### Planning the inquiry

#### 1. What is our purpose?

1a) To inquire into the following:

- **transdisciplinary theme**
  
  **How The World Works:** An exploration of the physical and material world; of natural and human-made phenomena; of the world of science and technology.

- **central idea**
  
  Everything around us is matter and has different properties

#### 1b) Summative assessment task(s):

What are the possible ways of assessing students' understanding of the central idea? What evidence, including student-initiated actions, will we look for?

1. Students will go on a scavenger hunt looking for several items: three solids, two liquids and one gas. Label each item. Tell what all three states of matter have in common. Observation- The students went on a Matter Walk around the School where they located and recorded evidence of solids, liquids, and gases around the school.

2. The students performed a Cracker Lab where they observed the shape, size, color, and felt the texture of four different types of crackers. Before the observation, discussions were held about the similarities and differences of objects in different textures, sizes and colors. Examples: Books, rocks and toys are all solids, but have different properties that make them unique.

3. After completion of different examples of states of matter students identify which state of matter belongs to which property.

4. Create a poster of labeled drawings that show the three states of matter and put the drawings under the appropriate headings of solids and liquids, and gases. Matter Walk

#### Class/grade: 1st Grade  
Age group: 6-7 years old

School: Wildwood School  
School code: 2068

Title: “It Matters”

Teacher(s): Kreydick, Kelsey

Date: March/ April 2015-2016

Proposed duration: 2 hour everyday over 5 weeks

#### 2. What do we want to learn?

What are the key concepts (form, function, causation, change, connection, perspective, responsibility, reflection) to be emphasized within this inquiry?

**Form:** Students learn that matter has shape, volume form and density.

**Function:** Students learn that matter has definite functions according to the different states.

**Change:** Students learn that some matter (water) can change from one state to another depending on the specific conditions.

What lines of inquiry will define the scope of the inquiry into the central idea?

- The States of matter-What is it Like?
- How the World is made up of Matter -Properties-How does it work?
- How matter can change from one state to another-How is it changing?

What teacher questions/provocations will drive these inquiries?

1. What are the properties of matter?
2. What are the three states of matter?
3. What do you need to do to change one state of matter to another?
4. How are mass and volume related to matter?

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3. How might we know what we have learned?

This column should be used in conjunction with “How best might we learn?”

Ask questions. ... to research and discuss the properties of solids and liquids that can be used to classify them using appropriate grade level print material. (Patterns) W.1.5

Carry out investigations. ... about the properties of solids and liquids describing them by their observable properties. (Patterns)

Carry out investigations. ... about the materials that have the properties of both solids and liquids.

Obtain information through observation. ... to compare the properties of solids and liquids before and after they are mixed together. (Patterns) W.1.8

Use observations and information. ... to identify the properties of solids and liquids.

Use mathematics. ... to measure the amount of water that evaporates over days and graph the data. (Energy and matter: Flows, cycles, and conservation)

Communicate. ... information orally or in writing about the properties of solids and liquids. W.1.2, SL.1.4

Analyze information. ... gathered about the changes in solids that have been mixed with liquids. SL.1.2

Plan, draw, and construct. ... a tower or bridge structure that considers and uses the properties of the solids from which it is constructed to successfully stand tall or hold weight. + (Structure and function) MP1, MP4, MP6

Communicate and evaluate. ... the designs with others comparing the strengths and weaknesses of the structures. + (Structure and function) SL.1.1, SL.1.2, MP.3

Design a structure. ... to capture evaporated water to reuse. + (Systems and system models)

Carry out investigations. ... on the results of mixing solids and liquids.

Communicate and evaluate. ... the findings of investigations with others. SL.1.1, SL.1.2, MP.3

Matter Walk around the school. Students look for solids, liquids, and gases around the building.

Discussion of the difference between “states and properties”. Freemont Magnet School website.

What are the possible ways of assessing students’ prior knowledge and skills? What evidence will we look for?

- Review Scientific Method and lab safety rules - check for understanding
- Ask students how they can tell how much space an object takes up. Record student’s answers on a chart.

4. How best might we learn?

What are the learning experiences suggested by the teacher and/or students to encourage the students to engage with the inquiries and address the driving questions?

Prior Knowledge

- People use their senses to gather information about the world around them.
- Water can be a solid or a liquid.
- Water can go back and forth from solid to liquid.
- There are many kinds of solid materials in the world, some produced and some made naturally.
- Solid materials can be sorted by their properties.
- Different solid materials can absorb or repel water.
- Different properties of solid materials can make them useful for different purposes.
- People use their senses to learn about the world.
- Scientists learn about things by observing them over time, writing about them, and making drawings of what they see in journals.
- Everything around you is matter and has different properties

Building background knowledge: read Science resource materials with students on matter/energy. Go over concepts, and vocabulary.

1. Students will observe various objects and describe their properties in their notebooks.
2. Students are given water, a rock and a balloon. Students will predict which ones have definite shape and volume. They will test their predictions by putting them in different containers. They observe the objects and record which ones have definite shape and definite volume in a chart.
3. Using their senses, students will make a list of ten objects in their classroom and home and list examples of matter and identify the state the objects are in. (Peer Assessment)
4. Using the scientific method, students are given ice and brainstorm the fastest ways to turn it into gas using the scientific method.
5. Students will go on a scavenger hunt looking for several items: three solids, two liquids and one gas. Label each item. Tell what all three states of matter have in common. Observation- The students went on a Matter Walk around the School where they located and recorded evidence of solids, liquids, and gases around the school.
• Ask students to describe the pencil, pen and notebook on their desks. Record answers on the board and tell students they have just described the properties of these objects.

What are the possible ways of assessing student learning in the context of the lines of inquiry? What evidence will we look for?

1. Students watched a movie on matter and had to identify five facts from the movie to list as important to them. After writing those five items as notes, they recorded them into an audio note and played them back. Peer assessment. Teacher observation. Students will complete chart in science journal (Teacher checklist)

2. Students record mass and volume in journals (Teacher observations. Students record their investigations in their science journal).

3. Students wrote observations in science journal after experiment on mixing water, borax, and glue to change a liquid into a solid. The students were able to reflect on transition of that mixture from a liquid into a solid. Students watched a podcast on states of matter using iPads. The students were able to create an audio reflection on what they learned. Observation and Checklist

First Grade Inquiry Fair- The students made Ice Cream-Changing a liquid into a solid, Ooblik,-When things melt in your hand, Are they a Solid or a Liquid, Empty Glass Trick,-Glass stayed dry, even after emerging in water, and Raisin Race -See how gas is dissolved in the liquid.

Possible Misconceptions

• Some students may believe that water changes into something else when it becomes a solid.
• There may be confusion about the change from solid to liquid and back again.
• Some students may not believe that water can change from solid to liquid and go back.

6. The students can perform a Cracker Lab where they observed the shape, size, color, and felt the texture of four different types of crackers. Before the observation, discussions were held about the similarities and differences of objects in different textures, sizes and colors. Examples: Books, rocks and toys are all solids, but have different properties that make them unique. After completion of different examples of states of matter students will identify which state of matter belongs to which property.

7. Students can create a poster of labeled drawings that show the three states of matter and put the drawings under the appropriate headings of solids and liquids, and gases.

What opportunities will occur for transdisciplinary skills development and for the development of the attributes of the learner profile?

Research skills - During lab activities, students will be collecting data and use their senses to observe and thinking skills to make conclusions. Data will be recorded in their science journals. Students had the opportunity to use their senses for observation, collect the data they needed to make conclusions, record data in science journals and present what they learned.

Social skills - Lab investigations will allow students to exercise self-control as they continue to practice the safety skills they have learned. They will be working in groups to solve problems so they will need to listen respectfully, take turns and cooperate to complete tasks within the designated time frame.

Learner Profile and attitudes - As with any Science based unit, we expect the students will develop their curiosity and appreciation for the natural world. Thinkers: As they are presented with problems to solve in the lab, students will further develop their ability to approach activities with creatively.
5. **What resources need to be gathered?**
What people, places, audio-visual materials, related literature, music, art, computer software, etc, will be available?

- iTunes

- www.scholastic.com/sn1

How will the classroom environment, local environment, and/or the community be used to facilitate the inquiry?

- A bulletin board that has a concept/question and student response board
- Science Instant Learning Center
- youtube

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Reflecting on the inquiry
6. To what extent did we achieve our purpose?

Assess the outcome of the inquiry by providing evidence of students' understanding of the central idea. The reflections of all teachers involved in the planning and teaching of the inquiry should be included.

Payne 2015-16

How you could improve on the assessment task(s) so that you would have a more accurate picture of each student’s understanding of the central idea.

What was the evidence that connections were made between the central idea and the transdisciplinary theme?

The students understood that everything in the World is matter but has different properties.

The students investigated solids, liquids, and gases are the same because they are all matter, but different because there is different mass and properties.

The inquiry Fair was our final assessment task. The students led the experiments and explained to other grade level students and parents how the matter changes form in various states.

Many observation experiences demonstrated how the students were able to classify matter all around their world. They used research skills- performing the labs with the crackers and Ooblek, Ice Cream, Raisin Race, etc.

Social Skills were obvious during open discussions of matter, cooperative games and experiments, and matter walks in groups.

Kreydick 2015-16

How you could improve on the assessment task(s) so that you would have a more accurate picture of each student’s understanding of the central idea.

I think the assessments we did gave an accurate picture of each student’s understanding of the central idea.

What was the evidence that connections were made between the central idea and the transdisciplinary theme?

We had an Inquiry Fair that focused on matter experiments and explorations. The students made Ice Cream and followed the Scientific Method to record their hypothesis and observations. Played with Ooblek to try and determine if it was a solid or liquid and observed their observations. They watched raisins to see what would

7. To what extent did we include the elements of the PYP?

What were the learning experiences that enabled students to:

- develop an understanding of the concepts identified in “What do we want to learn?”

Students really enjoyed the hands on experiments like making oobleck and ice cream. Students liked the Matter Walk around school, they predicted where they would find the solids and liquids but not the gases. Gases had to be pointed out to them.

- demonstrate the learning and application of particular transdisciplinary skills?

Research - Students had the opportunity to use their senses for observation, collect the data they needed to make conclusions, record data in science journals and present what they learned.

- develop particular attributes of the learner profile and/or attitudes?

In each case, explain your selection.

As students continued to be able to classify matter around them and manipulate and create different states of matter, they gained an appreciation for the natural world. Thinkers- In order to solve the lab tasks, students were creative in finding new solutions. We promoted the attitude of curiosity with the students. As science is essentially inquiry and curiosity driven.
happen when you drop them ginger ale.

The students understood that everything in the World is matter but has different properties. We took walks to find different types of matter and watched videos explaining the different types and the properties. We also did an activity where students were able to identify properties of different crackers.

The students investigated solids, liquids, and gases and found how they all have different mass and properties.

The inquiry Fair was our final assessment task. The students led the experiments and explained to other grade level students and parents how the matter changes form in various states.

Students participated in many activities to help them decide how to classify matter all around their world. They used research skills- performing the labs with the crackers and Ooblik, Ice Cream, Raisin Race, etc.

Social Skills were obvious during open discussions of matter, cooperative games and experiments, and matter walks in groups.

Students completed an assessment on a think sheet reflecting on their learning. They compared different types of matter and explained how they were the same and different. They also described different properties of matter.
8. What student-initiated inquiries arose from the learning?

Record a range of student-initiated inquiries and student questions and highlight any that were incorporated into the teaching and learning.

Students had the following questions as a result of the learning:
- Why Does it Matter?
- When gas changes to liquid, does it get colder?
- Do solids move slowly?
- How Are solids, liquids, or gases the same/different?
- Why do gases move so fast?
- Why is there not so much room in the solid form?
- Why does water move not fast or slow?

At this point teachers should go back to box 2 “What do we want to learn?” and highlight the teacher questions/provocations that were most effective in driving the inquiries.

What student-initiated actions arose from the learning?

Record student-initiated actions taken by individuals or groups showing their ability to reflect, to choose and to act.

1. Students watched a movie on matter and had to identify five facts from the movie to list as important to them. After writing those five items as notes, they recorded them into an audio note and played them back. Peer assessment. Teacher observation. Students will complete chart in science journal (Teacher checklist)
2. Students record mass and volume in journals (Teacher observations. Students record their investigations in their science journal).
3. Students wrote observations in science journal after experiment on mixing water, borax, and glue to change a liquid into a solid. The students were able to reflect on transition of that mixture from a liquid into a solid. Students watched a podcast on states of matter using iPads. The students were able to create an audio reflection on what they learned. Observation and Checklist
   First Grade Inquiry Fair- The students made Ice Cream-Changing a liquid into a solid, Ooblik, -When things melt in your hand, Are they a Solid or a Liquid, Empty Glass Trick,-Glass stayed dry, even after emerging in water, and Raisin Race -See how gas is dissolved in the liquid.

9. Teacher notes

From A Framework of K-12 Science Education

Science and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Disciplinary Core Ideas - Component Ideas.

Key Ideas
- Solids and liquids have observable properties (e.g., flexible, flat, hard, rigid, rough, smooth, bubbly, colorless, foamy, transparent). (PS1.A)
- Solids can be sorted by their observable properties. (PS1.A)
- The properties of solid materials are considered when objects and structures are constructed. (PS1.A)
- Properties of types of matter (e.g., solids and liquids) can be used to classify them. (PS1.A)
- Some liquids are translucent (allow light to pass through), others are opaque (do not allow light to pass through). (PS4.B)
- Liquids take the shape of their containers. (PS1.A)
- Water can freeze (become solid) or evaporate (become a gas). (PS1.B, ESS2.C)
- Heating materials can cause observable changes, as when ice melts. (PS1.A, PS1.B)
- Particles of solid materials can pour, but they maintain their shape. (PS1.A)
- Solid materials in a mixture can be separated. (PS1.A)
- Some solids dissolve (change when mixed with water), some do not. (PS1.A)
- Some liquids mix with water, others form layers. (PS1.A)
- Some materials have the properties of both solids and liquids. (PS1.A)
- Scientists learn about things by observing them over time and keeping a record of their observations. (PS4.C)
- Scientists use journals to record their observations accurately in writing or with drawings. (ETS1.A, ETS1.B, ETS1.C)
- Scientists discuss strengths and weaknesses in their designs. (ETS1.C)
- Additional academic vocabulary: viscous, crystal, evaporation, flow, texture, surface