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Reasons for the Seasons
4th Grade Science Lesson

Element One: Classroom Context- The content area in which this "Reasons for the Seasons" lesson will be taught is Science. The lesson was developed for a 4th grade class, but I will be teaching it to my 3rd grade class. My class consists of 25 students; 14 girls and 11 boys. Culturally significant and relevant information pertaining to the context of my classroom is that I have one English Language Learner who is very new to the English language. I will be modifying different materials within my lesson for him in order to ensure his understanding of the phenomena. My 3rd grade class is very accustomed to technology. Each student is equipped with a chromebook in which they use throughout a variety of different subjects throughout the day. I will use the chromebooks to capitalize on this "Reasons for the Seasons" lesson.

Element Two: Lesson Planning with Rationales for your Decisions-

<u>**Names of Lesson Creators:**</u> **Marianne Berge, Kayla Twedt, STEPHANIE VIEAU, Marjorie Comer, Linda Morris, Elizabeth Vinson Grabois**
CONCEPT-BASED LESSON PLANNING PROCESS GUIDE

Note: The shaded areas indicate the shifts from more traditional lesson planning to a concept-based instructional design and asks teachers to metacognitively reflect on their planning. The red cells and shading indicate the primary focus of our work at the Institute. **The process guide is to help make visible "the invisible thinking" in which teachers engage as they plan lessons**. The guide is not intended to suggest that templates in use by teachers or in districts should be replaced; in fact, the process guide may be a valuable tool when used "side-by-side" with other lesson planning templates or tools. The intention is to illustrate the type of questioning that should occur consistently with any planning process when considering the instructional shifts implicit in the Colorado Academic Standards.

Shift in Instructional Design	*Lesson Elements and Design*	*Metacognitive Reflection*
The Unit Generalization and Focusing Lens asks students to … *Explain how the earth's tilt and orbit cause the seasons.*	**Lesson Focus:** (*Connection to Generalization and/or Focusing Lens in the District Sample Curriculum Project*) Seasons occur predictably due to the earth's tilt and orbit around the sun. (SC09-GR.4-S.3-GLE.1-EO.c; RA.3; N.1) CCSS.Math.Content.4.MD.B.4 - Make a line plot to display a data set of measurements.	*How does this specific lesson advance the big idea or generalization of the unit? What connections might be made between other content areas?* *Students begin to notice patterns in data tables comparing average*

Explain the relationships with regard to the earth and sun.		*temperatures in Denver and Australia. The formulate questions and explore to find more information.*
This lesson objective / learning target is critical to student understanding because…	**Objectives / Learning Targets:** *(Key knowledge & skills students will master in the lesson)* *(Language may be pulled from the task in the Learning Experience:"…so that students can…")* **Explain how the earth's tilt and orbit cause the seasons.** **Explain the relationships with regard to the earth and sun.** **Develop models to demonstrate the relationship between sun and earth that causes seasons.**	*In what ways does the learning target support the generalization?* *Students will be able to not only identify the reasons for the seasons, but explain how they correlate to the relationship between the sun and earth and how the earth's tilt and orbit CAUSE the seasons.*
Instructional strategies	**Instructional Strategy Menu (not exhaustive):** · <mark>Student-generated questions</mark> <mark>Essential Question- What are the reasons for the seasons?</mark> · *Teacher-provided inquiry questions* · *Think- aloud* · *Teacher modeling* · *Close reading protocol* · *Hands-on/experiential* · *Direct instruction* · *Collaborative groups* · *Socratic Seminar* · <mark>*Please add your own discipline-specific strategies*</mark>	*Which instructional strategies will foster learning the lessons skills, processes, or content?* *Student generated questions will promote the scientific practices (Asking Questions)*
In the first 3-7 minutes of the lesson, We want to engage the students with a scenario that will give them some context that will help them analyze data and create a graph.	**Opening (hook / anticipatory set / lesson launch)** <mark>**ENGAGE**</mark> <mark>Phenomenon. Our reason for being here today is to explore the phenomenon of seasons.</mark> **Engaging Scenario Video:** http://thekidshouldseethis.com/post/54997613241 **In this task, you will look at climate data from Denver and Melbourne, Australia. First you**	***In what ways does the chosen strategy work toward a larger purpose at the beginning of the lesson?*** *Engaging students, increasing curiosity, stimulating student-generated questions.* ***In what ways does the chosen strategy(ies)***

	will graph the data from the data with a partner or 2. After you have finished, write down some questions that you guys have looking at your graph and data. **Instructional Strategy chosen:** **Why is this strategy impactful:** (*In what ways does this strategy move the learner toward meeting the learning target? How would this strategy ensure all students, with differentiated needs, could feel successful?*) **How does this strategy support meeting the "==just-right challenge==," or "==building relationships==," or "==creating relevancy==," or "==fostering disciplinary literacy=="?**	*work toward a larger purpose. Interacting with complex texts; situating students in real-life, relevant experiences; Stimulating student discourse)?* ***In what ways does the chosen strategy cement the learning?*** *Adding relevancy with the scenario and creating a visual by graphing the data.*
The Learning Experience will	**==EXPLORE==** (Marianne) (10 minutes) ***Learning Experience / Lesson Google Classroom:*** **Instructional Strategy chosen: Give students time to explore answers to their questions.** **Teacher will facilitate share out of one question and one bit of information that they learned.** **==EXPLAIN==** **Construct a model.** **Teachers demonstrate correct model.** **Students write explanation of why we have seasons.** **Why is this strategy impactful:** (*In what ways does this strategy move the learner toward meeting the learning target? How would this strategy ensure all students, with differentiated needs, can feel successful?*) **How does this strategy support meeting the "==just-right challenge==," or "==building relationships==," or "==creating relevancy==," or "==fostering disciplinary literacy=="?**	*What evidence will show that the strategies impacted student learning? Were the strategies effective through the learning process?* *Students being able to explain the reason for the season through an accurate and creative model will solidify that the strategies were effective in the learning process because they are able to relate the information.*

The closing activity reinforces the learning.	**EVALUATE:** *A few students share their models. Exit tickets collected in Google classrooms.* *Closure* **Instructional Strategy chosen:** **Why is this strategy impactful:** *(In what ways does this strategy move the learner toward meeting the learning target? How would this strategy ensure all students, with differentiated needs, could feel successful?)* **How does this strategy support meeting the "just-right challenge," or "building relationships," or "creating relevancy," or "fostering disciplinary literacy"?**	
Technological resources that will support student learning and move students toward the learning target.	*Technological Resource and application:* **How: In what ways does this chosen resource support meeting the "just-right challenge," or "building relationships," or "creating relevancy," or "fostering disciplinary literacy"?**	*How will my students and I strategically use technology resources to enhance the learning experience? Students will use their chromebooks to amplify their learning through using the resources to find answers to their questions.*
Formative assessment will be a quick Check for Understanding in which students will demonstrate they are or are not on track.	*Formative Assessment* **Formative Assessment tool/method:** **Learning indicators of success:** *(What evidence will show that the learner is moving toward mastery of the learning target?)*	*What "indicators of success" will show that the students are gaining mastery?* *How will I use that evidence in a feedback loop?* *The "indicators of success" will show as students are able to display an accurate and creative model about the reasons for the seasons. I will use the evidence in their models to adjust/modify my instruction.*

Reflection: (What are the *strengths in the lesson plan? What changes would I make in the lesson plan for next time*?) **Teacher Reflection: What was most effective about this lesson? What areas could be improved?** **Student Reflection: Reflect on your thinking, learning, and work today. What were you most proud of?**	

Connection to Performance Goal: (*What did I do in this lesson that gives evidence or may be used as an artifact for my professional growth plan?*)	

Student Feedback: (*What did students say about the lesson? Did they find it engaging, interesting, appropriately challenging? Did their feedback confirm my own perception of the the lesson?*)	

Time Suggested	
Materials Needed	
Co-teaching Opportunity	
Cross-Content Connections	

Orbiting model:
http://d3tt741pwxqwm0.cloudfront.net/WGBH/npls13/npls13_int_seasons/index.html
NASA Space Place:
http://spaceplace.nasa.gov/seasons/en/
Useful?
https://d43fweuh3sg51.cloudfront.net/media/assets/wgbh/ess05/ess05_doc_lpasunlight/ess05_doc_lpasunlight.pdf
KIDS GEO:
http://www.kidsgeo.com/geography-for-kids/0017B-reasons-for-the-four-seasons.php
Discovery Kids:
http://discoverykids.com/articles/what-causes-seasons/
Ted ED "Reason for the Seasons" Video (first 41 seconds of the video):
http://thekidshouldseethis.com/post/54997613241

Written Explanation
Essential Question- What is the reason for the seasons?
Claim
I claim that the reasons for the seasons is the tilt of the earth as it travels around the sun in an elliptical orbit.

Evidence

My evidence comes from observing a model made by scientists. The model demonstrates how the earth travels around the sun during one revolution (12 months).

*In June, the Northern Hemisphere is receiving more solar energy with more hours of light (our summer).

*In December, the Southern Hemisphere is receiving more solar energy with more hours of light (their summer).

During March and October, both hemispheres are receiving about the same amount of solar energy with equal hours of light and dark.

Reasoning

*The earth has has an imaginary line through it called an axis that points to the North Star.

*The earth travels around the sun in an eliptical orbit.

*It takes 365 days or 12 months for one revolution around the sun.

*During the revolution, the Northern and Southern Hemispheres receive different amounts of sunlight due to the tilt and eliptical orbit.

Element Three: Description of the Lesson Implementation: I began my lesson by asking my class "What is the reason for the seasons?" I told them to turn to the person sitting next to them and explain their thinking for why we have seasons. As I was listening to conversations I heard students solidifying the different seasons ("In December we have Winter, which is really cold and sometimes snows" and "In Summer it's really hot and there are thunderstorms") but realized that while they could identify that there were, indeed, different seasons, they had little schema about *why* there were different seasons. After regrouping them, I stated our objective by telling them that today, we were going to find out why there are different seasons.

I showed the "Engaging Scenario Video" as seen in our lesson plan. This appeared to really excite the kids and get their "wheels turning" about how there are different seasons in different places around the world. Because my class has had little experience with graphing, I decided that instead of having my students graph in pairs, I would graph the data from Melbourne, Australia and and Denver, Colorado before the lesson on large chart paper, and have the students analyze it in pairs. I had each group use a loose leaf sheet of paper and number it from 1-3. They came up with 3 questions, observations, or comments they had about the data on the chart paper. Some of the observations I collected were "Australia has their summer from December to February and Denver, Colorado has their summer from June-September." "It would be really weird to have Winter in June!" "Why does Colorado have Summer in June and Australia have Winter in June?" Giving students a chance to analyze and think about the data that was being presented allowed for an opportunity for the students to think critically about the data and engage deeper in it.

After students shared their questions/observations/comments with the class, I set them loose to do the research using the websites listed above. As previously mentioned, each student in my classroom has a chromebook and each child was able to research on their own computer. I gave them a "note taking" sheet, where I had intended for them to take down notes from the research they were finding. After collecting these however, I realized that not many students chose to do this. I think they were too excited about the researching on the chromebooks and unfamiliar with note-taking while researching, that it was not as beneficial as I thought it would be. For the most part, however, my 3rd graders seemed to retain the answers they were finding to their questions, and the information they were collecting. I think that equipping students with the websites to go to was an easy way to monitor the websites they were navigating, but from the students' perspective, they felt like they were getting some "voice and choice" about which website they wanted to use and which one would give them the information that they were specifically looking for.

After giving them 10 minutes to research, I had each pair share out the information they found with the class. Students shared out answers like "When it is Summer South of the Equator, it is Winter North of the Equator." "During part of the year, the Earth is closer to the song than during other parts of the year," and "Earth has seasons because its axis is tilted and Earth rotates on its axis as it orbits." I noticed that this sparked conversation amongst the class and it felt like a collaborative moment of students working together to find an answer to the phenomena. I was no longer the teacher at the front of the class with all of the knowledge teaching it to my students, but rather the facilitator of the learning that was taking place amongst the class through conversation.

After the conversations with explanations of findings for the "reasons for the seasons" I had 3 pairs of students join together to create groups of 6 and gave them the task of creating a model that accurately showed the reasons for the seasons. I told the students that they were allowed to use any props in the room, or they could just use themselves. I gave them roughly 7 minutes to complete this task. During this time, I felt that the students were actually very engaged. I felt the hunger from most students to find the answer to this question, and while sometimes working in groups can cause distractions and off-task conversations, each student seemed genuinely engaged in forming an accurate model to explain the reason for the seasons. My students used emoji pillows that I have in my classroom to use as different rotations around the sun, they used chairs to stand on and most groups used themselves as the models to describe the rotation of the sun. Most groups were able to accurately display the reasonings, while some were a little confused. I think the use of a flashlight would have helped the confusion with these groups, which appeared to have trouble understanding where the sun was shining during different rotations.

After the groups created their own models to explain the reasons for the seasons, I showed them a correct model of why we have seasons. I did this using the website listed above "Why Do We Have Seasons?" I thought this model most accurately explained the model. I regretted not using a creative model (similar to the students') to explain the phenomena, but found it challenging with their only being one of me. After explaining in detail, as a way to solidify the research the students had done, I had students write about what they learned about the "Reasons for the Seasons." At the end of the lesson, I had students write a reflection about what they liked and didn't like about the lesson.

Element Four: Reflection:

My Reflection: This lesson was very hands on and engaging for my students. After showing the video at the beginning of the lesson, my students were instantly curious about the reason for the seasons. In my opinion, they felt like detectives. Instead of being the teacher, teaching them about the reasons for the seasons, they were put to a task and challenged to find the answer. This made them curious, excited, and engaged. I incorporated more opportunity for my students to talk with each other to help students build schema with each other and deepen their curiosity and conversations. I think this really benefitted the outcome of the lesson and made the class feel like they were collaboratively working to find an answer- something they love to do.

Based on the statements I got at the end of the class, I felt that the majority of my class was able to grapple with the reasons for the seasons. Out of my 25 students, 20 were able to explain it accurately (one way or another). The 5 that didn't seemed to be "approaching" an accurate description, but were not there yet. My guess is that they needed more time to come to a conclusion, for different reasons. As I reflect on how I could have helped these students come to a more solidified answer, I realize that using manipulatives to explain the correct model for the reasons for the seasons could have helped them. As mentioned, I used the website as my accurate model because there was only one of me in the room and I was not creative in thinking of another way to show it. I think a lot of these students were more visual-hands-on-learners, and would have benefitted from seeing a hands-on model from me.

Because this lesson was intended for 4th grade, the expectation was for students to graph the data about the different seasons in Melbourne, Australia and Denver, Colorado. I think this is very engaging and would leave to an even deeper curiosity from students. But for my third grade class, graphing the data for them and then having them analyze it with their peers, seemed to work just as well. I think if I were to teach this later

in the year, we could have graphed, but at this time, I had to assess where my students were at, and I knew graphing would cause more confusion than what was important for this lesson. Later in the year, I might use this lesson to graph again.

All in all, this lesson was very enjoyable for both me and the students. My students seemed very engaged and interested in finding an answer to this phenomena. I think this was a lesson that students will enjoy going home and telling their parents about. This lesson involved collaboration and critical thinking (of the 4 C's) which is something Douglas County Schools likes to initiate in every lesson plan as they push students to think with 24 century skills!

Student Reflection: Based on data collected, the majority of my students (20/25) learned from this lesson. As mentioned, at the end of my lesson I had kids reflect on what they liked and didn't like about the lesson. Students reported that they liked researching different websites, they liked creating the model with groups, they liked working with each other and not alone, and they liked learning that a place like Australia has seasons at different times than we do in Colorado. Based on their reflections, I think my students felt very engaged because they got to be active investigators and got to use a lot of voice and choice throughout the lesson. I got a couple comments from students that they wished they had better things to use when trying to show a model for how to show the reasons for the seasons. Maybe if I were to teach this lesson again, I would give students a choice to use props that I bring in ie. a flashlight, beach ball, etc.