

Teaching New G2-3 Science Curriculum

Active,
Transdisciplinary
and Fun!



Part 1

*What's new in the
Science?*

Part 2

*What resources will
support us to
design for learning?*

Part 3

*How might we
make connections
with other subjects?*



Image from ***Braiding Sweetgrass for Young Adults: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants***

Illustration: Nicole Neidhardt

Source: Written by Robin Wall Kimmerer, Adapted by Monique Gray Smith, Illustrated by Nicole Neidhardt 2022, page 18



About the adaptation for young readers, Nicole Neidhardt shared:

*"I hope the teachings of **relationality** come through for young readers. To understand that we are all in relation to one another, and to our plant relatives, animal relatives, and to the land, the water, the air – and with those **relationships**, there's a **responsibility** to care for [them]," Neidhardt echoes. "Teachings that encompass relationality can **change** the way [young adults] not only think about themselves in the world but also **how they can move through the world.**"*

<https://quillandquire.com/authors/monique-gra-v-smith-and-nicole-neidhardt-on-adapting-br-aiding-sweetgrass-for-a-ya-audience/>



Relationships





How might we design learning for students so that they understand the complexity and relationships that exist within their world?





**Real life isn't always
separated into neat little
lines and compartments.**



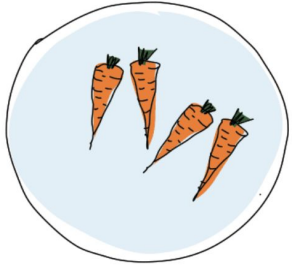


**Life is most meaningful
when we understand the
relationships between the
parts and how they work
together.**



Disciplinary recipes: A visual guide!

Intradisciplinary



within one
discipline

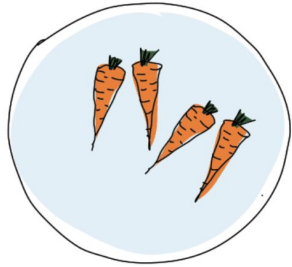
A single ingredient
(aka, discipline)
- no mixing

<https://makinggood.design/thoughts/tasty>



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Cross disciplinary



viewing one discipline
from the perspective
of another

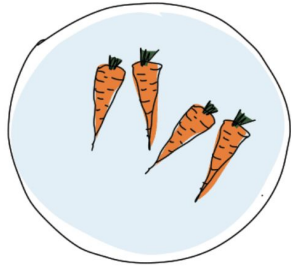
a load of
ingredients on
their own...
[a pretty dull meal!]

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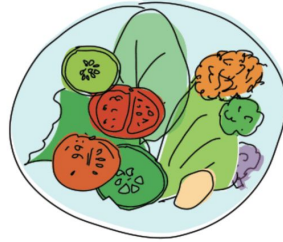
Cross disciplinary



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Multidisciplinary

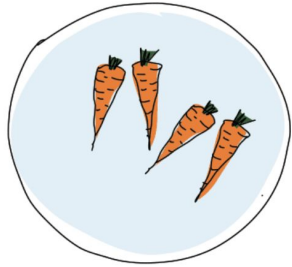


several different
disciplines, each
providing different
perspectives...

a salad bowl —
ingredients remain
intact and distinguishable

Disciplinary recipes: A visual guide!

Intradisciplinary



within one
discipline

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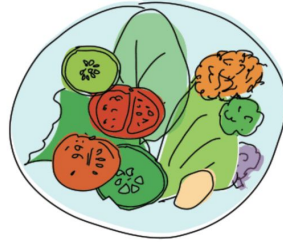
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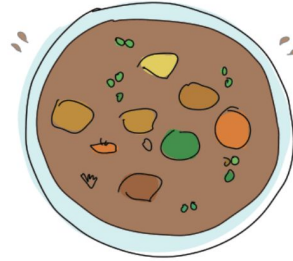
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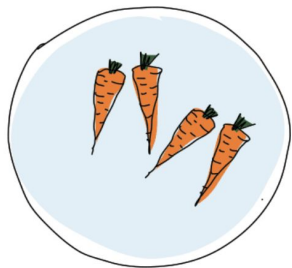


Integration of
disciplinary contributions
is required ...

.. a stew!
ingredients mush
into each other
and are only partially
distinguishable

Disciplinary recipes: A visual guide!

Intradisciplinary



within one discipline

A single ingredient (aka, discipline)
- no mixing

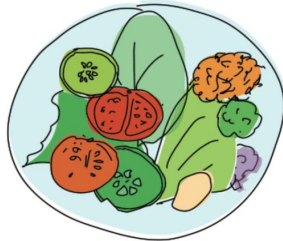
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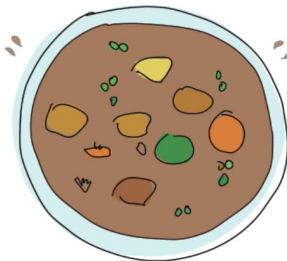
Multidisciplinary



several different disciplines, each providing different perspectives...

a salad bowl — ingredients remain intact and distinguishable

Interdisciplinary



Integration of disciplinary contributions is required...

.. a stew!
ingredients mush into each other and are only partially distinguishable

Transdisciplinary



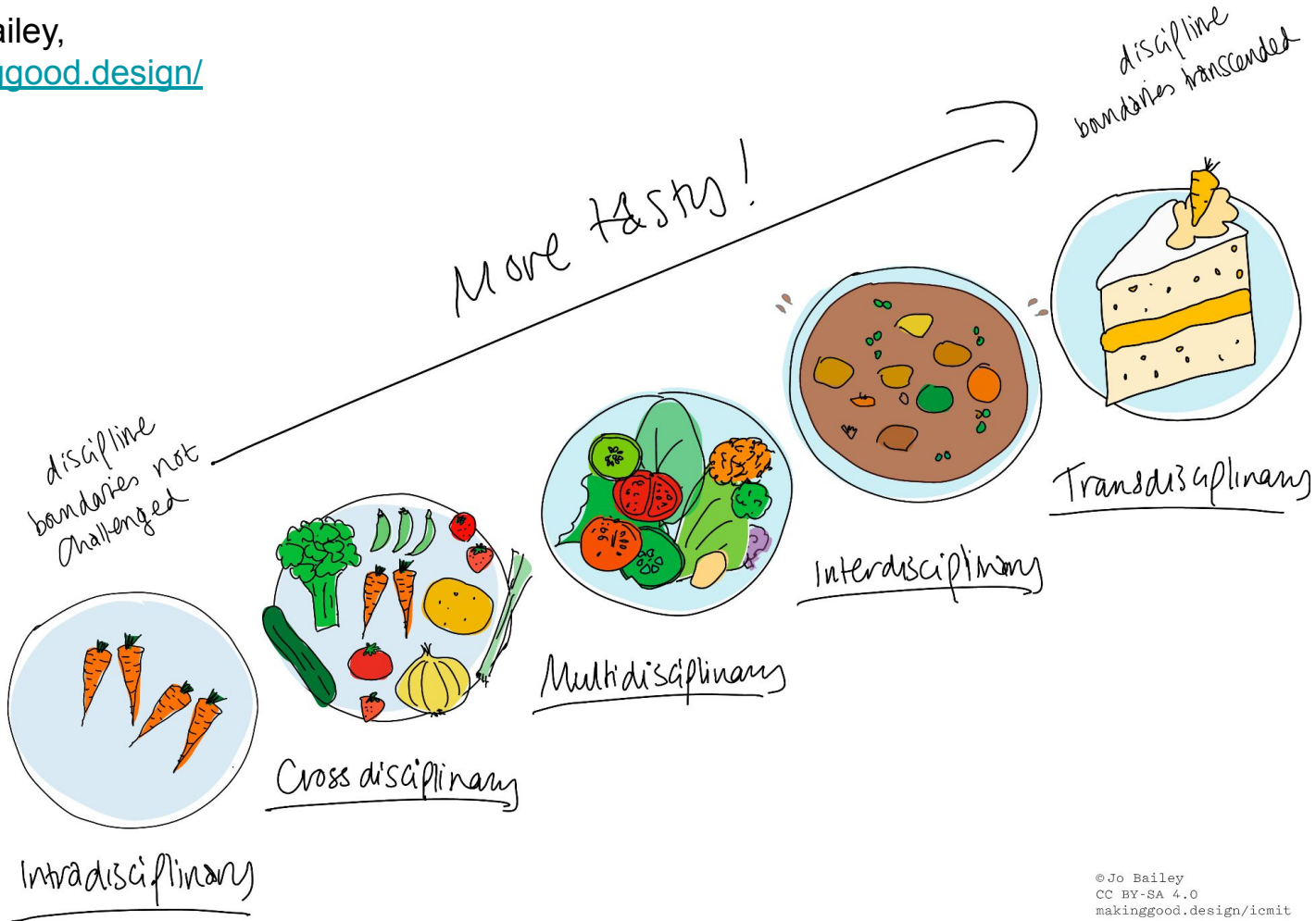
a unity of intellectual frameworks beyond disciplinary boundaries

... a CAKE!

the ingredients are no longer distinguishable and the final 'product' is of a different kind

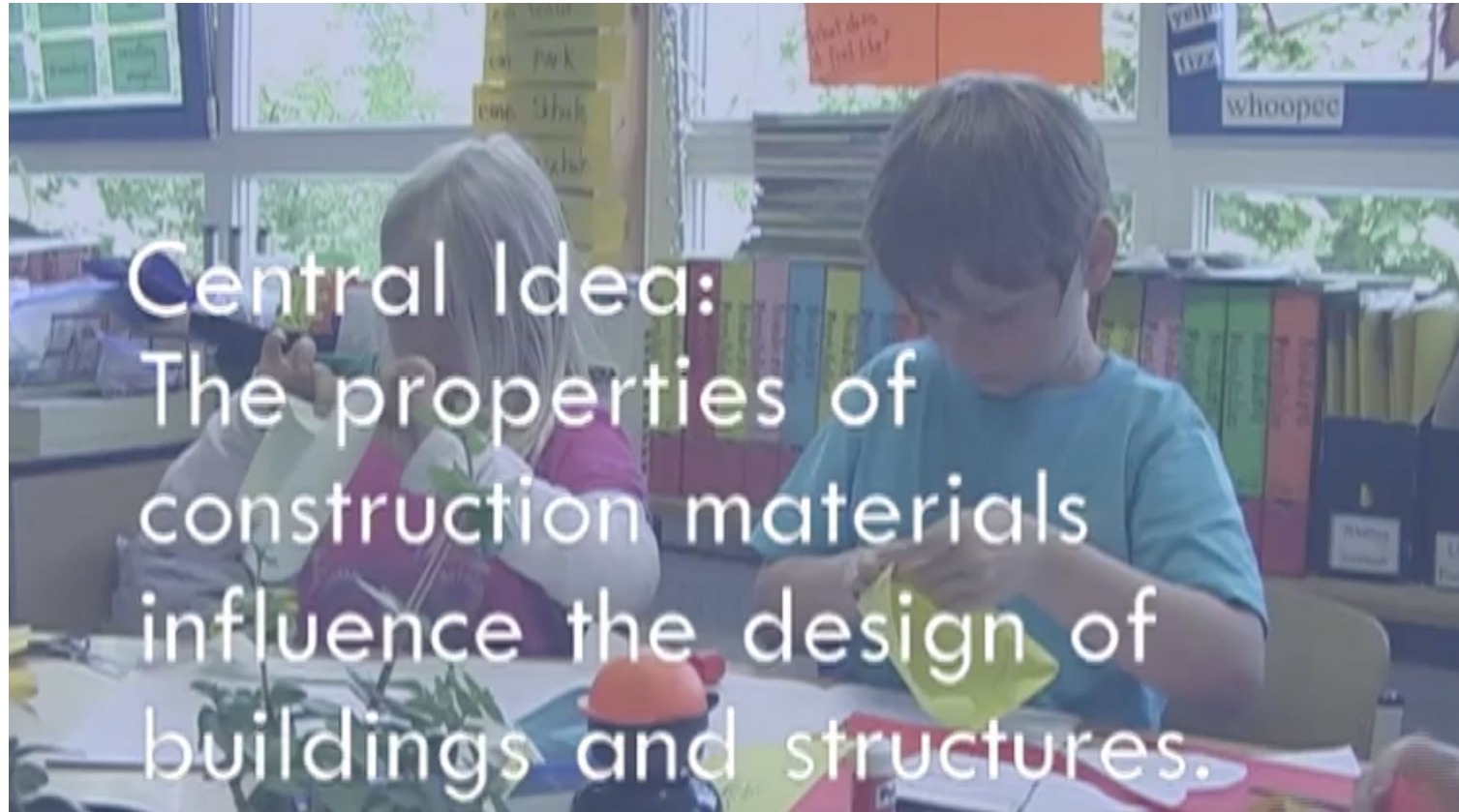


Source: Jo Bailey,
<https://makinggood.design/>



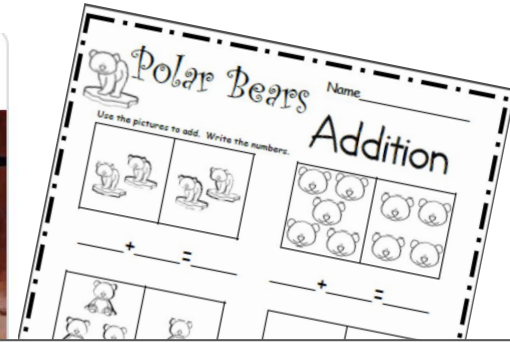
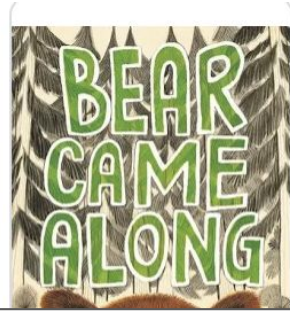
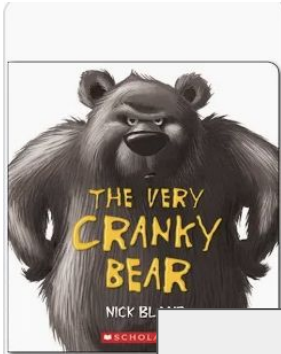
Look for Connections: ***“I notice that....”***

connects to me, my context or my vision...”



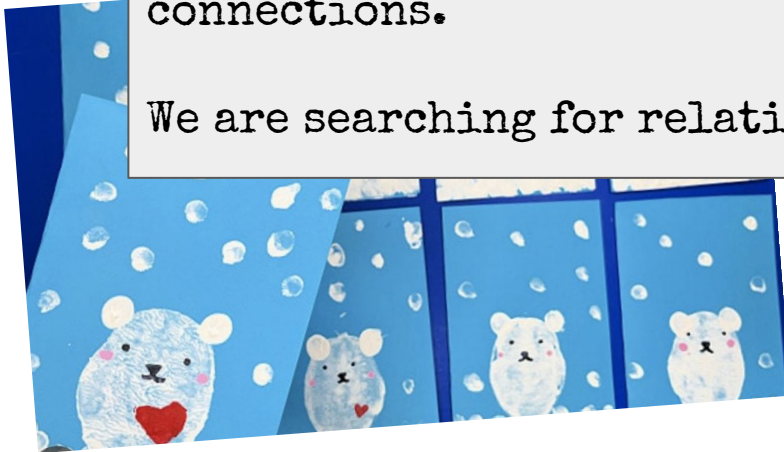
Central Idea:
The properties of
construction materials
influence the design of
buildings and structures.

In practice, this is different than a theme...



Rather than centering around a thematic topic, this design will use concepts to help make transdisciplinary connections.

We are searching for relationships between the parts.



<p>Organizing Idea GRADE 2</p>	<p>Earth Systems: Understandings of the living world, Earth and space are deepened through investigating natural systems and their interactions .</p>
<p>Guiding Question</p>	<p>How can Earth's components and relationship to the Sun be understood?</p>
<p>Learning Outcome</p>	<p>Students investigate Earth, its landforms, its bodies of water, and its relationship to the Sun.</p>



 KNOWLEDGE

A year is the length of time it takes Earth to revolve around the Sun.

A day is the length of time it takes Earth to rotate fully (on its axis).

Earth's surface experiences day when it faces the Sun, and night when it does not face the Sun.

 UNDERSTANDING

Earth revolves around the Sun and rotates.

 SKILLS & PROCEDURES

Describe the relationship between time and Earth revolving around the Sun.

Represent ways that Earth's rotation connects to patterns of day and night.



Organizing
Idea
GRADE 3

Earth Systems:
Understandings of the
living world, Earth and
space are deepened
through investigating
natural **systems** and
their **interactions** .

Guiding
Question

What visible **changes**
can be identified by
examining Earth's
surface?

Learning
Outcome

Students analyze
changes in Earth's
surface and explain
how its layers hold
stories of the past.

 KNOWLEDGE

Changes that can occur to
Earth's surface over a long
period of time include

- mountains wearing down
- rivers changing course
- lakes and seas drying out and refilling
- glaciers moving, advancing, and receding

Natural events that can change
Earth's surface in a short period
of time include

- volcanic eruptions
- earthquakes
- landslides
- tsunamis
- floods
- melting and freezing

Changes to Earth's surface can
be shared through

- scientific knowledge
- stories
- traditional knowledge

 UNDERSTANDING

Earth's surface changes over
time.

Relationships with land provide
intergenerational knowledge of
Earth's surface for many First
Nations, Métis, and Inuit.

 SKILLS & PROCESSES

Describe how natural events
change Earth's surface.

Discuss changes to Earth's
surface over time that are
shared through stories and
intergenerational knowledge of
First Nations, Métis, and Inuit.

Investigate natural events that
have changed Earth's surface in
Alberta.

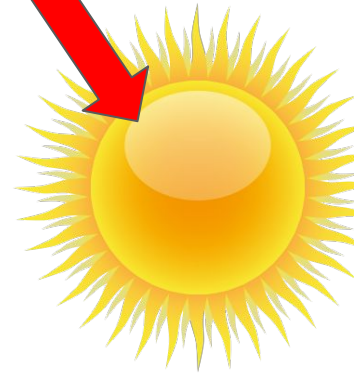


Things or people that are connected to each other.

What makes a good relationship? What makes it not-so-good?

Things or people that **impact** each other. Impact is **affect** (feelings) or **effect** (consequence), or **change**.

relationshi
p

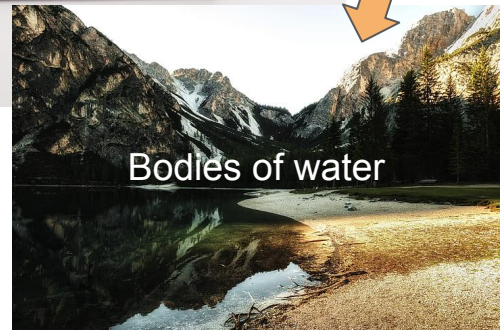
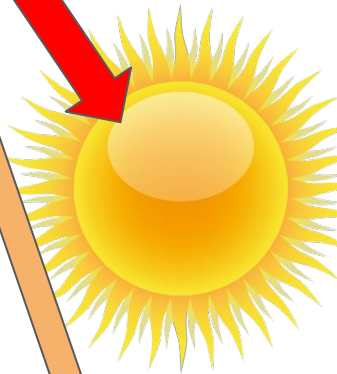


a set of things working together as parts of a mechanism or an interconnecting network.

What makes a good relationship? What makes it not-so-good?

a set of ways or procedures that describe how something is done; an **organized** framework or method.

A system is not “random”, chaotic, or “things are everywhere”



Science Curriculum through Concepts

This document takes a look at the learning outcomes and has identified many of the **topic specific concepts** that teachers need to help students unpack. Sometimes called micro-concepts, these concepts are KEY to demonstrating understanding of the learning outcomes.

[Teaching Science through Concepts: New AB Curriculum](#)

Knowledge is essential to make sense of concepts.

Skills and procedures activate the knowledge.

Understanding of CONCEPTS helps to TRANSFER the learning to new and authentic situations.



What changes occur over time?

How do we know change is happening? What is the effect?

What is the relationship between the Earth warming and natural changes?

Wind, water, glaciers, Badlands

Cause and effect

What is the relationship between the land and the sun?

What is our relationship with the systems of water on Earth?

What about other places?

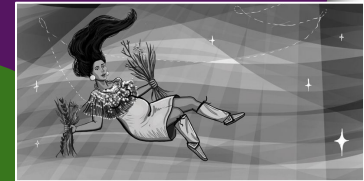
Senses, observations, data collections

Growth and change over time... when I was young...

Interactions happen because the world is **connected.**

Key Concepts: RELATIONSHIP INTERACTIONS

We are all connected. Our actions, our responsibilities



Cause + effect

document graph changes

MATH

If... then...
and then

changes over time
quickly → Disasters
Fires

Who's voice is heard?

voice
story

Indigenous
Intergenerational
Knowledge

**Dino
Beats**

COMMUNICATE
literature
poetry / observ.
emotional respon.

**Interactions
Relationships**

Dinos
animals
habitats / homes

relationships

**Take
action**
what matters
to you?

Use & space
land.
ACTIONS

**Earth
warming**

Evidence How do we know?

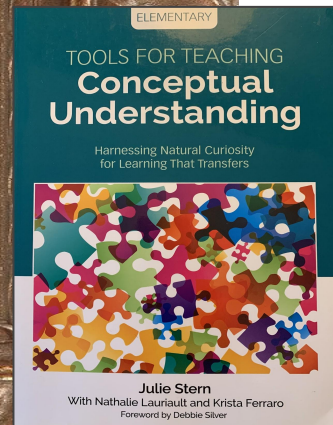


What is the relationship between **_(concept)_** and **_(concept)_**?

How does _____ impact _____?

What effect do _____ and _____ have on _____?

How do the forces of _____ and _____ interact?



An **incomplete** planning map...

Learning Experience & Assessment Map

What is the relationship between humans and the changes happening on Earth?
Big idea: Interactions happen between things that are connected.

Summative Assessment Triangle (products/performances, observations, conversations)

- Students will create a museum artifact that demonstrates a significant Earth change
- Students will respond to questions about the relationship between humans and Earth changes.
- Students will be observed while engaged in experiences that reveal relationships between “parts”



Earth’s surface, changes over time, observation skills, communication skills

Adopt a Tree or Sit Spot

Students will revisit their spot each month, drawing, noticing and writing/talking about changes they see. “What can we notice when we revisit the same spot?” How can we feel connected to Earth?

Unpack concept: Relationships

Help students make meaning. Examples and non-examples. Build it on a bulletin board that can grow and change in your space.

How do our senses help us understand our environment?

Capture video evidence of students using senses to describe various enviros. Now.. how about animals? Same? Different?

Get out into Nature

Plan a scientific journey to capture and document observations of changes on Earth. What will the evidence be? How do we know?

Data Tracking/math

Guide students to track and capture data (temps, wind, rainfall, floods, fires, etc.). Graph and display, expand vocabulary through guided talk. Ask about the data? Evidence?

Voice Through Art

Help students communicate their thoughts and feelings about the Earth, changes and their relationship. How can art communicate messages?

If.. Then...

Explore the concept of causation by learning about the landforms, layers (fossils), flow of water
Impact of sudden changes: earthquakes, floods, fires,

Literature Circles

Use questions to help students explore various genres and ideas presented through literature.

Always caring, never change.

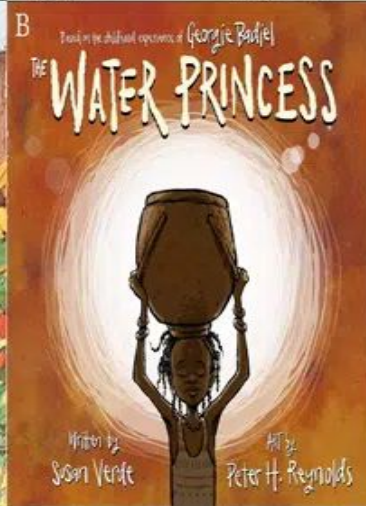
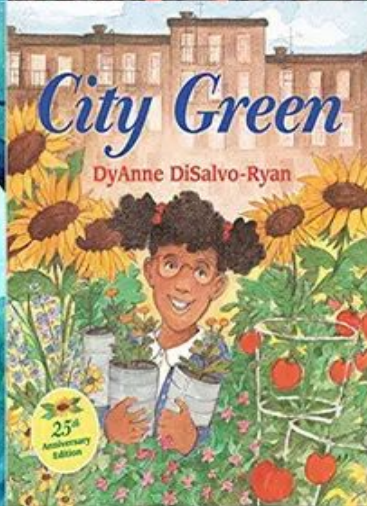
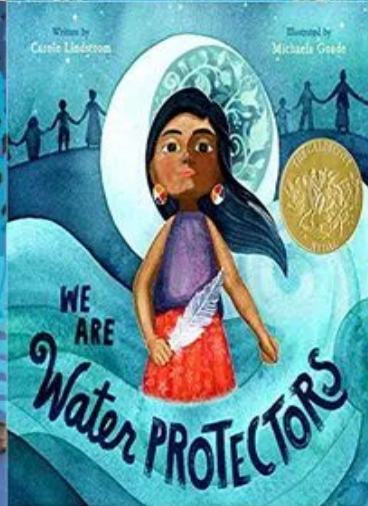
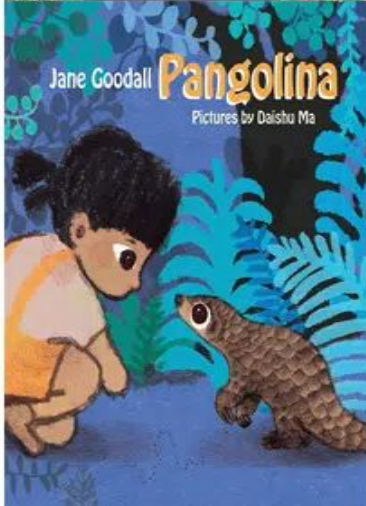
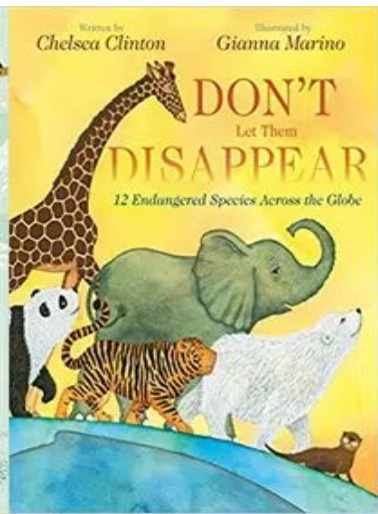
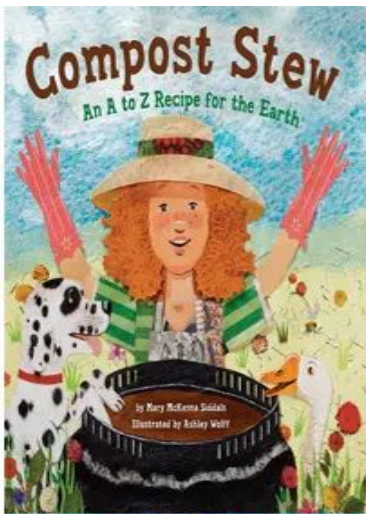
Interview: Are there examples of things that should not change? What about how we care for the Earth and each other?

Music tells a story

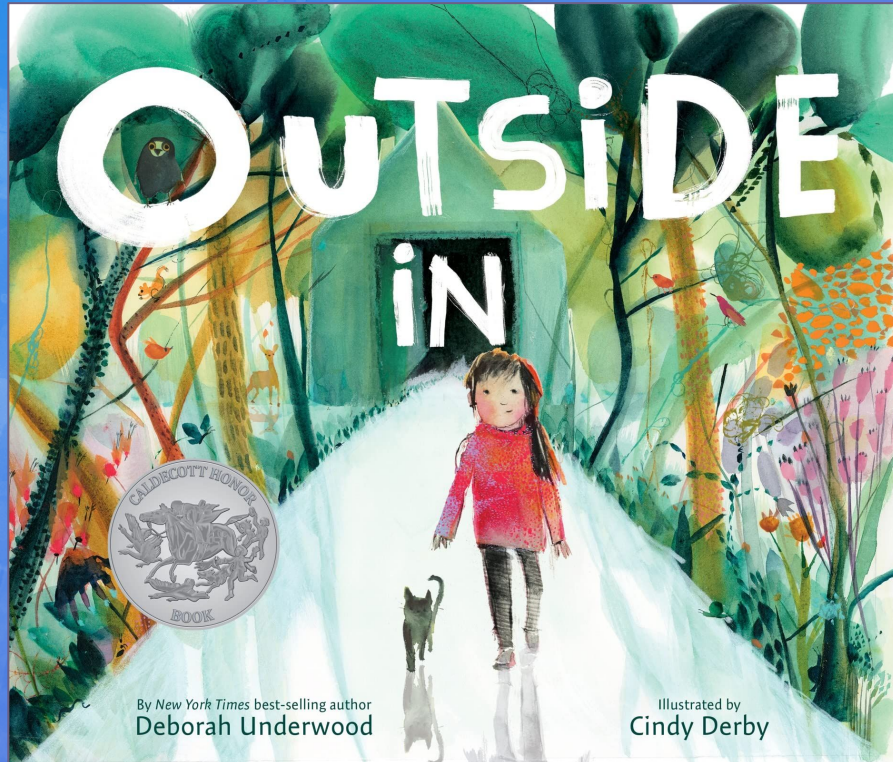
Use your senses to draw, or paint, the story that is shared through various musical selections. Notice how music changes show up differently in your art.

What are the most powerful ways students can show what they know and understand through a variety of curricula?





What is your relationship with the Earth?



While watching the video, please use the following prompts to inspire your thinking:

I notice... (art, science, literature)

I wonder...(engaging, questions, ideas)

I think...(connections, pieces, action)

How do your senses and feelings change when you go outside? Inside?





Our Changing Earth – Kananaskis Field Study

Task: You are a junior geologist, someone who studies the earth's surface. You must **PROVE** the big understanding.....

The **BIG** Understanding is:

The Earth's surface changes over time due to processes and forces of nature.

While visiting Kananaskis Country in Alberta, you need to use your **OBSERVATION SKILLS** and background **KNOWLEDGE** to inquire into the changes that occur on the Earth's surface over time.

Part 1: General Observations... What do you see?

DESCRIBE as much as you can about **your observations**.

Consider the land, the plants, the water, and anything else you can see.



Part 2: Types of Rocks in our Local Environment

TELL about the **rocks** located in this environment.

What kinds of rocks are here? How do you know?

What stage of the rock cycle are you seeing?

Part 3: Changes in the Landscape Over Time

THINK about the **CHANGES** that may have occurred in this area.

What changes can you observe in the landscape? Think about the plants, animals, and people.

WORD BANK (Use these words!)

Landscape		Processes		Forces	
sedimentary	minerals	weathering	erosion	water	wind
metamorphic	sediments	melting	cooling	ice	earthquakes
igneous	hills	compaction		volcanoes	floods
valleys	soil	heat and pressure			
mountains	rivers				
waterfalls	plants				



CLOSE READ

A Picture of Change for a World in Constant Motion

By Jason Farago Aug. 7, 2020



Lifelong Nature Journaling

1. GET THE FACTS... Describe what you see.

Write *descriptively* about what you see. Describe the: LINES, SHAPES, COLOURS, TEXTURES, OBJECTS, PEOPLE, NATURE, etc. What MATERIALS did the artist use? What is the SIZE of the work?

2. HOW IS EVERYTHING PUT TOGETHER?

What is the first thing that catches your eye?
Is anything repeated? How are things connected?
What is the most important colour, shape, or object?
Do some shapes appear to be close up or far away?

3. WHAT IS IT ABOUT?

IMAGINE you are in the middle of this work of art. Think about the SOUNDS, SMELLS, TASTES. How does it make you FEEL in your mind and body? Does it remind you of anything (a memory)? What is the artist telling you. Is there a story, a feeling, an idea?

4. YOUR LAST WORD. . . .

Do you think this is a good work of art? Why?
What do you like most? Would you change anything?
Would you like to see more work by this artist?




Get Outside

- ★ Be a model
- ★ Hard surface
- ★ Choose a spot
- ★ Look carefully
- ★ Draw what you see
- ★ Use your senses
- ★ Add details
- ★ Consider prompts
- ★ Practice often
- ★ Later add labels, colors, paints, magnifying glass



Counting Collections & Tracking Data

Choral Counting & Counting Collections



Edited by
**Megan L. Franke,
 Elham Kazemi, &
 Angela Chan Turrou**

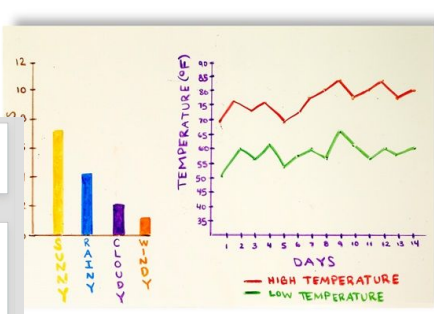
Transforming
 the PreK-5
 Math Classroom

LEARNING OUTCOME
 Students analyze quantity to 1000.

KNOWLEDGE	UNDERSTANDING	SKILLS & PROCEDURES
Any number of objects in a set can be represented by a natural number.	There are infinitely many natural numbers.	Represent quantities using words and natural numbers.
The values of the places in a four-digit natural number are thousands, hundreds, tens, and ones.	Every digit in a natural number has a value based on its place.	Identify the digits representing thousands, hundreds, tens, and ones based on place in a natural number.
Places that have no value within a given number use zero as a placeholder.	Each natural number is associated with exactly one point on the number line.	Relate a number, including zero, to its position on the number line.
The number line is a spatial representation of quantity.		

LEARNING OUTCOME
 Students interpret place value within 100,000.

KNOWLEDGE	UNDERSTANDING	SKILLS & PROCEDURES
For numbers in base-10, each place has 10 times the value of the place to its right.	Place value is the basis for the base-10 system.	Identify the place value of each digit in a natural number.
The digits 0 to 9 indicate the number of groups in each place in a number.	Place value determines the value of a digit based on its place in a number relative to the ones place.	Relate the values of adjacent places.
The value of each place in a number is the product of the digit and its place value.	Place value is used to read, write, and compare numbers.	Determine the value of each digit in a natural number.
Numbers can be composed in various ways using place value.		Express natural numbers using words and numerals.
Numbers can be rounded in contexts where an exact count is not needed.		Express various compositions of a natural number using place value.
The less than sign, $<$, and the greater than sign, $>$, are used to show the relationship between two unequal numbers.		Round natural numbers to various places.
		Compare and order natural numbers.
		Express the relationship between two numbers.



KNOWLEDGE

Changes that can occur to Earth's surface over a long period of time include

- mountains wearing down
- rivers changing course
- lakes and seas drying out and refilling
- glaciers moving, advancing, and receding

Natural events that can change Earth's surface in a short period of time include

- volcanic eruptions
- earthquakes
- landslides
- tsunamis
- floods
- melting and freezing

Changes to Earth's surface can be shared through

- scientific knowledge
- stories
- traditional knowledge

UNDERSTANDING

Earth's surface changes over time.

Relationships with land provide intergenerational knowledge of Earth's surface for many First Nations, Métis, and Inuit.

SKILLS & PROCEDURES

Describe how natural events change Earth's surface.

Discuss changes to Earth's surface over time that are shared through stories and intergenerational knowledge of First Nations, Métis, or Inuit.

Investigate natural events that have changed Earth's surface in Alberta.

Station 1 Simulate changes to landforms



Station 2 Students use Gizmos to see Earth shifts/plates

 Gizmos

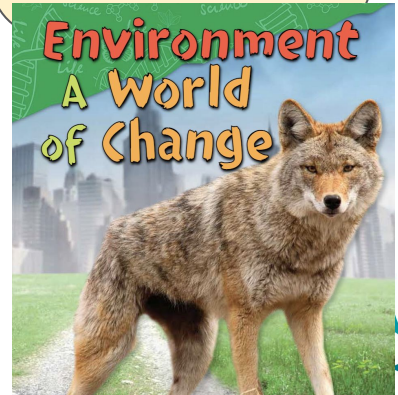


Building Pangaea

Remember, KUSPs need to be addressed AND can be clustered, prioritized, revisited and designed to inform how a student understands the Learning Outcome.

Station 3

Students read/listen to Pearson Literacy readers available on new LearnAlberta



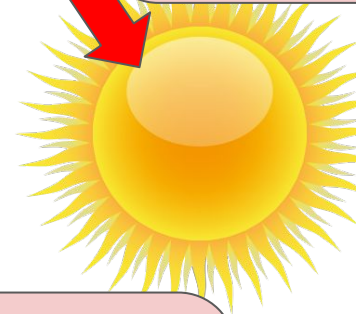
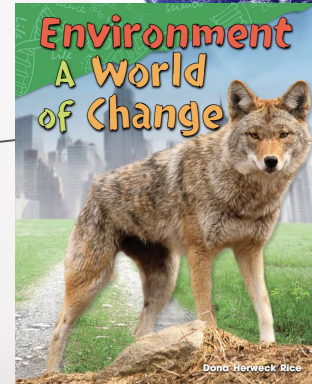
Things or people that are connected to each other.

What makes a good relationship? What makes it not-so-good?

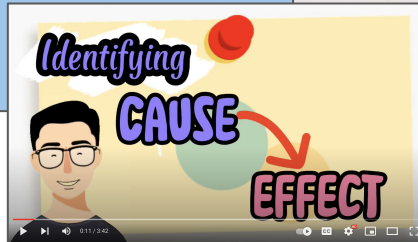
In my... the... don't... at



I learned about fires and floods... change the land... These also impact... people in huge...



Things or people that impact each other. Impact is affect (feelings) or effect (consequence), or change.



I noticed that a little bit of water could really move the sand. What would happen if it was forced with more power?



Streamline Planning and Assessment



Engaging (and efficient) Task Design

Students in Grade 3 will create a museum artifact and display that represents the interactions or relationship they have learned about when studying the Earth, land, people and changes over time. Students will have choice in the materials they use, and how they will communicate their understanding.

LEARNING OUTCOME

Students analyze and describe how plants and animals interact within environments.

LEARNING OUTCOME

Students analyze changes in Earth's surface and explain how its layers hold stories of the past.

LEARNING OUTCOME

Students examine and apply listening and speaking skills, processes, or strategies in a variety of formal and informal interactions.

LEARNING OUTCOME

Students analyze text and make connections to personal experiences to support meaning.

LEARNING OUTCOME

Students investigate writing and research processes that support informed written expression.

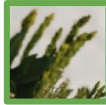


Engaging (and efficient) Task Design continued...

Students in Grade 1 will create a story that tells about a change that happens to a person or an animal over time. The story can be communicated through various materials, drawings, words and through oral telling.



Current Art program of studies - Students will learn the shapes of things as well as develop decorative styles.

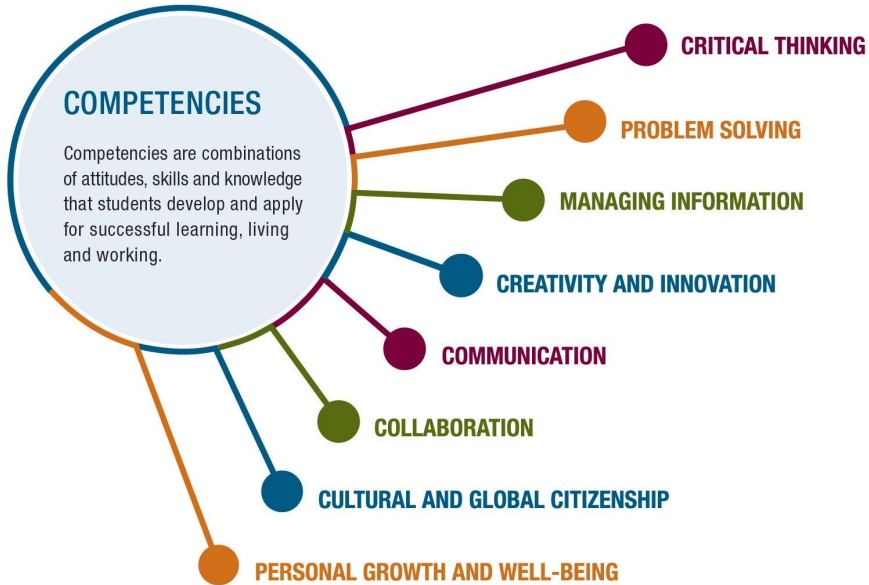


LEARNING OUTCOME

Students interpret and explain representations of data.



Competencies, Literacy and Numeracy Progressions remain the same!



COMPETENCIES OVERVIEW



Students are the artists, scientists, thinkers, innovators and leaders of the future. They will be tasked with solving the problems of today, while imagining and creating a new tomorrow. Competencies are critical for equipping students with the knowledge, skills and attitudes that they will need to successfully navigate their personal journeys in learning, living and working.

<https://education.alberta.ca/media/3272998/competency-indicators-september-30-2016.pdf>



**How might we capture the evidence of learning?
How can we involve students in the feedback process?**



Look-Fors

Thought Collector

For Interviews with Students or Observations of Performance during Task or Presentation

Level

Description of Success Criteria
What will the evidence "look like" at different levels of proficiency?

Teacher Talk Prompts
How did you arrive at that answer/conclusion?
Please show me how you did that.
Help me understand what you are thinking here.
Are you saying... ?
What else can you add to your answer?
I'm unclear about how you..... ?
How could you check your answer?

Notes

Evidence or Proof

Task or Challenge	Not Yet	With Assistance	Independently



How many I wonders do you have?



Click the
image to
access!





CRC Designers of Professional Learning

Please reach out to us to discuss professional development for your school!



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Kim
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