

Grade 4 Science

Earth and Living Systems

Introduction to the Unit &
Learning Maps

Introduction

"Two-Eyed Seeing" refers to learning to see from one eye with the strengths of Indigenous ways of knowing and from the other eye with the strengths of Western ways of knowing and to using both of these eyes together.

(Mikm'aw Elder, Albert Marshall)

Indigenized Instructional Practices are:

- Holistic
- Collaborative
- Relational

The four pillars of Indigenous Ways of Knowing:

- Storytelling
- Land Based Learning
- Leadership/Language
- Healing

(Elder, Consultant and Educator Donna Ross-Donna is Cree-Métis from Saskatchewan and member of the One Arrow First Nation, Treaty Six territory.)

Teacher Notes

Instructional Design:

When approaching the specific [Teacher Quality Standards](#) regarding First Nations, Métis and Inuit learning, Alberta teachers are often perplexed as to their level of competency within these areas. It is important for teachers to consider both their pedagogical approach to learning as well as the content and resources being utilized to fully meet the standards. The following series of tasks utilizes a student-centered pedagogical approach along with authentic Indigenous created content to uncover the General Learner Outcomes from the Grade 4 Science Program of Studies and to satisfy the Teacher Quality Standards as set out by Alberta Education.

To fully honor the Indigenized Instructional Practices and the four pillars of Indigenous Ways of Knowing as shown above, this unit of study provides foundational knowledge for teachers and students to begin the process of building a relationship with a local plant relative, the land, and ideally, a local Elder or Knowledge Holder. To create a resource that focuses on one Indigenous communities' culture, language, knowledge and history would not truly reflect the rich diversity of Indigenous Peoples within Alberta. Therefore, multiple groups of Indigenous peoples are represented in this resource that share a common



worldview. It is critical for teachers to understand the value of creating relationships with local Indigenous culture, language, knowledge and history. For example, the concept of “Learning from Place” allows us to recognize that one community of Indigenous peoples might have a use of a strawberry plant that differs from another community. It honors the local peoples to know the difference.

“Indigenized” thinking tasks are designed utilizing instructional routines that challenge the traditional power dynamic in a classroom. Students will actively navigate their learning by participating in thinking tasks to generate meaning in an independent and collective manner while teachers are actively listening and observing student knowledge. There is a noticeable shift from “learning about” to “learning from”. Students and teachers have the opportunity to focus on learning from the land, and Elder, a picture, or a peer.

Learning Maps

*These thinking tasks are designed to be highly inclusive. They follow a UDL (Universal Design for Learning) approach to learning. Possible levels of student achievement within the Grade 4 Science General Learner Outcomes are addressed with the **Learning Map** and then supported with student-led** and Building Thinking Classrooms***style instructional routines. A teacher should consider their classroom population when observing the learning map prior to the task to ensure it represents the community of students within their classroom.*

Both teachers and students have an ongoing opportunity to assess, reflect and report upon the learner outcomes by referring to the Learning Map provided throughout the learning and assessment cycle.

The teacher’s role is to ask questions, listen to and observe the learning taking place while students participate in the learning tasks. The teacher can be responsive to the learning that is generated after the learning has taken place during consolidation/sharing times.

This pedagogical approach benefits all students by allowing opportunities for students to think critically and use metacognition to deepen learning. Students will develop skills that lead to agency over their learning. The students will reflect and think about their thinking and share their thoughts with the community.

This pedagogical approach benefits teachers by building the foundation for sound, sustainable instructional and assessment practices.

A teacher may find that many more General Learner Outcomes and Specific Learner Outcomes are being met through the use of these instructional routines if they are followed with fidelity.

As with any routine, it takes time for students and teachers to see and feel the benefits and the purpose of this novel instructional routine.



Each task begins with “Starting in a Good Way”. The intention during this time is to get student’s minds, bodies, hearts and spirits ready to learn.

As the graphic below shows, learning may be designed to follow one of two paths, by either initially “Weaving Knowledge” (using student’s previously learned knowledge) or by “Gathering Knowledge” (providing students with new knowledge). Either way, students will experience prompts to process and generate shared knowledge through the thinking tasks provided.

The daily thinking tasks are designed to fit into a 40 to 60 minute block. The teacher can choose the length of the time required for each section of the learning to suit their schedule.

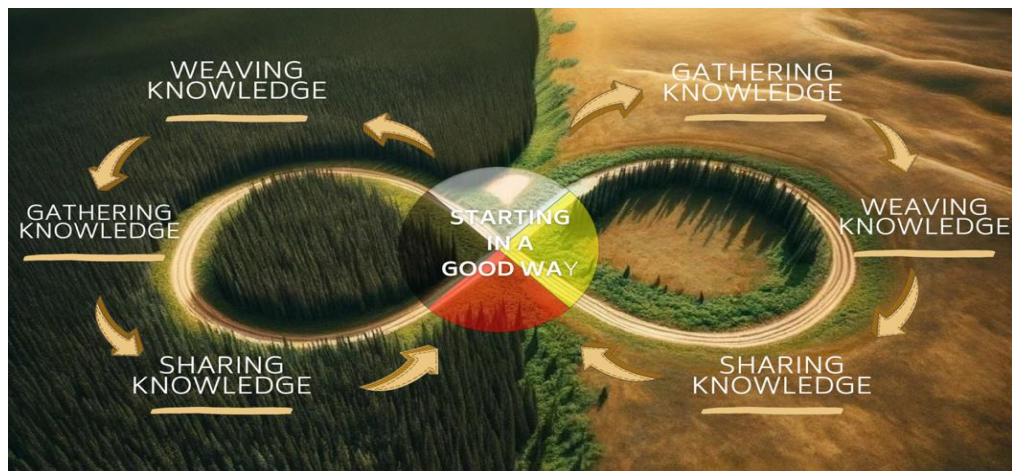
Elder and Knowledge Keeper Voice:

As educators working towards involving authentic Indigenous voices into our programming, it is important to remember three things.

1. **Engaging Elders and Knowledge Keepers/Holders:** Elder voice is critical for finding direction and incorporating knowledge into our programming. Our Elders work very hard to support their families within their local communities. While our Elders are eager to provide support to people outside of their local community, they do experience fatigue from their work. Be respectful of their time and ensure that requests made are reasonable and specific. For example, asking an Elder to spend an entire day talking to multiple large groups of students about their experiences in Residential School can be exhausting. Asking an Elder to share knowledge about your local Indigenous communities’ relationships with plants can be uplifting for them. Offering protocol and an honorarium, as per your school division’s guidelines will demonstrate the willingness for a reciprocal relationship. Respectfully honoring and fostering an *ongoing* relationship demonstrates a commitment to the Truth and Reconciliation Calls to Action.
2. **Authentic Indigenous Resources:** Authentic Elder and Knowledge Keeper/Holder voice first is always preferable to utilizing online resources. With that, there can be barriers to fostering those relationships. If a teacher must use online resources it is important to ensure that the teacher is aware of the authenticity of the online resources. Who created and is sharing these resources? Does the resource reflect the beliefs, culture and knowledge of your *local* Indigenous Peoples? Does the purpose of the resource match the purpose of the intended learning?



3. **Place:** Alberta is a province with many Indigenous communities. It is critical that a teacher is aware of what group (s) of Indigenous Peoples makes the land they are on home. It is respectful to ensure that students are aware of the historical relationship the Indigenous Peoples have with the settler community on the land we all walk. When using text and digital resources, note who the author is and attempt to use resources that reflect the local Indigenous Peoples culture, language, knowledge, beliefs, and traditions. Being respectful to local Indigenous Peoples language culture, knowledge and tradition will ensure that pan-Indigenization does not take place.



Learning Maps



Grade 4 Science Learner Outcome: “Students analyze organisms and relate external structures to functions.”					
	Approaching	Essential	Developing	Confident	Extending
Knowledge	I know that plants or animals have different body parts.	I know the names of external parts of plants and animals.	I can match external structures to specific organisms.	I can group organisms based on similar and different external structures.	I can observe and describe external structures in detail using drawings, labels, or descriptions.
Knowledge	I can name and point out body parts of plants or animals.	I know that different body parts on plants and animals have different jobs to do.	I know how a body part helps an organism survive.	I know how different structures help organisms live in their environment.	I know how external structures are adaptations that help organisms survive in different environments.
Skills and Procedures	I can notice differences in environments.	I can compare different environments.	I can explain how external structures help organisms adapt to their environment.	I can analyze how changes in the environment affect the survival of organisms and their structures.	I can predict how organisms might adapt over time in response to environmental changes.
Understanding	I understand plants and animals can grow.	I understand the earth is home to many plants and animals in many differing environments.	I understand human activities impact environments and the survival and growth of organisms .	I can evaluate how human actions influence the ability of organisms to adapt and survive.	I can use my understanding of structures and functions to solve real-world problems.

Grade 4 Science Learner Outcome: "Students investigate the systems of Earth and reflect on how their interconnections sustain life."					
	Approaching	Essential	Developing	Confident	Extending
Knowledge	<p>I know the Earth.</p> <p>I know the Sun.</p>	<p>I know the earth has air, water, land and life.</p> <p>I know that the Sun gives heat and light</p>	<p>I know the Earth has systems to support life. IE: Atmosphere, hydrosphere, geosphere, biosphere.</p> <p>I know living things need the Sun to survive.</p>	<p>I know specific examples of how Earth's systems interact with each other.</p> <p>I know sunlight and warmth affect where and how organisms live.</p>	<p>I know how one Earth system can affect another and can give examples.</p> <p>I know how life on Earth depends on the Sun and what happens when sunlight is limited.</p>
Knowledge	I know water.	I know water sustains life for all plants and animals.	<p>I know First Nations, Métis, and Inuit view water as sacred.</p> <p>I know traditional teachings/stories about water in Indigenous cultures.</p>	I know how I view water and can share ways to honour and protect it.	I know Indigenous views of water can be compared with other worldviews or scientific understandings
Skills and Procedures	I can interact with nature.	I can observe and recognize that Earth's systems are connected and can affect each other.	I can observe and explain how changes in one system affect others and living things.	I can explain why it is important to protect the Earth's systems.	I can reflect on how Earth's systems sustain life and propose ways to protect them.
Understanding	I understand how I feel when I am interacting with nature.	I understand how my own activities can impact nature.	I understand how human actions impact the atmosphere, biosphere, geosphere, and hydrosphere.	I can analyze and compare how human activities affect Earth's systems and life.	I can suggest and support actions people can take to protect Earth's systems and life.

Grade 4 English Language Arts Learner Outcome: "Students develop listening and speaking skills through sharing stories and information."

	Approaching	Essential	Developing	Confident	Extending
Knowledge	I know about listening. I know about speaking.	I know listening and speaking passes information from person to person.	I know listening and speaking helps me learn.	I know listening and speaking helps others learn.	I know sharing knowledge and stories creates new ideas.
Skills and Procedures	I can listen when others speak. I can take turns speaking.	I can share ideas or information using simple words and sentences.	I can tell a short story or give information with details and a clear order.	I can speak for different purposes and adjust how I speak for my audience.	I can share ideas in group discussions and build on others' thoughts.
Understanding	I understand when it is important to listen and to speak.	I can understand others' experiences by listening and speaking to them.	I can enhance my knowledge by speaking and listening to others.	I can explore learning in many situations by respectfully listening and speaking.	I can use verbal and nonverbal tools to enhance my communication when speaking and listening,

Grade 4 Math Learner Outcome: Students multiply and divide natural numbers within 10 000.

	Approaching	Essential	Developing	Confident	Extending
Knowledge	<p>I know about addition.</p> <p>I know about subtraction.</p>	<p>I know multiplication is repeated addition.</p> <p>I know division is repeated subtraction.</p> <p>I know multiplication means counting (adding) equal groups.</p> <p>I know division means sharing (subtracting) equal groups.</p>	<p>I can recall basic multiplication facts with factors to 12.</p> <p>I know the (inverse) relationship between multiplication and division.</p>	<p>I know when a solution is reasonable and when it is not.</p>	<p>I know using estimation before finding a solution will increase my likelihood of success.</p>
Skills and Procedures	<p>I can perform addition and subtraction with numbers to 5.</p>	<p>I can perform basic multiplication and division with whole numbers using a multiplication matrix or concrete models.</p>	<p>I can perform multiplication and division using concrete and pictorial models.</p>	<p>I can show my understanding of a multiplication or division solution by using concrete, pictorial and abstract models (algorithms).</p> <p><i>*Video for teachers.</i></p>	<p>I can apply properties of numbers, such as the commutative, associative, and distributive properties, to solve multiplication and division problems.</p>

Understanding	I understand skip counting can help with repeated addition.	I understand that using multiplication and division is more efficient than using repeated addition and subtraction.	I can use mental math to solve multiplication and division problems by recognizing number relationships.	I can evaluate the numbers in a multiplication or division problem and select the most efficient strategy (e.g., using factors, breaking numbers apart, or using estimation).	I can apply a variety of strategies to solve multi-step problems and real-world scenarios, demonstrating flexibility and understanding in selecting the most efficient method.
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