Dufferin-Peel Catholic District School Board

Grade 9 Resource (SNC1W) – Earth & Space

Overview

Part 1: **Indigenous Knowledge Systems** (Day1) - See Student Handout 1

Students will:

- learn about Indigenous Peoples' knowledge systems and why they are important in connecting us to the Earth and the cosmos (see compiled videos in slide deck.
- learn how Indigenous Peoples' knowledge systems can help deepen our understanding of Western science
- learn about the significance of **stories** in Indigenous Knowledge systems.

Part 2: **Indigenous Knowledge Systems and Our Connection to the Stars** (Days 1/2, Day 3)

Part A:

- **Jig-saw Activity:** Students reflect on how multiple knowledge systems can benefit and deepen their learning. Students listen to Indigenous Peoples speak about our connection to the stars and compare similarities and differences between the Indigenous and Western knowledge systems.See Student Handout 2.

- **Lesson Wrap-up**: Review or learn about the **life cycle of stars** from the Western perspective by watching videos on slide deck. Students can follow along with the video using the fill-in-the blank Student Handout 3. (Solutions also provided here)

Part B:

Our Origins, Star and Planetary System Formation (Day 3) - Adapted from "S-'Baa Hane' – Story of the Stars"and "T['éhonaa'éí Nihemá – Navajo Moon"

Students will:

- learn about how star and planetary systems form, and that the Sun, planets, and other bodies in the Solar System were all formed together as a system in a kinesthetic way.
- enact a prescribed set of movements to simulate the scientific explanation of the formation of a star and a planetary system around that star.

Learning Goals

We are learning to ….

- explain the importance of Indigenous knowledges and ways of knowing.
- explain our connection to the universe using multiple knowledge systems.
- describe our various connections to the stars and planets.
- explain the origin and evolution of the solar system.

Success Criteria

I can …

- *explain why Indigenous knowledge systems are important.*
- *describe what is similar and what is different between Indigenous and Western systems in a Venn diagram.*
- *explain how colonialism has devalued Indigenous ways of knowing.*
- *provide 2-3 examples of how Indigenous knowledge systems from different Indigenous peoples have valid ways of explaining the significance of our connections to the universe.*
- *explain how my understanding of the stars and planets is deepened by learning from both Indigenous and Western knowledge systems.*
- *describe the process of how stars and planets are formed.*

Curriculum Expectation(s)

Overall Expectations	**Specific Expectations**
E2. Investigating and Understanding Concepts demonstrate an understanding of the components, characteristics, and associated phenomena of the solar system and the universe, and the importance of the Sun to processes on Earth.	E2.3 summarize observational evidence used to support theories about the origin and evolution of the universe and the solar system, considering diverse ways of knowing E2.4 describe major components of the solar system and the universe and compare their characteristics

Student Prior Learning

Students will have already learned about certain aspects of the solar system (e.g., moon, sun, planets).

Lesson Descriptor

Part 1: **Indigenous Knowledge Systems** (Day1) **-** See slide deck.

1. Students will learn about Indigenous knowledges by listening to a series of videos of different Indigenous Peoples talking about their knowledge systems. As students listen, they can use their Student Handout 1 to:
    - Examine Indigenous and Western systems using a Venn diagram.
    - Reflect on guiding questions.
    - Understand the word **story** and its significance to Indigenous peoples (Wilfred Buck video).
    - Explore how the word story has been used to perpetuate romanticism and devalue Indigenous knowledge systems.
    - Understand how stories are connected to our identity and gifts (Sandra video).
2. Consolidate: Have students share in small groups what they have learned.
3. Ask students to look at the stars that night in the evening from their window (for 'homework') and consider: *What do you see? What do you wonder? How do you feel?*

Part 2: **Indigenous Knowledge Systems and Our Connection to the Stars** (Day 1, 2)

Minds-On: To access prior knowledge and experiences, ask students:

When you look up at the night stars, what do you see?
What do you wonder?
How do you feel?

Part A: Students will learn about their connection to the stars while listening to videos and their classmates through a **Jigsaw activity:** (See Student Handout 2)

1. Students will be assigned a **home group** (e.g., can be assigned as letters A - G or as a theme, such as group Earth, group stars, group moon, etc). Each home group should have 4 - 5 students.
2. Within each home group, each student will be **assigned a number,** from 1 to 5 (depending on class size). The number corresponds to one **video (out of 5)** they will watch (also provided in the slide deck). The 5 videos are:
    1) Douglas Sinclair is Anishinaabe from Ojibways of Onigaming First Nation (2.20)
    2) Tehahenteh Miller is Kanien'keha (Mohawk) from 6 Nations of the Grand - Our Language Connects us to the Stars (8.58)
    3) Isaac Murdoch is Anishinaabe (Ojibway) - How the Milky Way Came to Be (18.20)
    4) Navajo Tales - The Stars (4.28)
    5) Tales from the Mythologies of Creation, Maui and Aoraki (Maori of New Zealand) (6.36)

Note: The length of the videos range from 2 minutes to 18 minutes (video length in brackets).

Tip: The teacher could assign videos based on learner needs or assign groups more than one video.

3. Students go find classmates who have the same assigned number as them. As a group, students watch their assigned video and summarize key learnings on their Student Handout 2
4. Students then return to their **home group** and share what they learned to their home group members. With this strategy, each student in the home group serves to deepen the learning, as they work together as a whole, and complete the 'jigsaw'.

Lesson wrap-up: Students will learn/review the origins and life cycle of a star from the Western knowledge system by watching a video of Daniella Scalice (an educator lead for the NASA Astrobiology Program. Students can fill-in-the blanks on their Student Handout 3. Solutions are also provided here).

Part B: **Our Origins, Star and Planetary System Formation (Day 3)** - Adapted from "S-'Baa Hane' – Story of the Stars"and "T['éhonaa'éí Nihemá – Navajo Moon"

Students will:

- learn about how star and planetary systems form, and that the Sun, planets, and other bodies in the Solar System were all formed together as a system in a **kinesthetic way.**
- enact a prescribed set of movements to simulate the scientific explanation of the formation of a star and a planetary system around that star.

Materials: projector screen to watch online videos, a large floor space indoors (such as a school gym) or outdoors.

To access the lesson, click HERE

Resources

Astrobiology at NASA - Life in the Universe. (n.d.). *Navajo Moon | NASA and the Navajo Nation | Education | Astrobiology*. NASA Astrobiology. Retrieved December 3, 2022, from https://astrobiology.nasa.gov/education/nasa-and-the-navajo-nation/navajo-moon/

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For Educators. (n.d.). LESSONS FROM THE EARTH & BEYOND - Home. Retrieved December 3, 2022, from http://www.lessonsfromearthandbeyond.ca

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NASA Astrobiology. (2022, November 30). *Navajo: Star and Planetary System Formation from "S- 'Baa Hane' – Story of the Stars"*. YouTube. Retrieved December 3, 2022, from https://www.youtube.com/watch?v=GVNw85UpUt8

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Virtual Eye. (2012, July 2). *Tales from the mythologies of Creation, Maui and Aoraki*. YouTube. Retrieved December 9, 2022, from https://www.youtube.com/watch?v=P6q8E1IaQjY

We Come From the Stars. (n.d.). LESSONS FROM THE EARTH & BEYOND. Retrieved December 4, 2022, from https://www.lessonsfromearthandbeyond.ca/we-come-from-the-stars.html

Images: from www.canva.com

Images/Background in Slide Deck

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ESA/Hubble & NASA, V. Antoniou and J. Schmidt. (2021). *Big, Beautiful and Blue.* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:NGC_2336-Big-Beautiful_and_Blue.jpg

Hubblesite. (n.d.) *Hubble-planetary-nebula-mx.* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Hubble-planetary-nebula-mx.jpg

NASA, ESA, and the Hubble Heritage Team (STScI/AURA). (2013) *A Unique Hubble View of Comet ISON.* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:A_Unique_Hubble_View_of_Comet_ISON.jpg