**Resource Analysis: Daily and Seasonal Changes**

Andrea Waine

Nippissing University

Primary Junior Division

*Grade level*: 1

*Strand*: Understanding Earth and Space Systems

*Topic*: Daily and Seasonal Changes

*Specific Expectation*: 3.3 describe changes in the amount of heat and light from the sun that occur throughout the day and the seasons

Throughout the Understanding Earth and Space Systems unit in grade 1, students begin investigating daily and seasonal changes. The big ideas covered in this unit are that changes occur in daily and seasonal cycles and those changes ultimately affect living things. Important concepts include defining a cycle as a circular sequence of events and identifying the sun as Earth’s principal source of heat and light. As students begin to understand the changes in light and heat that occur throughout the day and the seasons, they use this information to assess the impact of daily and seasonal changes on the environment, society, and human outdoor activities. Students learn to identify and compare the four seasons, and establish how humans prepare and respond to daily and seasonal changes. However, in order for learners to assess the impact of these changes on society and the environment, and identify how living things including humans, adapt to these changes, it is imperative they first recognize what changes occur. Thus, it is important for students to establish a solid foundation of knowledge surrounding the concept of changes in the amount of heat and light from the sun that occur throughout the day and year. For this reason, the resource analysis has been designed to address this specific expectation.

**Identification of Resources**

1. Branley, F.M. (1974). *Sunshine Makes the Seasons.* New York, NY: HarperCollins Publishers.

*Sunshine Makes the Seasons* is a storybook that introduces readers to the scientific reasoning behind our four seasons. It explores seasonal changes and how the light and heat from the sun affect life on Earth. It also features a step-by-step description of an interactive experiment that allows children to create their own orbital model with an orange and a pencil to explore the relationship between the sun and Earth.

1. A globe and a flashlight

A globe is a spherical model that provides a great visual and physical representation of our planet Earth. When facing the globe, a flashlight can be used to represent the sun by offering heat and light to the planet during interactive demonstrations.

**Integration of Resources**

In order to introduce students to the changes in the amount of heat and light from the sun that occur during the day, the globe and the flashlight can be used during an interactive demonstration. Prior to the demonstration, it is assumed that students would have covered the definition of a cycle and have been introduced to the concept of sun being Earth’s principal source of heat and light. These concepts could be reinforced during the demonstration by having students recall this information. The terrestrial globe is a great physical tool to assist students in visualizing the tilt of the Earth. During the demonstration, a flashlight can be used to represent the sun by offering heat and light to the planet. Students would begin by locating where they live on the globe. An interactive discussion would be led by the educator, having students identify the differences they notice during day and night, and how many hours represent one whole day. The activity would progress by holding the flashlight and pointing it directly towards the globe, while the sphere would turn and slowly complete one full rotation. Students would be asked to record their observations. A discussion would be led afterwards highlighting the changes in heat and light from the sun that occur throughout the day. An alternative to the interactive demonstration would be to have students lead the activity in small groups. This way, students could collaboratively explore the scientific concepts with their peers in a hands-on approach.

Similarly, *Sunshine Makes the Seasons* storybook can be used during an interactive read-aloud in order to introduce students to the changes in the amount of heat and light from the sun that occur during the seasons. Prior to the read-aloud, it is assumed that students would have already discussed, based on prior knowledge and experience, differences within the four seasons (i.e. weather, daylight, outdoor activities, etc.). This resource can be used to help explain the scientific reasoning behind the differences of the four seasons. The text features suitable graphics that allow visual representation of the concepts being covered. The book also features a step-by-step experiment that allows students to explore the relationship between the sun and the Earth by creating their own orbital model with an orange and a pencil. Learners can work with a partner or in small groups to explore the scientific concepts behind seasonal changes. The experiment allows students to explore the difference in the amount of heat and light Earth receives throughout the year compared to the amount it would receive if it were not tilted. Students begin by holding the orange straight and revolving it around their source of light (i.e. flashlight). They should notice that wherever they hold the orange as they circle the flashlight, the orange is lighted from pole to pole. The activity progresses by having students repeat the experiment with the orange now tilted. Through this approach, students have a hands-on representation of the changes in light and heat as Earth revolves around the sun.

**Safety Guidelines**

For safety reasons, the teacher is recommended to place the pencil in the orange for the students prior to the activity. If the experiment is not suitable for the level of the learners, the educator can lead an interactive demonstration as a whole class rather than having students assume the responsibility for this activity.

**Scientific Explanation**

Daily and seasonal cycles are influenced by Earth’s rotation and revolution. The sun is Earth’s primary source of heat and light. The changes in the amount of heat and light from the sun that occur daily and throughout the seasons are a result of Earth’s movement. Although we do not feel it, our planet is constantly in motion. It rotates on its axis and it revolves around the sun. We refer to Earth’s axis as an imaginary straight line that runs through the poles of the planet. However, Earth’s axis is titled at an angle of 23.5 degrees. We refer to the movement of the Earth on its own axis as its rotation. It takes twenty-four hours to complete one full rotation. We refer to this as one day. Therefore, Earth’s rotation causes day and night. The Earth spins from West to East. As it rotates, one side of the Earth faces the sun, while the other side faces away. When we face the sun, we have light and more heat. We refer to this as day. When we face away from the sun, it is dark and we receive less heat. We refer to this as night. Thus, when one side of the Earth has day time, the opposite side experiences night time. In the morning, the sun appears to rise in the east. This is because our side of the earth is turning towards the sun, whereas, in the evening, it appears to set in the west. This results from our side of the earth turning away from the sun. The changes in the amount of heat and light from the sun that occur throughout the day are therefore a result of Earth’s rotation.

Similarly, the changes in the amount of heat and light from the sun that occur throughout the seasons are a result of the Earth’s tilt. The Earth is in constant movement around the sun, which is located in the center of the solar system. We call this movement, Earth’s revolution. It takes 365 days, known as one year, to complete one full revolution around the sun. Furthermore, the Earth is divided horizontally in two equal parts by an imaginary line we refer to as the equator. The equator separates the top part of the Earth, known as the Northern Hemisphere, from the bottom part of Earth, known as the Southern Hemisphere. The tilt of the Earth is the reason we experience the various seasons. When the Northern hemisphere is tilted towards the sun, it receives more heat and light, whereas the southern hemisphere receives less heat and light, and vice versa. In January, the northern hemisphere is tilted away from the sun. This is when it experiences winter as it does not receive as much light or heat. We therefore have shorter days, whereas in June, the northern hemisphere is tilted towards the sun. It receives more light and heat and experiences longer days. Finally, in March and September, the sun faces the middle of the Earth and the rays of sun hit both hemispheres equally. We experience spring and fall during these times, with mostly equal day and night lengths. Overall, the changes in the heat and light from the sun that occur during the seasons are a result of Earth’s revolution and its tilt.

**Justification of resources**

Both resources directly address the specific expectation outlined. They can both be used as visual tools and hands-on resources to support student’s understanding of the scientific concepts being presented in this topic. I believe it is advantageous to incorporate as many valuable resources in this unit, as the science content be taught can be challenging for young learners to grasp and comprehend. A globe is a multi-disciplinary resource that can be utilized and incorporated in many topics across a range of subject areas and grade levels. For instance, the globe is often used as a tool in social studies courses. In fact, a focus area is developing spatial skills through the use of, interpretation, and analysis of maps and globes. Therefore, it is certainly a relevant tool within the classroom. Similarly, the text resource provides further opportunity for subject integration. The interactive read-aloud offers opportunity for open discussions, recollection of information, and oral communication. Therefore, the use of this resource supports subject integration. It also provides step-by-step instructions to guide students in investigating and exploring the scientific concepts independently. Overall, I believe both resources are valuable hands-on tools that can be used to support student learning, while directly supporting the specific expectation and providing the opportunity for curriculum integration. They are useful and relevant resources that can easily be introduced to the P/J classroom.

**References**

Branley, F.M. (1974). *Sunshine Makes the Seasons.* New York, NY: HarperCollins Publishers.

Ontario Ministry of Education. (2007). *The Ontario curriculum grades 1‐8: Science and Technology* Retrieved from: <http://www.edu.gov.on.ca/eng/curriculum/elementary/scientec18currb.pdf>