

**Slides presented at the
2015 NGSS Network Leadership Conference**

**Middle School Lesson
Presentation**

February 18, 2015

Presenter: Wendy Whitmer



Session Layout

- What to look for...
- Lesson
 - Setup
 - Engage in the lesson as a student
 - Closure of the lesson
- What did you see?
- Other important things to look for and final thoughts



What to look for...

- Recognition of time limitation and that this is a snapshot of the classroom
 - Recognition of where we are in implementation



What to look for...

- Used the EQuIP Rubric as a starting place
- Though it is designed to look at curriculum and not instruction, we thought it might provide a good basis to identify and modify questions for this session



A few big ideas from the EQuIP

- Practices, disciplinary core ideas, and crosscutting concepts work together to support students in making sense of phenomena and/or designing solutions to problems
- Provides opportunities for students to develop and use the three dimensions
- Lessons fit together coherently targeting a set of performance expectations



In Context: What to Look for in the Lesson

- Purpose of the lesson
 - How does the lesson help students make meaning of the phenomena while deepening their understanding of the three dimensions targeted by the lesson and building toward proficiency on the PEs?
 - What will this lesson expose students to that would contribute to the overall understanding and how is this made explicit for students?



In Context: What to Look for in the Lesson

- Three dimensions
 - How were the students engaged in three-dimensional learning?
 - Opportunities to use and construct each of the dimensions
 - Dimensions work together to help the students make sense of phenomena or design a solution to a problem
- Coherence
 - How did the lesson fit into a coherent picture that would support students in being able to demonstrate the understandings identified in the standards?



Evidence



I can see it, point to it in a lesson or unit, highlight it, or quote it directly from what is written.



Middle School Lesson

A Day at the Beach



Wendy Whitmer

Science Teacher, Lakeside Middle School, Nine Mile Falls, WA

Dr. Craig Gabler

NSELA President 2014-15; Regional Science Coordinator,
Capitol Region ESD, WA

Dr. Ellen Ebert

Washington State Science Director



Middle School Lesson

NGSS Bundle of PEs for the Unit

MS-ESS2-5

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

MS-ESS2-6

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

MS-PS3-4

Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.



Middle School Lesson

CCSS Bundle of PEs for the Lesson

CCSS.Math.Content.6.EE.C9

Represent and analyze quantitative relationships between dependent and independent variables.

CCSS.ELA-Literacy.WHST.6-8.2.F

Provide a concluding statement or section that follows from and supports the information or explanation presented.

CCSS.ELA-Literacy.WHST.6-8.7

Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.



Middle School Lesson

Learning Target for the Lesson

Plan and conduct an investigation to determine how different surfaces affect the rate of heating and cooling.

Background:

- 6th Grade Classroom- Beginning of year
- Start of a unit on weather
- Students have brainstormed what they already know about weather
- Students have formulated questions they have about identified weather phenomena



Middle School Lesson

A Day at the Beach



1. Complete the probe independently.
2. Share your answers with your colleagues.
3. Can you come to a consensus at your table?



Middle School Lesson

Let's Test It!

What would be a good investigative question we could test? How does _____ affect _____?



How does the surface affect the rate of heating and cooling?

What are our variables?



Middle School Lesson

Let's Test It!

Write a procedure to test Allia and Adrionne's responses.

Materials:

- 2 Beakers
- 100ml Soil
- 100ml Water
- 2 Digital Thermometers
- Lamp



Middle School Lesson

The Data

Table 1 Heating and Cooling Data

Heating			Cooling		
Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)	Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)
0:00	21°C	19°C	10:00	36°C	24°C
1:00	24°C	20°C	11:00	33°C	24°C
2:00	28°C	21°C	12:00	31°C	23°C
3:00	30°C	21°C	13:00	29°C	23°C
4:00	32°C	22°C	14:00	28°C	23°C
5:00	33°C	22°C	15:00	27°C	23°C
6:00	34°C	23°C	16:00	26°C	23°C
7:00	35°C	23°C	17:00	25°C	22°C
8:00	35°C	23°C	18:00	25°C	22°C
9:00	36°C	24°C	19:00	24°C	22°C
10:00	36°C	24°C	20:00	24°C	22°C
Total temperature change	15°C	5°C	Total temperature change	12°C	2°C



Middle School Lesson

The Data

Table 1 Heating and Cooling Data

Heating			Cooling		
Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)	Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)
0:00	21°C	19°C	10:00	30°C	24°C
1:00	24°C	20°C	11:00	33°C	24°C
2:00	28°C	21°C	12:00	31°C	23°C
3:00	30°C	21°C	13:00	29°C	23°C
4:00	32°C	22°C	14:00	28°C	23°C
5:00	33°C	22°C	15:00	27°C	23°C
6:00	34°C	23°C	16:00	26°C	23°C
7:00	35°C	23°C	17:00	25°C	22°C
8:00	35°C	23°C	18:00	25°C	22°C
9:00	36°C	24°C	19:00	24°C	22°C
10:00	36°C	24°C	20:00	24°C	22°C
Total temperature change	15°C	5°C	Total temperature change	12°C	2°C

1. Make 3 observations about the data. What patterns do you see?
2. Can we answer our investigative question using this data?
How does the surface affect the rate of heating and cooling?
3. Make a claim that relates to our question.
4. Provide evidence from the data table to support your claim.



Middle School Lesson

Reasoning

Table 1 Heating and Cooling Data

Heating			Cooling		
Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)	Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)
0:00	21°C	19°C	10:00	30°C	24°C
1:00	24°C	20°C	11:00	33°C	24°C
2:00	28°C	21°C	12:00	31°C	23°C
3:00	30°C	21°C	13:00	29°C	23°C
4:00	32°C	22°C	14:00	28°C	23°C
5:00	33°C	22°C	15:00	27°C	23°C
6:00	34°C	23°C	16:00	26°C	23°C
7:00	35°C	23°C	17:00	25°C	22°C
8:00	35°C	23°C	18:00	25°C	22°C
9:00	36°C	24°C	19:00	24°C	22°C
10:00	36°C	24°C	20:00	24°C	22°C
Total temperature change	15°C	5°C	Total temperature change	12°C	2°C

1. At your table, explain WHY you saw the results you did. Why does the surface affect the rate of heating and cooling?
2. List all the factors you can think of.



Middle School Lesson

Washington State Context...

Table 1 Heating and Cooling Data

Heating			Cooling		
Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)	Time (minutes)	Soil Temperature (°C)	Water Temperature (°C)
0:00	21°C	19°C	10:00	36°C	24°C
1:00	24°C	20°C	11:00	33°C	24°C
2:00	28°C	21°C	12:00	31°C	23°C
3:00	30°C	21°C	13:00	29°C	23°C
4:00	32°C	22°C	14:00	28°C	23°C
5:00	33°C	22°C	15:00	27°C	23°C
6:00	34°C	23°C	16:00	26°C	23°C
7:00	35°C	23°C	17:00	25°C	22°C
8:00	35°C	23°C	18:00	25°C	22°C
9:00	36°C	24°C	19:00	24°C	22°C
10:00	36°C	24°C	20:00	24°C	22°C
Total temperature change	15°C	5°C	Total temperature change	12°C	2°C

Conclusion Criteria:

1. Conclusive Statement (answer the question...)
2. High data from data table
3. Low data from data table
4. Explanatory Language



Middle School Lesson

A Day at the Beach Next Steps



1. Students return to their probe and update their responses.
2. Students investigate how surface affects air temperature.
3. Students investigate how temperature affects air movement.
4. Students build a rain gauge and measure local precipitation.
5. Students do short research projects on weather phenomena (i.e. tornadoes, hurricanes, thunderstorms, etc.)
6. Students talk about energy and return to this investigation to discuss energy transfer.
7. Students learn about seasons and the Coriolis effect.
8. Students conduct research to find data supporting Global Climate Change and to identify current and future impacts on the weather.
9. Students create a concept map of weather-related phenomena and compare to their original concept map.



Practices:

- Ask questions to clarify premise
- Plan and conduct an investigation collaboratively
- Analyze data sets

NATURE OF SCIENCE:

Science depends on evaluating proposed explanations

Core Ideas:

Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things.



Crosscutting Concepts:

- Cause and Effect: Students use cause and effect relationships to predict phenomena in the natural world.
- Patterns: Students use patterns to identify cause and effect relationships.

Middle School Lesson

Resources



1. STC for Middle School: Catastrophic Events, National Academy of Sciences, 2000
2. Thanks to Page Keeley for editing the “A Day at the Beach” probe.



In Context: What to Look for in the Lesson

- Purpose of the lesson
 - How does the lesson help students make meaning of the phenomena while deepening their understanding of the three dimensions targeted by the lesson and building toward proficiency on the PEs?
 - What will this lesson expose students to that would contribute to the overall understanding and how is this made explicit for students?



In Context: What to Look for in the Lesson

- Three dimensions
 - How were the students engaged in three-dimensional learning?
 - Opportunities to use and construct each of the dimensions
 - Dimensions work together to help the students make sense of phenomena or design a solution to a problem
- Coherence
 - How did the lesson fit into a coherent picture that would support students in being able to demonstrate the understandings identified in the standards?



Other important things to look for?

What are some other things we would want to see in a high-quality lesson aligned to the NGSS?

