

Lesson Plan 4: The Experiment: Why do seasons exist?

Subject: Science

Unit: Seasons

Grade level: 1st-4th grade

****Prior knowledge: students have some gained some knowledge about seasons.**

Objectives:

1. Students will be able to engage and perform an experiment in order to understand that it is the Earth's tilt around the sun that causes the seasons to occur, rather than the Earth's distance from the sun.
2. Students will be able to work in-groups and use the digital video camera and software to film and edit an I-movie while conducting the experiment.
3. Each group will be able to summarize their findings and present their short I-movie, using the LCD projector to the entire class.

Materials:

Computers
Digital video camera
Digital Video Editing Software
LCD Projector
Graph paper (for each group)
Flash light (for each group)
Ruler (for each group)
Globe

Time period: 1-2 weeks (Depending on availability of computers)

Safety Precautions:

You need parents to sign, "[Permission to Photograph/Videotape Release forms](#)", from your district, to publish student pictures on the web! Students must be informed of safety regulations concerning digital video camera use. Teachers must model how to correctly and carefully operate the digital video camera.

A strap for video camera is a good idea and a tripod is an excellent safety feature to have as well.

Science Standards and Benchmarks Objectives:

Michigan Science Standard: I. Construct New Scientific and Personal Knowledge

Content Standard 1: All students will ask questions that help them learn about the world; using appropriate technology; learn from books and other sources of information; communicate their findings using appropriate technology; and reconstruct previously; and reconstruct previously learned knowledge.

(Constructing New Scientific Knowledge)

Elementary 1: Generate reasonable questions about the world based on observation.

Elementary 2: Develop solutions to unfamiliar problems through reasoning, observation, and/or experiment.

Michigan Science Standard: V. Use Scientific Knowledge from the Earth and the Space Sciences

Content Standard 3: All students will describe and investigate what makes up weather and how it changes from day-to-day, from season to season and over long periods of time; explain what causes different kinds of weather; and analyze the relationships between human activities and the atmosphere. (Atmosphere and Weather)

Elementary 3: Describe seasonal changes in weather. (Key concepts: Seasons: fall, winter, spring, summer. Real world contexts: Examples of visible seasonal changes in nature.)

Content Standard 4: All students will compare and contrast our planet and sun to other planets and star systems; describe and explain how objects in the solar system move; explain scientific theories as to the origin of the solar system; and explain how we learn about the universe. (Solar System, Galaxy, and Universe).

Elementary 2: Describe the motions of the earth and moon around the sun. (Key concept: Perceived movement of the sun across the sky, orbit, month, year, day, night, spin, and calendar. Real world contexts: Models or diagrams of the positions and relative distances between the sun, earth, and moon; models showing the motions of the earth and moon; outdoor observing the sun's motion.)

National Science Education Standards:

Earth and Space Science

Content Standard D:

As a result of their activities in grades K-4, all students should develop an understanding of:

- **Properties of earth materials**
- **Objects in the Sky**
- **Changes in Earth and Sky**
- **A fundamental concept that this standard includes is the fact that as the sun moves across the sky its path changes slowly over the seasons. Students will further explore this concept as well as discovering why seasons actually take place.**

National Technology Education Standards:

Michigan Technology Education Standard 6. Technology Problem-solving and Decision making tools. Students use technology resources for solving problems and making informed decisions (Grade 3-5)

Benchmark 8: Use technology resources (e.g. calculators, data collection probes, videos, educational software) for problem-solving, self-directed learning, and extended learning activities. (5, 6).

Engage:

Ask students to identify what types of information they found using the Internet about seasonal affects on animals and plants. What Internet search engines did they use? Were specific Internet engines more effective to use than others? Why or why not? What words did they type in the search engine that helped guide their searches? What did they learn about the occurrence of seasons, seasonal changes, after conducting their research on the Internet? **(Review from lesson 3).**

Ask students if they could think of why seasons happen. What other things could they do to find their answer? Then, show the materials (ruler, flashlight, graph paper) that students will be using to create the experiment. Then, ask the posing questions, “How can we use the materials we have in front of us to help us answer the question?” “What could we do?” Other specific questions could include: What do you think the flashlight should be used for? Graph paper? Ruler? *(Answers will vary depending on prior knowledge).*

Explore

1. Students will explore, in their cooperative groups, by moving a 12-inch ruler attached to the bottom side of a flashlight in different positions. The light from the flashlight should be reflected on to the graph paper. This way, students can shade in the reflected light areas on the graph paper. They will then analyze their results appropriately. Questions to be asked during explore: *Why are some shaded areas larger than others? Why are there smaller areas located within larger areas?*
2. Ask students to predict whether or not they will receive the same results if they repeated the same activity with the globe. Students will then replace their graph paper with a globe and repeat the same as above. The teacher should also ask students whether or not they should move the globe or let it remain in one position? Why or why not? Students should respond by saying the Earth moves around the sun, so the globe should move around the flashlight. Then, the teacher should ask the groups how the globe should be positioned? Students should discover that the Earth actually orbits around the sun on a tilted axis. Students will analyze their newly discovered results.

Explain:

1. Students should be able to explain that due to the rotational tilt of the Earth's axis, while orbiting and revolving around the sun, seasons develop and occur. Due to the tilt of the earth's axis while orbiting the sun, many different areas receive varied amounts of direct and indirect sunlight. It is not because of the Earth's distance from the Sun. The Earth is actually closest to the Sun in the winter. So, why is it cold in winter? The teacher should inquire this question to the students. Responses should include reference to the amount of direct or indirect sunlight on the Earth. Teacher should also ask: "What if someone asked you these questions, in the summer time, the Earth is actually farthest away from the sun. So, why does it receive so much sunlight? Students should try and justify their answers by using specific details and should include reference to the tilt of the earth.
2. Students must answer these types of questions using the materials from the experiment. Students will videotape each other by using the digital video camera. Teacher should model proper use of the digital camera prior to student handling.
3. Song Activity:

The Tilt of the Earth (sung to the tune of Mary Had a Little Lamb)

Earth's tilt makes the seasons change,
Season's change, seasons change,
Earth's tilt makes the seasons change,
They change all through the year.

Near the sun it's summertime,
Summertime, summertime,
Near the sun it's summertime,
The days are hot and bright.

Far away it's wintertime,
Wintertime, wintertime,
Far away its wintertime,
The days are cold and gray.

Spring and fall are in-between,
In-between, in-between,
Spring and fall are in-between,
The days are cool or warm.

Evaluate:

1. From informal observations and oral discussions carried out throughout the lesson, teacher will be able to assess if students were successful at performing the experiment and comprehending the science concepts.
2. By closely observing and monitoring students, teacher will be able to determine if students mastered the use of digital video camera and were able to complete previously stated objectives.
3. Student presentations.

Extend/Apply:

Ask students to try and determine when the first day of each season begins. They may do this by using either the Internet or the materials provided from the experiment completed earlier.

Resources:

<http://www.miclimb.net>

http://www.michigan.gov/documents/MichiganCurriculumFramework_14058_7.pdf

<http://www.nap.edu/readingroom/books/nses/html/overview.html#content>

<http://cnets.iste.org/>

<http://www.ucfv.bc.ca/biology/Biol210/1999/SeasonalChange/Seasons.html>

[BrainPop.com](http://www.brainpop.com)

<http://pics.tech4learning.com/>

Kid-safe Websites (over 100): <http://www.josts.net/explore/kidsafe.htm>

www.google.com

- Professor Moyer from the University of Michigan, Dearborn, Michigan assisted with developing this activity.

<http://www.fi.edu/time/Journey/JustInTime/seasons2.html>

<http://www.fi.edu/time/Journey/JustInTime/seasons3.html>