 left-hand columns. What does the Distance column tell you about how the list of cities is organized?
- Does the average monthly temperature range increase or decrease as you read down the column?
- Does the number of frost-free days increase or decrease as you read down the column?
- Does the annual precipitation increase or decrease as you read down the column?

Analyze relationships between columns.
- What happens to the average monthly temperature range as the distance from the lake increases?
- What happens to the number of frost-free days as the distance from the lake increases?
- What happens to the annual precipitation as the distance from the lake increases?

Make 3 line graphs of the data: temperature, frost-free days, and precipitation. Refer back to models.
- The x-axis is the distance from the lake.
- The y-axis is the other variable, (e.g., temperature range frost-free days, and precipitation) on the y-axis.
- Plot the line graph for each city using a different colour for each.

Interpret

1. How does distance from the lake affect temperature, frost-free days, and precipitation?

2. Hypothesize explanations for the relationships between the variables.