



Water Consumption Lesson 3		Grade 8, Science and Technology
<p>Critical Learning</p> <ul style="list-style-type: none"> • Water is fundamental to our way of life and also to the ecosystems upon which our lives depend. • Easy access to water has bred in many of us a disregard for how much of it we actually use in our daily lives. • Recent recognition of the scarcity of water in some parts of the world has caused us to look for ways to be more efficient in our water use, and to find technological solutions to help us use it more efficiently. 	<p>Guiding Questions</p> <ul style="list-style-type: none"> • What is our personal responsibility related to water? • How can we think globally by acting locally? • How does water consumption in different regions of Canada compare to water consumption in other developed countries and in developing countries? • What choices are families with restricted water availability forced to make? • What are possible health implications for families with restricted water availability? 	
<p>Curriculum Expectations</p>		
<p>Relating Science and Technology to Society and the Environment</p> <p>1. Assess the impact of human activities and technologies on the sustainability of water resources</p> <p>1.1 evaluate personal water consumption, compare it with personal water consumption in other countries, and propose a plan of action to reduce personal water consumption to help address water sustainability issues</p> <p>Developing Investigation and Communication Skills</p> <p>2. Investigate factors that affect local water quality</p> <p>2.6 use appropriate science and technology vocabulary, including water table, aquifer, potable, and freshwater, in oral and written communication</p> <p>2.7 use a variety of forms (e.g. oral, written, graphic, multimedia) to communicate with different audiences for a variety of purposes</p> <p>Understanding Basic Concepts</p> <p>3. demonstrate an understanding of the characteristics of the earth’s water systems and the influence of water systems on a specific region</p> <p>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)</p>	<p>Learning Goals</p> <p>Students will be able to:</p> <ul style="list-style-type: none"> • compare water consumption in Canada with that of a family in another country • examine the various states of water on the earth’s surface and their distribution • use scientific and technological vocabulary in oral and written work 	
<p>Instructional Components and Context</p>		
<p>Readiness</p> <ul style="list-style-type: none"> • Estimating • Collaborative learning, e.g., taking turns, making sure everyone understands, agreeing disagreeably • Active listening strategies 	<p>Terminology</p> <ul style="list-style-type: none"> • Perspective • Responsibility • Inequity 	<p>Materials</p> <p>For each group</p> <ul style="list-style-type: none"> • pails of water totaling 30 litres • large tub for “waste” water • one-litre measuring cup • wash basin <p>For each student</p> <ul style="list-style-type: none"> • Stop-Start-Continue • Canada’s Watery Lifestyle

Minds On (Elicit and Engage)

Whole Group → Appreciating Another Perspective

Show students a 5L bucket of water (outside, if possible). Students estimate (1) its mass and (2) how far they think they can carry it. Share estimates.

Tell students that, in parts of the world, people walk 1.5 km or more to obtain water. Provide a point of reference, e.g., Google “Earth,” or a distance within your school community, e.g., 15 lengths of a Canadian football field, 110 yards, or 100 metres, so students can conceptualize the distance. Invite students to lift and/or carry the water a shorter distance.

Debrief by asking whether they could they imagine carrying the bucket 3 kilometres, a typical return trip with a full pail of water.

Action! (Explore and Explain)

Small Groups → Using Problem Solving

Do shared reading of a water story using a print or electronic text, such as the story “**Denied My Right to Clean Water**” by Francis Anyaegbu, Nigeria.

Present a scenario.

“Imagine a family in this location with this situation: They have 30 litres of water for drinking, bathing, cooking, washing clothes, washing dishes, watering the garden, cleaning the latrine and watering the chickens.”

Students problem solve how to do all of those tasks with 30 litres. Display and orally review instructions:

- Use the measuring cup, wash basin, and tub to get a practical estimate of the quantities they are assigning to each task.
- Record the amount of water assigned to each task.
- Assess their success, e.g., Did everyone have enough water? Were important tasks given priority? Did they recycle water, e.g., by using bathing and clothes-washing water for other purposes? What is the minimum amount of water a person needs to bathe? What are possible health implications of such limited availability?
- Draw conclusions about how much water is needed versus how much water is used in countries like Canada. Make connections to the personal water audit from Lesson 2.

Consolidation (Elaborate, Evaluate, Extend)

Whole Class → Goal Setting and Planning

Share that in some parts of the world, people bathe with 250 millilitres of water. Share with students how much water Canadians use daily, contrasting usage to 30 litres. See “**Canada’s Watery Lifestyle**.”

Discuss the meaning of the paradoxical phrase “think globally by acting locally.” Model creating a plan of action using the Stop-Start-Continue organizer. **Co-construct criteria** for an effective plan.

Based on their personal water audit (from Lesson 2) and the learning in this lesson, students create a plan of action using the **Stop-Start-Continue** template.

Students then reflect on (1) their personal responsibility with respect to water and (2) how their plan of action shows that they can think globally by acting locally. Students add this reflection to their Water Portfolio.

Pause and Ponder

QuickTip

Vocabulary: Link to prior lessons and engage students by including a word wall vocabulary in an activity, e.g., **Share One, Get One**.

QuickTip

See (1) **reading strategies** and (2) **Strategy Implementation Continuum**

QuickTip

Review or establish norms for collaborative learning, e.g., disagreeing agreeably, making sure everyone participates.

A_{as}L Provide feedback on skills during **collaborative learning**. Groups can also use a checklist or Likert scale to self-assess.

A_{as}L Provide feedback on action plan development. Note which students require guided practice to develop a feasible plan. Collect and return to them next class with written feedback. Alternatively, explicitly teach students how to provide feedback to each other.

A_{as}L Collect Water Portfolios and return to them next class with written feedback.

Minds On

Vocabulary

Effective vocabulary-building practices include the following:

- Knowing a definition is not synonymous with understanding a word.
- Word knowledge is built incrementally.
- Be selective. Limit words to those essential to the unit and to those students will use during teaching-learning activities.
- Include proper names.
- Students need to hear words used in context, and to practise using words themselves in context about a half-dozen times.
- For multi-syllabic words, pronounce words clearly while cueing students to word parts visually so that students both hear and see words.
- Associate words with visual symbols and with words students already know.
- Use colour and clustering, e.g., concept maps and mind maps, to show connections between words.
- Gradually build understanding of the multiple meanings of words.
- Use semantic maps to focus on related words, explanations, what it isn't, word roots, prefixes and suffixes, and word history (how it came to mean what it does).

Resources for Vocabulary Building:

Allen, Janet (1999). *Words, Words, Words: Teaching vocabulary in Grades 4-12*. Stenhouse.

Marzano, R. J. (2004). *Building Background Knowledge for Academic Achievement: Research on What Works in Schools*. Alexandria, VA: Association for Supervision and Curriculum Development.

Share One, Get One

Prepare cards, e.g., cue cards, with terms on one side and an informal definition on the other. Each student draws one card. On a signal, students mingle and on a second signal, join a partner. One student asks the partner to explain the term, using the informal definition, if necessary. Students switch roles and then exchange cards. On a signal, students mingle again. Repeat process so that each student uses several cards. Once students have practised this routine, the activity can be efficiently completed in 3-5 minutes.

Research-based activities would also be appropriate, for example:

- creating a word jar/box containing words, an informal definition, and a visual symbol
- collaboratively creating concept maps categorizing words and showing the relationships between them

Action

Reading Strategies

Reading comprehension strategies are tools effective readers use to make sense of text. These include but are not limited to:

- making and adjusting predictions
- reading with a purpose
- making connections
- visualizing
- questioning
- summarizing
- using graphic organizers, such as, KWL and Probable Passage

What students select to use in this lesson will depend on (1) which strategies have been taught and practised previously and (2) what students know about their own learning strengths and needs. Anchor charts identifying strategies modeled and practised are helpful reminders.

See **Think Literacy Cross-Curricular Approaches, Grades 7-12**, pages 7-95.

Strategy Implementation Continuum

It is important that the teacher model each strategy or skill with a Think-Aloud before engaging students in shared and guided practice.

See the **Strategy Implementation Continuum** (gradual release model).

Provide feedback on effective strategy use as students use the strategy.



Collaborative Learning

Cue students to practise collaborative learning skills, for example:

- taking turns
- making sure everyone understands
- agreeing disagreeably
- practising active listening.

These may be on an anchor chart in the classroom.

Note: Collaborative learning skills also need to be modeled and explicitly taught. Provide scaffolds, such as anchor charts, and specific, constructive, oral feedback during collaborative learning activities. Hold students individually and collaboratively accountable.

See Bennett, Barrie and Rolheiser, Carol (2001). *Beyond Monet: The Artful Science of Instructional Integration*. Ajax, ON: Bookation. p. 289.

Anchor Charts

An anchor chart is a strategy for capturing students' voices and thinking. As such, anchor charts are co-constructed by the teacher and students. By making students' thinking visible and public, anchor charts "anchor," or stabilize and scaffold classroom learning. Anchor charts should be developmentally appropriate, clearly focused, accessible, and organized.

Consolidation

Success Criteria

Success criteria provide students with a clear description of what successful attainment of learning goals looks like. When students know and understand the success criteria, they have a clearer picture of the targeted learning, and what they need to do in order to be successful. Developing success criteria early in a unit or task, encourages students to actively monitor and self-regulate their own learning.

When developing criteria:

- Describe observable behaviours in clear, detailed, student friendly language
- Create descriptions which allow for a range of performance
- Ensure that the list of criteria is manageable
- Engage students in the development process – this encourages a shared understanding of the criteria, gives students a greater sense of control, and initiates students in the use of specific language which describes their learning

When using success criteria:

- Post the criteria (e.g., on an anchor chart), and refer to it when discussing learning goals and providing feedback
- Provide students opportunities to communicate about their learning and performance, making specific references to the success criteria
- Develop other assessment tools (e.g., checklists, rubrics) that are based on the assessment criteria, and make explicit for students the connections
- Use anonymous samples of work, and engage students in analysing and critiquing the samples using one or more of the success criteria
- Provide multiple opportunities for students to analyse and critique their own work, and set goals and next steps, if adjustments are needed

See **Learning Goals** and **Success Criteria**.

Co-constructing Criteria

Co-constructing criteria is the process of working collaboratively with students to develop the criteria and indicators for successful demonstration of knowledge and/or skills related to learning goal.

See **Learning Goals** and **Success Criteria**.

Stop, Start, Continue

A Plan of Action

<p>STOP Something that you should stop.</p>	<p>What are you doing that is currently not working?</p>
<p>START Something you should start.</p>	<p>What should you put in place to improve?</p>
<p>CONTINUE Something you should continue.</p>	<p>What is working well?</p>