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Three-Dimensional Science Lesson Plan

Lesson/Unit Title: Earth's Tilt: The Reason for the Seasons	Adapted from: https://www.youtube.com/watch?v=Pgg0LThW7QA
<p>Lesson to Redesign or Plan: Briefly describe a favorite or upcoming lesson that you would like to redesign or plan.</p> <p>We'll try to figure out what is the reason for the seasons, starting from the knowledge that the Earth is tilted and in it revolves around the Sun once per year.</p>	
<p>Core Ideas: List the GPS/GSE content standards on which your lesson will focus.</p> <p>S4E2. Obtain, evaluate, and communicate information to model the effects of the position and motion of the Earth and the moon in relation to the sun as observed from the Earth.</p> <ol style="list-style-type: none"> Develop a model to support an explanation of why the length of day and night change throughout the year. Develop a model based on observations to describe the repeating pattern of the phases of the moon (new, crescent, quarter, gibbous, and full). Construct an explanation of how the Earth's orbit, with its consistent tilt, affects seasonal changes. 	
<p>Authentic Scenario: Describe a real-world scenario that will engage students in making sense of a phenomenon or designing a solution to a problem that is meaningful to them.</p> <p>You and your Australian friends make plans for you to go visit them next summer. They say, "Come anytime during summer; surprise us!" You live in Georgia and when summer comes around, you jump on plane and go to Australia. When you knock on your friends' door they are very surprised and asks why you are there? You remind them that you all decided that you would visit during the summer, but they start laughing and say, "But it's winter here now!"</p> <p>Guiding Question: Craft and open-ended, grade-level appropriate question that will provoke inquiry and engagement focused on the core idea of the lesson.</p> <p>How can it be summer in America and winter in Australia?</p>	
<p>Science & Engineering Practices: List the specific elements of 1-2 practices the lesson will emphasize.</p> <p><i>Asking questions and defining problems.</i> <i>Developing and using models.</i> <i>Constructing explanations and designing solutions.</i></p> <p>How will you support students in developing understandings about the practice(s)?</p> <p><i>Provide explicit instructions on purposes. Allow students to explore conditions related to phenomena.</i></p>	<p>Crosscutting Concepts: List the specific elements of 1-2 crosscutting concepts the lesson will emphasize.</p> <p><i>Patterns</i> <i>Cause and effect: mechanism and explanation</i> <i>Systems and system models</i></p> <p>How will you support students in developing understandings about the crosscutting concept(s)?</p> <p><i>Explicit questions and discussions. Allow students to explore this phenomena at different scales.</i></p>

<p>How will you engage students in applying the practice(s) to make sense of phenomena and/or to design solutions to problems?</p> <p><i>Students will use models to generate scientific explanation for the phenomena.</i></p>	<p>How will you engage students in applying the crosscutting concept(s) to make sense of phenomena and/or to design solutions to problems?</p> <p><i>Guide students to incorporate concepts of cause and effects as well as systems models in their explanations of Earth's orbit and related phenomenon.</i></p>
<p>Integration: Explain how the three dimensions will work together to support students in making sense of phenomena and/or in designing solutions to problems.</p>	

Lesson Sequence:

5E Stage	Student Activities	Teacher Activities
<p>Engage How does the lesson capture student interest, activate prior knowledge, and connect to a complex question, global issue, or real world problem?</p>	<p>How will students engage actively in the three dimensions throughout the lesson?</p> <ul style="list-style-type: none"> • Pre-assessment drawing- pairing the following terms on a given earth picture: -Ecuador -North and South Pole -Northern and Southern Hemisphere -Axis • Drawing of the Earth revolving around the Sun. 	<p>How will the teacher facilitate and monitor student learning throughout the lesson?</p> <ul style="list-style-type: none"> • Teacher introduces lesson by telling the story of the two friends (one from Georgia, USA and one from Australia) who planned a visit during summer. • Teacher prompts questioning: <ol style="list-style-type: none"> 1. How can it be summer in Georgia, USA and winter in Australia? 2. Is there a correlation between the sun and seasons? • Teacher provides explicit instruction about the word pairing and drawing activity. • Teacher elicits prior knowledge <ol style="list-style-type: none"> 1. What is the center of our solar system? 2. How long does it take Earth to revolve on its orbit once around the Sun? 3. Is the Earth taking that lap while is standing straight up and down or is tilted on its axes? • Teacher helps students clarify ideas and generate additional questions.
<p>Explore How does the lesson allow students to develop a common base of experiences by actively investigating the phenomenon or problem?</p>	<ul style="list-style-type: none"> • Students will play with a flash light and the earth drawing to see what is happening when the light is tilted. • Students will record their findings. 	<ul style="list-style-type: none"> • Teacher uses questioning to prompt students thinking. <ol style="list-style-type: none"> 1. What does direct sun light mean? 2. What does indirect sunlight mean? 3. How can the angle of the Sun's light make a difference between hot and cold?

<p>Explain How does the lesson allow students to develop, share, critique, and revise their own explanations before connecting those to accepted scientific explanations and terminology?</p>	<ul style="list-style-type: none"> • Students will share their conclusions with the rest of the class. • Students complete Earth Orbit's Tilt and its seasonal changing reading and answer reading check questions. 	<ul style="list-style-type: none"> • Teacher supports student conclusions through talk moves: <ol style="list-style-type: none"> 1. Sharing 2. Expanding 3. Clarifying 4. Digging deeper 5. Thinking with others • Teacher uses questioning to prompt students thinking <ol style="list-style-type: none"> 1. What are you observing 2. What do you think that means?
<p>Elaborate How does the lesson allow students to extend their conceptual understanding of the three dimensions through opportunities to apply knowledge, skills, and abilities in new experiences?</p>	<ul style="list-style-type: none"> • Students debate other scenarios. • Students write a letter to the Australian friend to explain about the confusion and to assure the American friend understands the reason for the seasons. 	<ul style="list-style-type: none"> • Teacher evaluates student responses to check for understanding and adjust instructional plans, as needed. • Teacher facilitates discussions amongst students. • Teacher monitors and provides support, as needed.
<p>Evaluate How does the lesson—through both formative assessments embedded throughout the lesson and a summative assessment that might coincide with the elaborate phase—make visible students' thinking and their ability to use practices with core ideas and crosscutting concepts to make sense of phenomena and/or to design solutions?</p>	<p>Formative: Students try to figure out the phenomena</p> <p>Summative: Drawing of Earth position in every season for the Northern Hemisphere. Unit Assessment.</p>	<p>Formative: What did we learn? Discussion on key concepts and terms</p> <p>Summative: Discussions that check for the students understanding of the phenomena.</p>

Classroom Reflections (To Be Completed After the Lesson and Provide Feedback to Others):

Based on your experience teaching this lesson, what will you do differently, or what suggestions would you give to someone else using this lesson plan?

References:

Achieve, Inc. and NSTA. (2014). *EQuIP Rubric for Lessons & Units: Science*. Washington, D.C.: Achieve, Inc.
 Bybee, R. (2013). *Translating the NGSS for Classroom Instruction*. Arlington, VA: NSTA Press.
 Chris Embry Mohr. (2015). Personal communication. NGSS Unit Implementation Resources.

3-D Lesson Planning Template Source:

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