What Happened to Our Ice?

Welcome to NSTA's Daily Do

Teachers and families across the country are facing a new reality of providing opportunities for students to ***do*** science through distance and home learning. The **Daily Do** is one of the ways NSTA is supporting teachers and families with this endeavor. Each weekday, NSTA will share a sensemaking task teachers and families can use to engage their students in authentic, relevant science learning. We encourage families to make time for family science learning (science is a social process!) and are dedicated to helping students and their families find balance between learning science and the day-to-day responsibilities they have to stay healthy and safe.

What is Sensemaking?

Sensemaking is actively trying to figure out how the world works (science) or how to design solutions to problems (engineering). Students ***do*** science and engineering through the science and engineering practices. Engaging in these practices necessitates students be part of a learning community to be able to share ideas, evaluate competing ideas, give and receive critique, and reach consensus. Whether this community of learners is made up of classmates or family members, students and adults build and refine science and engineering knowledge together.

Materials

Items: Four ice cubes (They should all be the same size and shape), Four drinking glasses (They should all be identical), Table salt, Sugar, Sand, One-quarter teaspoon measuring spoon

Article: Scientific American – What Makes Ice Melt Fastest? A Chemistry Challenge from Science Buddies

Informational Handout: What Are Dinner Table Discussions (DTD's)? & Dinner Table Discussion – Guidance for Families

Optional Handout: Science and Engineering Practices – Developed by NSTA using information from Appendix F of the Next Generation Science Standards

Collection of Resources: Direct links to all videos, articles, handout materials, and other resources – https://bit.ly/DD-04-30-2020

Introduction

In today's Daily Do*, What happened to our ice?,* families participate in a **Dinner Table Discussion** (see handout) about the phenomenon of melting ice. This sensemaking discussion has four parts:

1. Families raise the question "**What happened to our ice?"** by introducing the phenomenon of melting ice. Students and their families observe and/or taste liquids making careful observations of how and why the liquids change before and after ice melts.

2. Families ask students to explain what they currently understand about how and why they think ice melts.

3. Families prompt students to generate questions about how and why ice melts.

4. Families read an article and do an activity together to find some answers to their questions about how and why ice melts.

What happened to our ice?

Have you ever taken a long sip of a day-old soft drink from your favorite fast food restaurant? Have you ever noticed the glass full of ice keeping your drink cold on a hot summer evening is

not there anymore by the time dinner is ready? If you have, you know a little about asking the question "Where did my ice go?"

In today's Daily Do, we will figure out what happened to your ice!

Introducing the Phenomenon & Raising the Question

There are two options for introducing this phenomenon:

1. Pour soda, or another liquid like lemonade, into a glass and allow ice to melt in it. Pour the same liquid, without ice, into another glass. Have your child taste the contents of each glass and ask leading them questions such as:

    - What do you notice about the taste difference between the two?
    - What do you notice about the appearance of the liquids?
    - What do you think is different about the two liquids? How do you know?

2. Ask your children to observe a glass of ice water (or a clear cup) (roughly 1/3 ice and 2/3 water). Ask them to observe it again approximately 30 minutes later. Ask leading questions such as:

    - How have the contents in the glass changed in the last 30 minutes?
    - Why do you think those changes occurred?
    - How do you know?

Tell us what you know...

Encourage your children to explain to you what they know (or think they know) about why ice melts. Ask them to *"explain the science of why ice melts"*. Children will attempt many varieties of explanations, but our goal here is not to distinguish between right vs. wrong answers or ideas. Rather, we want to foster discussion about the *"how"* and the *"why"* of water changing from a solid (ice) to a liquid (water).

Accessing Prior Knowledge

Students may also call on knowledge from previous grade levels during this part of the discussion.

- Kindergarten and 1st grade students may mention that all matter has properties, and those properties can be observed.
- 2nd grade students may mention that different kinds of matter exists and can be either solid or liquid depending on the temperature.
- Elementary students (grades 3-5) may mention heating or cooling a substance can cause changes that can be observed. Sometimes these changes are reversible and sometimes they are not.
- Middle or high school students may include that no matter what change in properties occurs, the weight doesn't change. A more sophisticated version of this explanation could sound like "Matter cannot be created nor destroyed; it can only change forms."

All of these connections to ideas and learning opportunities at previous grade levels should be encouraged by asking follow up questions such as:

"Can you tell me more about that?"

"How do you know that?"

What questions do you have?

You can say something like ***"It sounds like we have more questions than answers. What questions do you have about how and why ice melts?"*** Encourage children to ask as many questions as possible that are relevant to the discussion.

Common questions could include:

- Where did the ice go?
- What does ice turn into?
- Is ice the same thing as water?
- Where does the water on the outside of the glass come from?
- Can you turn other liquids into ice besides water?

Pursuing Common Questions

Read the Scientific American article What makes ice melt fastest? (as a family or individually) and complete the extension activity, if you so choose. High school students can engage in this activity independently. Younger students will need more assistance. After reading the article and completing the activity, ask your children the following questions:

- What is one new thing you learned that you didn't know before?
- Which of our original questions did we answer in our discussion and by reading the article?
- What other questions do you have about phase change (how things turn from solid to liquid, liquid to gas, liquid to solid, etc.?

Why does the ice melt faster?

Now that we understand more about how and why ice melts, it makes us wonder other things about phase changes. If you and your children would like to pursue an extension activity connected to this Dinner Table Discussion, check out the Daily Do *Why does the ice melt faster?*

NSTA Collection of Resources for Today's Daily Do

NSTA has created a *What happened to our ice?* collection of resources to support teachers and families using this task. If you're an NSTA member, you can add this collection to your library by clicking ADD TO MY LIBRARY located near the top of the page (at right in the blue box).

What Are Dinner Table Discussions (DTD's)?

This activity is called a Dinner Table Discussion (DTD). Dinner Table Discussions do not have to physically happen at the dinner table. Rather, they are intended to facilitate connections for the family around a discussion about science ideas wherever you may congregate for a meal. Whether you cook dinner at home or order take-out, the Dinner Table Discussions are centered around relevant science phenomena and raise common questions children have about the world around them. The goals of DTD's are to:

(1) Foster connection among the family through discussion of relevant science ideas.

(2) Prompt students and their families to think about what they currently know.

(3) Help students and their families ask what they want to know more about.

(4) Discover something new that moves everyone along the learning continuum of a particular science idea.

Like Daily Do's, these types of activities are considered "micro-learning experiences". They are not intended to replace classroom science learning, and are not intended to be used as "home school" stand-alone science lessons. They are not intended to result in being able to generate robust, complete scientific explanations of phenomena. Conversely, they are intended to move student thinking along the continuum of learning.

These are intended to be family-style discussions, with provided parent talk-moves, that stimulate thinking among family members and move everyone along the continuum of learning. Each dinner table discussion has these components to them linked below. These components provide fertile ground for the discussion to be authentic, phenomena-driven, rooted in science, and focused on **sensemaking**.

Dinner Table Discussion - Guidance for Families

Dinner Table Discussions have three main components. The following guidance will support you in facilitating your family discussion.

Introducing the Phenomena & Raising the Question

Our goal is to raise a puzzling question for students that does three things: (1) prompts them to think about what they currently know, (2) makes them ask what they want to know more about, and (3) helps them discover something new that moves them along the learning continuum.

Tell me what you know....

We want to foster children explaining what they think they understand to be true. These previous understandings are critical to exposing what they know and the questions they have. As they work to explain their current understandings, they will realize they don't know as much as they think, which will spur the generation of further questions.

What questions do you have?

In developing insufficient explanations for things, students generate authentic questions they have that are the pathway to discovering the answer. In other words, these are our explanatory questions. That, if we were able to investigate, we would understand more about what we currently don't understand. Our goal here is to generate lots of questions, but anticipate the common ones. The common questions are central to developing an explanatory idea, and we want to foster that environment by giving adult family members discussion prompts (talk moves) to facilitate the discussion for students as they work to articulate what they want to know more about.

Pursuing Common Questions

Our goal here is not to develop a robust and complete scientific understanding of a particular phenomenon. However, our goal is to help students/children understand a puzzling phenomenon more deeply than they do. Learning is a continuum, and our goal with these discussions are to move students further along the continuum; not get them to the end. The objective is to stimulate thoughtful discussion that is rooted in a scientific phenomenon and a scientific explanation.