

1 Mining Matters

The Ontario Curriculum Grades 1–8: Science and Technology, 2007 (Revised)

Code	Specific Expectations
Relating Science and Technology to Society and the Environment	
1.1	analyse the positive and negative impacts of human interactions with natural habitats and communities, taking different perspectives into account, and evaluate ways of minimizing the negative impacts

The Ontario Curriculum Grades 1–8: Language, 2006 (Revised) — Media Literacy

Code	Specific Expectations	Teacher Prompts
1.1	identify the purpose and audience for a variety of media texts (<i>e.g., This video was created by the mining industry to convince viewers that the mining industry has changed, for the better.</i>)	Why do you think this video was created? Who is it aimed at? How do you know?
1.3	express opinions about ideas, issues, and/or experiences presented in media texts, and give evidence from the texts to support their opinions (<i>e.g., I think this video about the mining industry is one-sided because it shows only the mining industry as being good for the land; not how they have failed in preserving the habitats of many living things.</i>)	Which parts of the video were more convincing than others? Why do you think so? Did anything seem exaggerated? Explain.

Opening Scenario

Humans depend on the products of rocks and minerals in the ground for everything that is necessary to live their lives, including copper to carry electricity in wires, salt in our food, and pumice in our toothpaste. We get these materials from the ground by mining. Unfortunately, if mining is not carried out in a responsible way, natural habitats and communities can be adversely affected. How can we continue to benefit from the materials that are mined and still ensure that the natural environment is protected for the benefit of future generations? Watch the video “Mining New Opportunities – Part 1” to learn how the mining industry promotes the changes it has made over the years.

Big Ideas

- Changes to habitats (whether caused by natural or human means) can affect plants and animals and the relationships between them.

In this Unit, the Big Ideas have been further developed to include the following:

- Certain mining practices can cause harm to the environment or society.
- Sustainable mining practices minimize risk to the environment and maximize benefits to society.
- Humans must be aware of changes and impacts of mining practices on communities and try to control them.

Media Viewing Strategies

1. Before viewing the video, discuss the following with the students to help determine their prior understanding and knowledge about the subject content and purpose of the media text. You may discuss these again after the video to clarify or add to their knowledge. Use a think, pair, share strategy to discuss the following:
 - Why do you think the mining industry would create a video about mining?
 - What clues might you hear or see as you watch the video that would tell you that it was created by the mining industry?
 - Introduce the following vocabulary before you watch the video, to help students understand the narration: *efficiency, impact, sustainable development* (that term is defined in the video), *compromise, toxins, collaboration, remediate, rehabilitate, reclamation, closure planning*.
2. Help students focus on the video as they view it by asking the following questions:
 - At the beginning of the video, listen for the different artifacts that the Aboriginal people produced from minerals over 10,000 years ago.
 - Watch for the definition of “sustainable development” (*development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*). Think about how you could put that definition into your own words.
 - Listen to Micah Winter; how does he feel about mining? (*not opposed to it as long as the environment is protected*)
 - Shane Matson describes how a wetland is used. How does a wetland remove toxins? (*filters out some of the toxins*)
 - Watch for some of the activities that the mining industry does to reclaim the land after it has been mined. (*buildings are razed, trees and natural grasses are planted and wildlife habitat is restored*).
3. Show the video **Mining New Opportunities – Part 1** to the students.

4. Continue to use the T-chart to list the arguments in support of (+) and against (-) for the other statements discussed in Step 2 above.
5. In groups, have the students complete the Investigation by using a variety of library and Internet resources to research their role. Suggested roles are listed in Step 7 below but you may wish to create your own as well.
6. Ask the students to use the following Problem Diagnosis Chart to organize their thinking.

(A) The Desired Goal	(B) Blocks	(C) Causes	(D) Solutions

Below are the explanations for each of the categories in the chart. A sample response for a mining company employee is provided in italics:

- (A) What is the desired result or outcome? (*You want to see a mine developed on the site.*)
 - (B) What is preventing us from reaching the goal? (*The communities living on the land fear mining practices.*)
 - (C) What caused the problem? (*Past mining practices left people fearful of how the land had been harmed; how there were job losses when the mine closed; and so on.*)
 - (D) What can we do? (*Show the communities how we've changed.*)
7. Have the students present their points of view by way of a role play (see Appendix 2: Action through Research – Role-Playing), representing the perspectives of a mining company employee, an ecologist, a family who lives in the community, and a member of the Aboriginal community living near the proposed mine site.

In the Investigation, students should consider:

- The variety of ways in which mining companies have attempted to reverse the damage caused to the natural habitats
- The community's feelings about increased traffic congestion, pollution, increased (possibly unwanted) population when the mine starts to be built and then operated
- The thoughts of the First Nations communities about what happens to their traditional ways of living on the land
- The increased wealth of the community if a mine operates (increased population leads to opportunities to build community centres)
- The concerns of what happens to the livelihood of all concerned when the mine stops operating

Differentiated Learning

ESL/ELD/Remedial

- You may wish to complete parts of the chart before giving it to some of the students. For example, you could list one or two “Desired Goals” and have them start from there to fill in the other categories.
- Some students find it easier to express themselves in role play as opposed to the written word. Ensure these students have the chance to participate (perhaps even more so) in this part of the activity.

Enrichment/Extension

- Encourage students to check out additional resources on the topic of mining, endangered species, habitats etc.
- Have students use the Problem Diagnosis Chart to think about other kinds of problems they encounter during the school day. For example, a desired goal might be to play cooperatively in the schoolyard with everyone. Then they can work from there to complete the other categories.

Assessment and Evaluation

1. During the Investigation, students will learn one or more of the following:
 - The changes to habitats and communities caused by mining practices
 - The impact of mining practices on habitats and communities
 - Measures that can be taken to implement sustainable mining practices
2. Use the applicable Rubrics from Appendices 5-8 with the above to assess students’ knowledge and skills.
3. Use Appendix 10 for the Role Play assessment.

Tell Me More – Taking a Strip Off – or Not!

Literacy Strategy: Monitoring and Repairing Understanding (using Context Clues)

Background information

Students use a variety of strategies to monitor their understanding and/or “fix-up” their understanding if it breaks down (i.e., to repair comprehension). In this Tell Me More, students will hone in on strategies that help them, as readers, infer the meaning of unfamiliar words and concepts, using context clues embedded in the text.

**Literacy Strategy:
Monitoring and
Repairing Understanding
(using Context Clues)**
adapted from *A Guide to
Effective Literacy
Instruction, Grades 4 to 6,
(2006), Volume One,
pp. 54-55.*

Context refers to the text surrounding a word or passage. Students succeed when they have opportunities to work with new vocabulary before and after finding it in challenging texts.

Examples of context clue strategies that could be used for this article include: ■

- **Example** – the unfamiliar word is illustrated by one or more examples (e.g., recreation)
- **Description or definition** – characteristics or features of the unfamiliar word are described or explained (e.g., sustainability problem)
- **Elaboration** – additional information about the unfamiliar word is given in the sentences that follow it. (e.g., surface mines)
- **Signal words** (e.g., ‘which means’, ‘such as’, ‘the problem is’, ‘because’, ‘either ... or’ and ‘in addition’)
- **Typography and Design** – design features draw attention to important words and concepts (e.g., headings, sub-headings, diagrams, illustrations, bold font, and brackets)

Before Reading

1. Help the students activate their prior knowledge and vocabulary about mining practices and the importance of habitats. In small groups, have them jot down their key ideas on slips of paper or sticky notes and then categorize them. As a class, record the key vocabulary words on chart paper or the overhead.
2. Print the following terms on cardstock, large enough to be seen by all students. Have at least one card for each group of students (duplicate if necessary)

sustainability problem	surface mines	ecologists
pollution	contaminated	biodiversity
best management practices	non-sustainable mining	endangered
reclaimed	sources of minerals	habitats

3. Print the first two sentences of the Tell Me More for all to see. (*i.e., Mining in Canada began in the early 1800s. About 60 years ago, though, the demand for raw materials to make houses, roads, cars, and other products really took off.*)
4. Model the strategy of using context to understand key words by reading the first two sentences from the Tell Me More. Think aloud as you read. For example: *“Raw materials – I wonder what that means – well, in the first sentence they talk about mining and I already know about mining; it’s when we dig rocks and metals from the ground. Then it goes on to say that houses, roads, and cars are made out of the ‘raw materials’ – so I think that refers to the metals that they mine.”*

Note

You may wish to create a chart called Context Clues to display the following clues for use as students read the Tell Me More.

5. Distribute the Tell Me More. Have the students look over the article, noting the headings, sub-headings, diagrams and illustrations. Ask them to look for words that are in bold font and/or brackets. As they are looking, distribute the words on the cardstock that you made earlier.
6. Ask the groups to look for their words in the text and see if they can find a meaning for each word. If you have made a Context Clues chart, ask students to refer to it to help them explain why the clues were useful. Share the meanings with the class.
7. Optional – Discuss the usefulness of the clues (*e.g., it avoids having to check a dictionary all the time because you can make good guesses using the text itself; it makes the reading go faster because the meanings are right there; the meaning is specific to what you are reading about*)

During Reading

1. Students will read “Taking a Strip Off – or Not!” individually. They may need to read the text more than once in order to use a variety of context clue strategies.
2. As students read the article, remind them to use the context clues to help them understand any other unfamiliar words.

After Reading

1. Redistribute the word cards, so that each group gets a new set. Have them find the meaning of their ‘new’ word from the text.
2. In groups, have the students decide on how they used context clues to understand the text using a “Numbered Heads” strategy (i.e., number students in each group from 1 to 4; if there are only three in a group, #3 answers for both 3 and 4. The expectation is that all students in a group will be able to provide a response when called upon. Randomly call on a number from each group to respond for his/her group. Call on other numbers for further questions or discussions.)

Differentiated Learning

ESL/ELD/Remedial

- Develop science-specific vocabulary strategies for vocabulary building, such as finding root words.
- Build a word wall for all specific vocabulary in this unit and encourage students to refer to the wall often.
- Give students their own copy of the Context Clues chart.
- When working in groups, pair struggling students with students who can work more independently.

Enrichment

- Encourage students to investigate the advantages and disadvantages to habitats and communities of a variety of mining practices, such as surface and underground (sub-surface) mining.
- Research appropriate guidelines to ensure that mining practices are sustainable.